“I’m very much a walker”: Elderly women, walking and ageing well

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Abstract

Walking offers a plethora of health and functional benefits to elderly women (defined as women aged 75 years and over). This thesis proposes, however, that walking outside the home can potentially make a much broader contribution to elderly women ageing well, in addition to the accepted health and functional benefits. A mixed methods research design is used to explore this proposition in greater detail. The quantitative component of the research employed nationally representative data sets from Australian cross-sectional and longitudinal surveys and the qualitative component used semi-structured interviews to explore the meaning and experience of walking among elderly women who self-identified as regular walkers in Canberra, Australia.

The quantitative findings are reported in three separate papers and the qualitative findings are reported in a separate chapter in the thesis. As part of the mixed methods approach, the findings from all sources were integrated and analysed and are summarised below.

1. Elderly women who live alone (48% in 2014-15) were more likely to walk than those who lived with others, and walking as little as one hour per week (i.e., less than the current recommendation of 150 minutes per week) contributed to maintaining mobility as elderly women aged. Walking had no effect on driving status, although experience as an elderly walker may play a role in easing the transition to cessation of driving.

2. Cardiovascular disease and diabetes, despite their high prevalence in elderly women (71% had one or both in 2014-15), did not reduce the likelihood of walking as older women aged. Health improvement or opportunities to socialise were not strong motivators to walk among the elderly women interviewed; whereas habit and pleasure may be more important.

3. The habit, derived from many years of prior walking, and the pleasure of walking appeared to mitigate neighbourhood barriers (such as low density suburban design, and hilly and uneven terrain) and fear of falling among elderly women who regularly walked.
Drawing on the integrated findings, as well as models of positive ageing described in the literature, and selected theories of ageing and theories of health behaviour, a psychosocial model of the contribution of walking to elderly women ageing well was developed. The conceptual model proposes that:

Regular walking has the potential to enable elderly women to age well through:
- enhancing neighbourhood connectedness (both social and environmental), fostering independence through maintaining mobility, facilitating walking capability, and, for some, continuing their identities as walkers as they age.

The findings from the individual research projects make an original contribution to knowledge, and the development of a conceptual model that captures the psycho-social elements of walking to elderly women ageing well contributes to policy development. The main contribution to public health practice is not new but emphasises the need to encourage older women to walk in their neighbourhoods, and elsewhere, before they become elderly women. A habit of walking established at a younger age provides the means to overcome the inevitable challenges of walking as one ages, while also offering a source of pleasure and a means of transport, in addition to the numerous established health and functional benefits.
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<tr>
<td>ABS</td>
<td>Australian Bureau of Statistics</td>
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<tr>
<td>ACT</td>
<td>Australian Capital Territory</td>
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<td>ALSWH</td>
<td>Australian Longitudinal Study on Women's Health</td>
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<td>BMI</td>
<td>Body Mass Index</td>
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<td>CVD</td>
<td>Cardiovascular disease</td>
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<td>HREC</td>
<td>Human Research Ethics Committee</td>
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<td>IPA</td>
<td>Interpretive Phenomenological Analysis</td>
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<tr>
<td>NHS</td>
<td>National Health Survey</td>
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<td>NNPAS</td>
<td>National Nutrition and Physical Activity Survey</td>
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<tr>
<td>U.K.</td>
<td>United Kingdom</td>
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<td>U.S.</td>
<td>United States of America</td>
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<td>WfE</td>
<td>Walking for exercise</td>
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<td>WfP</td>
<td>Walking for pleasure</td>
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<td>WfT</td>
<td>Walking for transport</td>
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<td>WHO</td>
<td>World Health Organization</td>
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Chapter 1: Introduction

Walking.....requires no special talents or equipment; it is inexpensive, safe, feasible, accessible, convenient, readily modifiable, and thus practical.
(Tudor-Locke, 2012, p. 540)

Just about everyone walks every day with little thought given to its importance in our lives. Walking is the means by which we navigate our homes and engage in everyday activities, accumulating thousands of steps each day with little effort. Walking is good for health at any age (Morris & Hardman, 1997) and has been described as the “perfect preventive medicine” (Tudor-Locke, 2012, p. 540). Walking is the most basic means of mobility but to older adults, in particular, the frail elderly, walking can be a challenging daily task. Thus, maintaining the ability to walk for as long as possible throughout old age is fundamental to the ongoing health and independence of older adults, and is an important contributor to ageing well.

1.1 Thesis statement and key research questions

Ageing is inevitable, but ageing well much less so. At the individual level, ageing is commonly associated with loss, change, diminution and limitation whereas ageing well potentially slows, lessens, mutes and enriches the ageing experience. This thesis proposes that walking, as distinct from participation in other physical activity, may assist elderly women to age well. In this thesis, the term ‘ageing well’ includes not only physical and mental health but also the broader experience of ageing well, encompassing adequate mobility, functional independence and psychosocial wellbeing (Anton et al., 2015; Beard et al., 2016; Rowe & Kahn, 1997).

Thus, this thesis examines the statement:

Regular walking outside the home contributes to ageing well among women aged 75 years and over
The following key research questions were developed to investigate the thesis statement:

1. Are there gender differences or changes over time in walking among Australian adults aged 75 years and over?
2. What are the determinants of walking (for any purpose) among elderly women as they age?
3. Does walking predict better mobility in elderly women as they transition from their mid-70s to their late 80s?
4. What is the experience and meaning of walking to women in their mid-70s and older, who self-identify as regular walkers in their neighbourhood?

The justification for the focus on women aged 75 years and over is clarified later in this chapter and is explained in greater detail in Chapter 2. Differences or changes over time in walking between elderly men and women are examined because of the paucity of data on walking in this age group. Once examined, however, the reason for the focus on elderly women instead of elderly men is described in Section 1.4.3. The importance of ageing well at the population level is described in Section 1.3.4 and the rationale for selecting the term ‘ageing well’, when several other terms are also in use, is discussed in greater detail in Chapter 7.

1.2 Terminology

A list of key terms used this thesis is provided in Section 1.7. However, as the distinction between older age groups is a fundamental theme in this thesis, the following terminology is used to clarify differences among age groups.

‘Older adults’, when used in this thesis without reference to a specific age group, refers to persons aged 65 years and over. ‘Elderly people’ refers to persons aged 75 years and over, and the term ‘very elderly’ refers to persons aged 85 years and over. In some epidemiological studies, persons aged 85 years and over have been referred to as the ‘oldest old’ (Baert et al., 2011; Jagger et al., 2011; Sims et al., 2014), but in this thesis the term ‘very elderly’ is used.
1.3 Significance of the research

An examination of the interdependence between elderly women, walking and ageing well is important because of 1) the extent and speed of ageing of the Australian population; 2) the cost and burden of disease and functional decline attributable to physical inactivity; 3) the expected beneficial role of walking in mitigating the burden of disease and functional decline attributable to physical inactivity in older women; and 4) the importance of ageing well at a population level.

1.3.1 Ageing Australian population

Between 1981 and 2011, the proportion of the Australian population aged 75 years and over grew by 171% compared with an increase in the total population of 48% (Hugo, 2013). In 2015, persons aged 75 years and over comprised between 6% and 7% of the Australian population (Australian Bureau of Statistics, 2017b) and in the coming decades, those aged 85 years and over will be the fastest growing age group (Australian Bureau of Statistics, 2013b). Differences in the numbers of older women compared with older men are particularly evident in the very old. In the 2016 census, women comprised 54% of the population aged 65 years and over, but 63% of those aged 85 years and over (Australian Bureau of Statistics, 2017a). However, the gap in the life expectancy between women and men is narrowing. In 2013-2015, life expectancy at birth for females was 84.5 years and for males was 80.4 years, or a gap of 4.1 years compared with 4.8 years in 2003-2005 (Australian Bureau of Statistics, 2016). Nonetheless, the proportion of elderly women is likely to be higher than the proportion of elderly men for many years to come.

1.3.2 Cost and burden of disease and functional decline attributable to physical inactivity

Although the population is ageing, the future old are expected to be better educated and in better health than previous generations (Productivity Commission, 2013). In Australia, data on the cost and burden of disease associated with physical inactivity were not available for the older population, but at a whole of population level physical inactivity was estimated to cost $13.8 billion in 2008 based on estimated healthcare costs, productivity costs and costs due to reduced life expectancy (Medibank Private and KPMG-Econtech, 2008). Worldwide, Lee et al. (2012) estimated that physical
inactivity caused 6-10% of the major chronic diseases of coronary heart disease, type 2 diabetes and breast and colon cancer. While opinions vary on the type, amount and duration of physical activity required to achieve health benefits, there is general agreement that moving from a sedentary lifestyle to one that includes more physical activity, confers considerable health benefits to older adults (Loprinzi et al., 2015).

1.3.3 Role of walking in mitigating the burden of disease and functional decline attributable to physical inactivity in older women

As described in greater detail in Chapter 2, Section 2.4, walking outdoors, independent of other physical activity, has been associated with numerous health and functional benefits for older women. Benefits include, but are not limited to, reduced risk of cardiovascular disease (Manson et al., 2002) and diabetes (Aune et al., 2015), improvement in depressive symptoms (Julien et al., 2015), better health-related quality of life (Heesch et al., 2012) and maintenance of mobility (Simonsick et al., 2005). Thus, walking can assist elderly women to age well by influencing their physical and mental health and their mobility.

1.3.4 The importance of ageing well

Ageing well is important not only to the individual but also to populations. As life expectancy increases, the more people who age well in terms of their physical, psychological and mental health, the lower the economic burden on the health system. This assumption is based on increasing the number of years lived in good or reasonable health and with a quality of life amenable to each individual, while simultaneously shortening the period of morbidity (Beard et al., 2016) and demand for health care that typically occurs at the end of life. Thus, ageing well has considerable implications for society as a whole and increasing participation in physical activity, such as walking, plays a pivotal role in ageing well. This is because physical activity participation can potentially delay the morbidity associated with ageing (Bauman et al., 2016) as well as lower mortality risk particularly among those who are currently inactive (Ekelund et al., 2015; McLaughlin et al., 2011).
1.4 Scope of the research

The research is framed around the selected population group (women aged 75 years and over) and the outcomes of interest (walking for various purposes). This section outlines the scope of the research; greater detail is provided in Chapter 2.

1.4.1 Why ‘walking’ and not all ‘physical activity’?

Walking is a significant contributor to overall physical activity in older adults (Valenti et al., 2016). Walking is egalitarian in nature and can be done by most elderly women as well as those who use a mobility aid to assist walking. Morris and Hardman (1997) highlighted the value of walking as a “gentle start-up for the sedentary, including the inactive immobile elderly” (p. 307). Ogilvie et al. (2007), concluded in their systematic review of interventions to promote walking among adults of all ages that there was “clear evidence” (p. 7) that increased walking is achievable in either the most sedentary or the most motivated of people. Hence, while the value of physical activity to elderly women is not in question, there is considerable scope for increasing participation in walking in this age group, particularly, as considerably less than 50% of elderly Australian women report not walking outside the home (see Section 2.3.1 in Chapter 2).

Thus, walking including the various domains of walking is the outcome of interest in this thesis rather than all physical activity.

1.4.2 Why 75 years and over?

In Australian society, an ‘older adult’ commonly refers to those aged 65 years and above. This reference age is largely historical and reflects socially constructed points in individuals’ lives, such as the age of retirement and eligibility for the old-age pension in Australia. Yet, above 65 years of age, the health and physical function of older adults of similar age can differ markedly and change quickly as one ages – much more so than the health and physical function of younger adults. As such, the physical and mental health, and functional capability of an 85 year old can be, and is likely to be, very different to that of a recently retired 65 year old. For example, based on objectively measured data from the Australian National Nutrition and Physical Activity Survey 2011-12, the proportion of men and women who meet 10,000 steps per day falls substantially from age 75 years and over and the proportion who are sedentary rises substantially.
compared with adults aged 65-74 years (Australian Bureau of Statistics, 2013a). Previous research has also identified the “importance of differentiating between age groups” to improve walking conditions for older adults (Krogstad et al., 2015, p. 259).

Hence, this thesis focuses on the age group 75 years and over rather than including those 65 years and over and, where possible, the findings distinguish between age groups within older age.

### 1.4.3 Why focus on elderly women and not elderly men?

In Australia, walking declines in both men and women around 80 years of age, but more so among women than men (Sims et al., 2014). Compared with men, women aged 80 years and over are also much more likely to have a profound or severe disability (Australian Bureau of Statistics, 2012b). Similar findings have been reported in U.K. studies. Older women in Britain aged 60 years and over reported a greater degree of disability than older men, despite reporting similar levels of self-perceived health status (Arber & Cooper, 1999) and more women in the Newcastle 85+ cohort study needed assistance with daily living than men (Jagger et al., 2011). In the same study Collerton et al. (2009) reported that 85-year-old women had a significantly higher number of diseases and disability scores than men of a similar age. Despite the variability in how men and women age “relatively less is known about the health and well-being of elderly women despite their greater number” (Rapp et al., 2016, p. S100). Hence the paradox of very old age – women live longer than men but with greater disability, ill-health and mobility challenges.

Thus, the population of interest in this thesis is elderly women rather than elderly men, although data on walking among elderly men are included in the initial stage of the research (see Chapter 3) for comparison purposes and to enhance the limited information about walking in elderly men and women, in general.
1.5 Ethical approval

The Human Research Ethics Committee (HREC) at the University of Canberra granted ethical approval for this research in two stages. Stage one sought ethical approval for the quantitative studies included in the thesis. This stage was relatively straightforward because of the use of existing data sources where informed consent by study participants had previously been obtained by the Australian Bureau of Statistics\(^1\) and the University of Queensland\(^2\). Stage one was approved in October 2014 (HREC: 14-226). Stage two sought ethical approval for the qualitative study which involved the author interviewing elderly women in their homes. Because of this, the ethics application included detail about the recruitment and involvement of participants, obtaining informed consent from participants, potential risks and their proposed mitigation, and protection and storage of data. Stage two was approved in March 2016 (HREC: 16-06).

1.6 Methodological approach

This thesis uses a mixed methods study design to examine the key research questions. A mixed methods approach merges the findings from two different analytical perspectives to enhance the depth of the findings and conclusions. The two perspectives are a quantitative analysis that is deductive and a qualitative analysis that is inductive. This approach aims to “draw from the strengths and minimize the weaknesses” of either quantitative or qualitative research when conducted in isolation (Johnson & Onwuegbuzie, 2004, p. 15). Thus, the approach facilitates a deeper interpretation of the merged findings as the limitations of each type of research are partially overcome by the complementarity of the other.

1.6.1. Why choose mixed methods

A mixed methods research design was chosen for pragmatic as well as epistemological reasons. The pragmatic reasons were: 1) the author’s interest in mixed methods research; and 2) the availability of several national high quality empirical data sets that

\(^1\) The Australian Bureau of Statistics is the data custodian for the National Health Surveys (2007-08 and 2014-15) and the National Nutrition and Physical Activity Survey 2011-12.

\(^2\) The University of Queensland, Australia, is the data custodian for the Australian Longitudinal Study on Women’s Health.
included variables of direct relevance to the research questions. In addition, direct engagement with elderly women, as part of the qualitative research, would enable collection of detailed data not available in the empirical data sets. The epistemological reasons derive from the anticipated depth of understanding that is possible from merging the objective findings with the rich detail obtained from personal accounts.

1.6.2 Support for a mixed methods approach in health research

A mixed methods approach to the investigation of health behaviour is supported by Glanz et al. (2008, p. 515) and by Kelley-Moore and Lin (2012) to explore the heterogeneity of lived experience among ageing populations. A mixed methods approach was used in the study by Krogstad et al. (2015) who found that “combining quantitative and qualitative data gave deeper insights into how elders perceived their walking environment” (p. 1).

1.6.3 Mixed methods approach employed in this thesis

Creswell (2014) described several mixed methods research designs. This thesis used a sequential mixed methods design. The approach usually involves collecting qualitative data on the same (or a sub-sample of) study participants in the quantitative component (Creswell, 2014, p. 224). However, this thesis used empirical data from nationally representative datasets, and combined the findings with data from individuals in the qualitative study. This approach enabled the findings from the quantitative studies to be generalised to in-scope elderly women in the qualitative study. In turn, the findings from the qualitative study provided experiential descriptions of walking to enhance the findings from the comparatively limited number of variables available in the quantitative studies. The mixed methods approach adopted was flexible and allowed for reflection between and during the phases. As a result, the findings from the quantitative phase informed but did not entirely drive the qualitative research. Quantitative findings are reported in a series of three papers completed as part of this thesis (see Table 1.1).
Table 1.1 Papers completed as part of this thesis

**Paper 1**
Cardiovascular disease and diabetes are not barriers to walking among the very elderly: findings from a national Australian survey (Field et al., 2017a)

*Healthy Ageing Research*
DOI: [http://dx.doi.org/10.1097/HXR.0000000000000011](http://dx.doi.org/10.1097/HXR.0000000000000011)

**Paper 2**
Walking for exercise and walking for transport among Australian adults aged 75 years and over: trends, gender differences and correlates (Field et al. unpublished)
Submitted to *PLoS ONE* [28 March 2017, Manuscript No. PONE-D-17-12338]

**Paper 3**
Walking up to one hour per week maintains mobility as older women age: findings from an Australian longitudinal study (Field et al., 2017b)

*Journal of Aging and Physical Activity*
DOI: [http://dx.doi.org/10.1123/japa.2016-0115](http://dx.doi.org/10.1123/japa.2016-0115)

1.6.4 Integration and interpretation of findings
At all stages of the research, attention was given to the eventual integration and interpretation of the findings. The process of triangulation facilitates the integration of findings into either converging, diverging or complementary results or a combination of these (Östlund et al., 2011). Triangulation was used in this thesis by simultaneously comparing the quantitative and qualitative findings with each other and with the findings from previous studies. In some instances, the quantitative and qualitative findings contributed additional data that were not able to be compared to each other but only to the findings from previous studies, and in other instances, the quantitative and qualitative findings diverged. Integration of findings was undertaken after the three papers describing the quantitative findings were completed and the qualitative findings were analysed.
1.7 Key terms

Following is a list of key terms used throughout this thesis.

‘Baby boomers’ most commonly refers to the cohort of men and women born between 1946 and 1964; a period of high fertility in Australia. The ageing ‘baby boomers’ will contribute substantially to Australia’s ageing population (Australian Bureau of Statistics, 2012b).

Correlates are variables statistically associated with, but do not predict, an outcome (e.g., walking). Correlates are typically identified in epidemiological studies conducted at a single point in time, such as in a cross-sectional design (Bauman et al., 2002).

Determinants are variables that predict an outcome (e.g., walking) because they precede the outcome, such as longitudinal studies where the same individuals are followed up over a period of time. Determinants do not infer causality, however, unless the research includes a comparator group, the findings indicate a strong and consistent dose-response relationship, and the relationship is conceptually plausible (Bauman et al., 2002).

Exercise refers to intentional physical activity.

Mixed methods research combines quantitative and qualitative research methods and integrates their findings in a single study (Creswell, 2014, p. 244).

Mobility refers both to movement of one’s body, such as walking, as well as other forms of mobility, such as riding a bicycle or through motorised means, such as a car or public transport (Webber et al., 2010).

Mobility aid includes walking sticks, walking frames, wheelie walkers and motorised walking aids.

Physical activity refers to any bodily movement produced by skeletal muscles that results in energy expenditure (Casperson et al., 1985).

Walking refers to walking outside the home. While walking inside the home provides additional physical activity, particularly to the house-bound elderly, this thesis focuses on walking outside the home because of the definitions of walking used in existing quantitative data sources and the desire to explore the meaning of walking among elderly women who self-identify as regular walkers in their neighbourhood.
Walking for exercise (WfE) refers to walking outside the home. Walking for exercise may be purposeful, such as for a health benefit, or may be undertaken for leisure.

Walking for transport (WfT) refers to walking outside the home as a means of transport to get to and from places.

1.8 Thesis outline

This thesis comprises eight chapters (see Figure 1.1). Chapter 1 has introduced the key research questions, outlined the methodological approach and provided contextual information for the remaining body of work in this thesis. Chapter 2 reviews the literature about walking among older adults, with a specific focus on older women, and includes an overview of the relevant theoretical perspectives about ageing and health behaviour that inform this thesis. Chapters 3, 4 and 5 describe the methods and findings of the quantitative and qualitative studies completed as part of this thesis. These three chapters address: 1) gender differences in walking among elderly men and women; 2) walking and mobility among elderly women as they age, and 3) the experience and meaning of walking to elderly women who regularly walk in their neighbourhood. Chapters 3 and 4 include the three papers which have been published or submitted for publication (see Table 1.1). Chapter 6 integrates and summarises the findings from the previous three chapters by applying the mixed methods approach. The value of the mixed methods approach in addressing the thesis statement and research questions is demonstrated in this chapter by organising the findings into 1) new findings or findings that were discordant with the literature; 2) findings that were consistent with the literature, but which offered additional insight and 3) findings that supported the literature. Based on the integrated findings from this thesis, Chapter 7 proposes a conceptual model of older women ageing well that is facilitated by walking. The conceptual model reflects the overarching findings from the body of work completed as part of this thesis. Chapter 8 describes practical, methodological and policy contributions, lessons learned and recommendations for future research that emerged from this research.
Figure 1.1 Summary and sequence of completed work as part of this thesis

- **Chapter 2**
  - Literature review

- **Quantitative phase**
  - Cross-sectional studies
  - Chapter 3, Papers 1 and 2

- **Longitudinal study**
  - Australian Longitudinal Study on Women's Health (1999 to 2011)
  - Chapter 4, Paper 3

- **Qualitative phase**
  - Qualitative study
    - Semi-structured interviews + Neighbourhood observation
    - Chapter 5

- **Chapter 6**
  - Integration of quantitative and qualitative findings

- **Chapter 7**
  - Development of a conceptual model of elderly women, walking and ageing well

- **Chapter 8**
  - Conclusion
Chapter 2: Literature review

Walking is the most natural activity and the only sustained dynamic aerobic exercise that is common to everyone except for the seriously disabled or very frail. (Morris & Hardman, 1997, p. 307)

2.1 Introduction

This chapter is a focused, narrative review of the published literature about walking and older women. The review is not intended to be an exhaustive list of all the reference material published on this topic, but the included papers and other references are those considered important in providing the context for this thesis and in identifying opportunities for further scholarly investigation. The review begins with a brief history of walking as a means of providing a context for how society’s views about walking have changed. An historical perspective is particularly relevant to walking and elderly women because women currently aged 75 years and over were children and young adults at a time when few people owned a car and walking was an integral part of their lives. The review then outlines the current situation regarding walking and elderly women, in particular, the decline in walking as older adults’ age, the evidence in support of elderly women walking outdoors and the physical activity recommendations for older adults. Factors that motivate or mitigate older women’s walking are then discussed, followed by an overview of walking and mobility, including the importance of the car as a means of transport among older adults. Theoretical perspectives informing the thesis are then summarised.

Where possible, the review includes studies that focus exclusively on, or report the results for, walking and elderly women. However, because much of the relevant literature includes all physical activity rather than just walking, individual studies (cross-sectional and longitudinal) and reviews (narrative, systematic and meta-analyses) that examine physical activity among older adults have also been included. Also, unless stated otherwise, the studies refer to community-dwelling individuals, not individuals living in institutions, such as aged care homes.
2.2 Brief recent history of walking

A brief recent history of walking in developed countries (primarily Europe and North America) provides the background to the role of walking in everyday life in the relatively recent past. For much of history, having no choice but to walk was emblematic of one’s position in life and was captured in this quote from Joseph A. Amato’s book *On Foot: A History of Walking* (Amato, 2004, p. 11):

> As we see through history, those who had to walk formed the legions of the inferior and less powerful. They went on foot because they couldn’t ride. They were compelled to walk because of the force of circumstances or at the command of others.

By the 19th century, the majority still walked out of necessity but “the upper classes strolled and promenaded for pleasure” (Amato, 2004, pp. 122-123). Rebecca Solnit’s book *Wanderlust The History of Walking* (Solnit, 2001) confined her historical account of walking to a post-industrialised world “when walking ceases to be part of the continuum of experience and instead became something consciously chosen” (Solnit, 2001, p. 267). She considered that the “golden age of walking” peaked around the start of the 20th century “when Europeans and North Americans were as likely to make a date for a walk as for a drink or a meal” (Solnit, 2001, p. 249). She also referred to many thinkers, writers, poets, philosophers and artists, who walked to think, to compose, to reflect, to seek solitude and to be in nature. Walking was sustenance for the mind as well as the body. Regarding women and walking she discussed the restraints women had in walking alone and after dark, as well as their often inappropriate attire restricting bodily movement.

Solnit referred to Henry David Thoreau, who wrote his philosophic essay *Walking*, in 1851. He wrote that his walks always led him to Nature, most notably, wild places where the “landscape was not owned” (Thoreau, 2010, p. 10). Thoreau often walked, usually alone, was never in a hurry and could walk for many miles without seeing another person – the average urban dweller today can only dream of such time and space in which to walk.
In the book *A Philosophy of Walking* (Gros, 2015), the author reflected on the simplicity and repetition of the act of walking; on going outside to walk; on walking slowly and “cleaving perfectly to time” (Gros, 2015, p. 37); on pilgrimages, long rambles, urban strolls and garden walks; on the pleasure, joy, happiness and serenity in the experience of walking; and on walking to stimulate the mind and energise the body. Gros (2015, p. 92), wrote that Thoreau considered walking as symbolic of his frugal way of living at a time in the mid-19th century when industrialisation was expanding and consuming natural landscapes with it. Solnit (2001), Amato (2004) and Gros (2015) each referred to the poet Wordsworth as an influential walker. In 1791, Wordsworth was the first to use the word “pedestrian” (Amato, 2004, p. 123) and in the early 19th century, Wordsworth described walking as “a poetic act, a communion with Nature, fulfilment of the body, contemplation of the landscape” (Gros, 2015, p. 209).

These descriptions of walking in recent history rarely mention walking in older age. One reason for this omission is that life expectancy was decades younger a century ago in most developed countries – even Thoreau, despite his extensive walking, died at the age of 44 years from tuberculosis. But these historical accounts of walking do illustrate the extent to which walking was integral to everyday life while also being an extension of artistic and reflective ways of living as well as a source of pleasure, for those able to participate in such activities.

### 2.3 Walking in older age

Today, in developed countries, walking is often a choice rather than a necessity for the majority of adults. People can choose to walk for different purposes, such as walking for exercise (WfE) or walking for transport (WfT). WfE includes purposeful walking to achieve a health benefit as well as strolling and hiking. WfT can be purposeful or incidental and refers to walking to get to and from places. These two domains are the distinctions made by researchers and policy makers, and the distinction is made in this thesis, although for those who regularly walk, walking for different purposes may not be as evident.
2.3.1 Prevalence of walking in older age

Estimates of the prevalence of WfE and WfT from the 2007-08 NHS (Australian Bureau of Statistics, 2011), indicate that 36% of men and 31% of women aged 75 years and over reported walking for exercise in the previous week. A higher proportion of persons in this age group reported walking for transport (47% of men and 44% of women). In the 2011-12 National Health Survey, WfE and WfT were not reported by gender, but among those aged 75 years and over, 28% walked for exercise, and 41% walked for transport (Australian Bureau of Statistics, 2013a); suggesting that participation in both WfE and WfT fell between these two survey periods. In 2011-12, the average duration of walking in the previous week, among adults aged 75 years and over who walked, was 56 minutes of WfE and 53 minutes of WfT. By contrast, the average time spent doing moderate physical activity (excluding walking) was 25 minutes and doing vigorous physical activity was 7 minutes (Australian Bureau of Statistics, 2013a). A recent review reported gender differences in participation in some domains of walking, including for leisure, and that age influenced these gender differences (Pollard & Wagnild, 2017). The authors concluded that more research is needed on “how walking fits into the lives of women and men across the life-course, especially in relation to gender differences in the impact of aging on walking” (Pollard & Wagnild, 2017, p. 1).

2.3.2 Decline in walking in older age

Not unexpectedly, physical activity (including walking), declines with age in both men and women, particularly after the age of 60 years (Schrack et al., 2013), although the pattern of decline is less clear in older and elderly women compared with men in this age group. Analysis of cross-sectional data from a large sample of older Australian adults (Sims et al., 2014) indicated that the duration of walking among those who walked remained relatively stable between 65-79 years of age for men, but increased in women, and from 80 years of age decreased in both men and women. Mean time spent walking among women aged 80 years and over, however, was similar to that of women aged 65-69 years (Sims et al., 2014). Once women are in their 80s, the decline appears to be consistent. Analysis of data from the Australian Longitudinal Study on Women’s
Health (ALSWH\(^3\)) showed a decline in walking and physical activity over a six-year period, when study participants were aged between 76-81 years and 82-87 years (Heesch et al., 2012). During this time, self-reported walking declined from 38% to 30% and participation in walking plus moderate/vigorous physical activity declined from 20% to 15%.

In addition to declining walking and physical activity with increasing age, functional ability also declines with age (Jacobs et al., 2012); albeit at varying rates depending on functional ability earlier in life (Peeters et al., 2013). One factor potentially contributing to the greater decline in walking among older women is the higher prevalence of arthritis among women aged 75 years and over (60%) than men (42%) (Australian Bureau of Statistics, 2012a). Although women live longer than men, women experience greater disability\(^4\) than men of a similar age (Australian Bureau of Statistics, 2012b). By contrast, men in this age group experience a higher prevalence of type 2 diabetes and heart, stroke and vascular diseases than women (Australian Bureau of Statistics, 2012a).

Stereotyping and ageist attitudes about the apparent need to slow down with age may also contribute to a decline in walking outdoors. In a study involving community-dwelling older women, pressure from friends, family and the broader community to sit and rest increased their sedentary behaviour (Chastin et al., 2014). Alternatively, older individuals themselves may feel as though they are already active enough through their involvement in family, social and community life. In a qualitative study in New Zealand involving adults aged 70-83 years who were attempting to increase their physical activity levels (Grant, 2008), the majority discontinued their exercise program because, compared with other aspects of their lives, physical activity was less important. The participants, including 17 women, reported that they felt quite healthy living their lives as they were and had little motivation to change at their age.

\(^3\) The ALSWH is a longitudinal study involving three cohorts of women. The older cohort, born between 1921 and 1926, was aged 70-75 years when the study began in 1996. Thereafter, the women were surveyed every three years: in 1999, 2002, 2005, 2008 and 2011.

\(^4\) The 2011 census included a question on needing assistance with everyday life, such as physical mobility and self-care. Responses to the question were used to determine the presence of ‘profound or severe disability’.
2.4 Why should older women walk outdoors?

Based on epidemiological evidence, walking outdoors is associated with numerous benefits for older women, including reduced risk of some chronic diseases, cognitive impairment and mortality, and improved health-related quality of life and physical function, and maintenance of mobility. The effect of walking on mental health and falls is mixed. The following section outlines the evidence underpinning the benefits of walking to older women.

2.4.1 Reduced risk of some chronic diseases

Morris and Hardman (1997) noted the abundant health benefits of walking, but in particular as a preventive measure against cardiovascular disease and type 2 diabetes. Recent studies and reviews provide ongoing support for this conclusion. In a prospective study of older women aged 50 to 79 years who were free of cardiovascular disease at baseline, walking was similar to vigorous exercise in reducing the risk of cardiovascular disease (Manson et al., 2002). In a narrative review of the literature, Brown et al. (2007) concluded that one hour of moderate-intensity physical activity per week, such as walking, might reduce the risk of cardiovascular disease and diabetes by 20% to 50% in middle-aged and older women. In systematic reviews of prospective studies, walking was associated with a significant reduction in the risk of type 2 diabetes (Aune et al., 2015) and in studies involving predominantly older women, walking significantly reduced the risk of cardiovascular disease (Hamer & Chida, 2008).

The effect of walking on stroke and arthritis in older adults has also been examined. In a prospective U.K. study of older men (11 years of follow-up), duration of walking reduced the risk of stroke independent of walking pace (Jefferis et al., 2014), although no comparable study has been undertaken for older women. Findings from a longitudinal study of elderly women show that physical activity, including walking, was associated with reduced risk of arthritis (Heesch & Brown, 2008).

2.4.2 Reduced risk of cognitive impairment, but mixed effects on mental health

The benefits of walking by older adults also extend to reduced risk of cognitive impairment. In a systematic review and meta-analysis, walking significantly improved executive functioning in sedentary older adults without cognitive impairment, but not in
those with cognitive impairment (Scherder et al., 2014). Similarly, Stephen et al. (2017) in their systematic review of 24 prospective and intervention studies found that leisure-time physical activity was protective against Alzheimer's Disease, although the authors concluded that specific recommendations about the type (e.g., walking), duration and intensity of physical activity could not be identified from their review.

In cross-sectional and intervention studies, walking is associated with improved mental health but the evidence is less conclusive in prospective studies. In a study of health-related behaviours in older adults, moderate to high (but not very high) levels of walking were associated with lower depressive symptoms (Julien et al., 2015) and in a Swedish study of 75 year olds (Hörder et al., 2013), regular walking was associated with better emotional role functioning in women (e.g., participation in regular activities due to feeling depressed or anxious). In an intervention study, walking enhanced the ‘mental aspect of health-related quality of life’ in older adults compared to a non-aerobic intervention, particularly among those whose baseline physical activity levels were low (Awick et al., 2015). However, walking did not predict improved mental health in a longitudinal study of elderly women (Heesch et al., 2012).

2.4.3 Improved health-related quality of life

While the effect of walking on mental health appears to be mixed, its effect on quality of life measures in older women (and older adults) is positive, although to varying degrees. Walking, independent of any other physical activity, predicted better health-related quality of life among older women (ranging in age from 76 to 87 years) over a six year period (Heesch et al., 2012). The authors showed that self-reported components of physical health (such as bodily pain, physical functioning and general health perception) improved with increasing levels of walking up to the recommended amount (150 minutes per week). The most gains occurred in those doing 200-300 minutes of walking per week, but some walking (<60 minutes per week) also resulted in “meaningful improvements in physical functioning and vitality” (Heesch et al., 2012, p. 670). Regular walking had a positive effect on role limitations due to physical

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5 The mental aspect of health-related quality of life is based on a score of 1 to 100; a higher score indicating better health status. The mean score for mental health status in this population of older adults was 52.3 (Awick et al. 2015).
problems and general health perception among 75 year old Swedish women (Hörder et al., 2013) and in the intervention study by Awick et al. (2015), walking improved the global quality of life of older adults.

2.4.4 Mixed association with falls

Falls in the elderly are a major source of morbidity and hospitalisations in Australia (Australian Institute of Health and Welfare, 2014). The association between walking, most notably walking outdoors, and falls is mixed. In a systematic review and meta-analysis (Sherrington et al., 2008), exercise programs that excluded walking, such as balance training were more effective at reducing the incidence of falls. However, the findings from individual studies differ. In a study of adults aged 45 years and over, participation in physical activity, in particular walking, was associated with a greater incidence of falling (Li et al., 2006). In a Japanese study of adults aged 65 to 79 years living in the community, walking was more effective at reducing falls than balance training, although walking increased the risk of tripping (Okubo et al., 2015). However, walking outdoors did not prevent falls in older adults aged 65 years and over compared with a control group in a home-based walking program (Voukelatos et al., 2015).

Because of the higher risk of falling while walking outdoors, fear of falling has been identified as a barrier to physical activity among older adults (Baert et al., 2011). Fear of falling is also higher among older women aged 65 years and over than men, and is high among those who have never fallen (Liu, 2015). In a qualitative study, both older men and women expressed their concern about falling, but older women took more precautions to avoid falling than older men (Johnson et al., 2016). Fear of falling was also not associated with walking frequency among older adults aged 60 years and over (Ory et al., 2016). Nonetheless, older men and women who fell frequently were also less likely to walk (Stahl & Albert, 2015).

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6 Role limitations due to physical problems refer to restrictions in participation in usual activities due to physical health.
2.4.5 Improved physical function (including mobility)

In prospective studies, increased physical activity, including walking, was associated with better functional status as older women age (Brach et al., 2003) and walking maintained mobility over a 12 month period in functionally limited older women (Simonsick et al., 2005). In an intervention study, structured physical activity was shown to improve mobility impairment (inability to walk 400 m independently) in community-dwelling older adults with pre-existing mobility impairment (Pahor et al., 2014). In a longitudinal study of older women, Peeters et al. (2013) observed a dose-response effect of physical activity on the disability threshold7. On average, among those who participated in moderate activity, such as daily walking when aged 70-75 years, the disability threshold was delayed until 80.5 years compared with 70 years among those classified as physically inactive (Peeters et al., 2013).

Little evidence of the benefit of daily step counts to physical function in older adults exists although the recommendation that some activity is better than none prevails. In a Japanese study involving older women aged 60 years and over (Osuka et al., 2014) just under 6,000 steps of habitual activity per day predicted increased ‘mobility limitation’8 but above this cut-point, the risk to mobility reduced substantially. The authors surmised that the cumulative effects of this low level of daily walking resulted in “changes in muscle mass and mobility-related physical performance” (Osuka et al., 2014, p. 135) which increased the risk of mobility limitations. Furthermore, chronic inactivity among older adults “might result in reduced ability to adapt walking function” to a variety of everyday circumstances (Cavanaugh et al., 2010, p. 201).

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7 In Peeters et al. (2013), a participant reached the ‘disability threshold’ if they responded ‘yes’ to needing help with just one of a range of daily activities, such as bathing, eating, walking indoors or doing light or heavy housework.

8 ‘Mobility limitation’ was identified based on the participant’s self-reported ability to walk a quarter of a mile or walk up 10 steps without resting.
2.4.6 Reduced mortality (from all causes)

In a systematic review of prospective studies, walking was associated with a significant reduction in all-cause mortality in studies involving predominantly older women (Hamer & Chida, 2008). More recently, in a study using objective measurement of daily walking among an older German population (>65 years), walking duration was inversely associated with mortality risk over four years of follow-up (Klenk et al., 2016). The majority of studies, however, have examined the effect of physical activity on mortality. In a prospective study of older women, physical activity, including walking, reduced mortality risk (Mutikainen et al., 2011). Several studies have reported that physical activity may have a greater effect on reducing mortality risk in older women (70 years and over) than in older men (Flicker et al., 2010; Martínez-Gómez et al., 2014; McLaughlin et al., 2011). Further, the frequency of physical activity may have a greater effect on mortality in the very old (80 years and over) compared with middle-aged adults (Brown et al., 2013). Irrespective of these age and gender variations, findings from a longitudinal study covering a period of 10-12 years, showed that just 15 minutes per day (or 75 minutes per week) of moderate or vigorous physical activity was associated with reduced mortality risk (Hupin et al., 2016).

2.5 Physical activity recommendations for older adults

Sims et al. (2010) developed the first recommendations for physical activity and older Australians aged 65 years and over (see Table 2.1), although in 2005 an advisory brochure on physical activity and older adults was released (Australian Government Department of Health, 2005). The recommendations applied to older people “across all levels of health and have application to community-dwelling people and those in residential care accommodation” (Sims et al., 2010, p. 81). Australian recommendations are similar to the WHO physical activity recommendations for adults aged 65 years and over (World Health Organization, 2010), although the latter are somewhat more prescriptive about the total amount of physical activity recommended per week (150 minutes of moderate intensity activity) and recommend minimum bouts of activity of 10 minutes or more.
Table 2.1: Physical activity recommendations for older Australians

<p>| | |</p>
<table>
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<tr>
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<tbody>
<tr>
<td>1.</td>
<td>Older people should do some form of physical activity, no matter what their age, weight, health problems or abilities.</td>
</tr>
<tr>
<td>2.</td>
<td>Older people should be active every day in as many ways as possible, doing a range of physical activities that incorporate fitness, strength, balance and flexibility.</td>
</tr>
<tr>
<td>3.</td>
<td>Older people should accumulate at least 30 minutes of moderate intensity physical activity on most, preferably all, days.</td>
</tr>
<tr>
<td>4.</td>
<td>Older people who have stopped physical activity, or who are starting a new physical activity, should start at a level that is easily manageable and gradually build up the recommended amount, type and frequency of activity.</td>
</tr>
<tr>
<td>5.</td>
<td>Older people who have enjoyed a lifetime of vigorous physical activity should continue to participate at this level in a manner suited to their capability into later life, provided recommended safety procedures and guidelines are adhered to.</td>
</tr>
</tbody>
</table>

Source: Sims et al. (2010, p. 83)

More recently, Bauman et al. (2016) highlighted the need to move beyond the importance of physical activity in older adults for prevention and treatment of chronic diseases to include a focus on the role of physical activity in reducing frailty and dependence.

2.5.1 Short bouts of walking confer health benefits

Blair et al. (1992, p. 115), recommended that three ten minute walks accumulated throughout the day was sufficient to achieve health and functional benefits. This recommendation contrasted with the previous recommendation of vigorous physical activity, three times per week for 20 minutes duration with the assumption that a lesser amount was insufficient to achieve a health benefit. Thus, moderate intensity physical activity, such as walking, accumulated in short bouts throughout the day emerged as a public health recommendation that could be achieved by a substantial proportion of the population. This recommendation remains today (Garber et al., 2011), although for older adults, in particular, doing some activity rather than none, is also recommended and is associated with health benefits (Brown et al., 2005; Sims et al., 2010). The

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9 The recommendation by Blair et al. (1992) was based on a randomised clinical trial involving middle-aged men that found that three 10 minute bouts of moderate-intensity exercise spaced at least four hours apart resulted in a similar training effect to a comparative group doing 30 minutes of exercise per day at a similar exercise intensity (DeBusk et al., 1990).

10 The recommendation for vigorous activity was made by the American College of Sports Medicine (American College of Sports Medicine, 1990).
benefits of short bouts of exercise of less than 10 minutes, but accumulating at least 30 minutes per day, were tested in adults aged 18-85 years using data from the U.S. National Health and Nutrition Examination Survey (Loprinzi & Cardinal, 2013). The study found favourable effects on metabolic syndrome, low-density lipoprotein (LDL) cholesterol, triglycerides and body mass index from this level and pattern of activity.

### 2.5.2 How many steps per day to achieve a health benefit?

The number of steps per day has also been aligned with health benefits, although for all adults, rather than older adults, exclusively. Tudor-Locke and Bassett Jr (2004), first proposed that 10,000 steps per day was an appropriate estimate of activity for adults to achieve a health benefit. They considered that up to 5,000 steps per day was consistent with a sedentary lifestyle but between these two cut points, 7,500 to 10,000 steps per day (or somewhat active), was also associated with health benefits in adults (Sugiura et al., 2002; Tudor-Locke et al., 2008)\textsuperscript{11}. Thus, these authors shifted the focus from duration and intensity in single bouts of physical activity, to accumulated activity measured in terms of steps per day.

### 2.6 What factors motivate or mitigate older women’s walking

Numerous motivators and barriers to physical activity participation among older women have been studied, although many do not distinguish between walking and other physical activity, nor is a distinction made between the findings from older men and women when both sexes are included in a study. In broad terms, the correlates and predictors of walking that have been studied include socio-demographic characteristics, health and disability status, cardiovascular disease risk factor status, and social, psychological and environmental factors. Most studies have examined several of these factors simultaneously and often confuse correlates (or associations) with predictors (or determinants).

\textsuperscript{11}The two papers by Tudor-Locke et al. (2004, 2008) focused on adults aged 20-64 years; although the cited papers do refer to older adults aged 65 years and over.
2.6.1 Individual factors

Several cross-sectional studies have investigated multiple potential correlates of physical activity and walking among older adults, although all the studies include adults younger than 75 years (Table 2.2). While older women in these studies generally had lower levels of physical activity compared with older men, in one study involving men and women aged 45-70 years, women reported higher levels of physical activity than men (Mesters et al., 2014). Differences in the findings between these studies are due in part to differences in the age group considered, the outcome of interest and measurement of the outcome variable (whether objective or subjective). Furthermore, Mesters et al. (2014) noted that despite the identification of numerous significant correlates, their final model only explained 25% of the variance in physical activity.

In other studies investigating specific correlates of walking and physical activity, dog ownership was associated with increased walking in a large study of post-menopausal women, particularly among those who lived alone (Garcia et al., 2015). Older adults who regularly walked a dog also felt more connected to their neighbourhood (Toohey et al., 2013). Among older women, major life events (such as personal illness or surgery and moving into institutionalised care) predicted reduced physical activity, including walking (Brown et al., 2009). In a qualitative study, older adults reported walking outdoors to maintain/improve health; for transport (to get to destinations or to public transport); for social reasons (to visit family, friends and neighbours); and because they owned a dog (Hanson et al., 2013).
## Table 2.2: Socio-demographic, health, disability, risk factor and psychological correlates of physical activity (including walking) in middle-aged and older adults

<table>
<thead>
<tr>
<th>Correlates</th>
<th>Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Older age</td>
<td>▼ (75+)</td>
</tr>
<tr>
<td>Women</td>
<td>–</td>
</tr>
<tr>
<td>Married/common law</td>
<td>▲</td>
</tr>
<tr>
<td>Living alone</td>
<td>–</td>
</tr>
<tr>
<td>Living in senior's housing</td>
<td>▼</td>
</tr>
<tr>
<td>Higher education</td>
<td>– (80+)</td>
</tr>
<tr>
<td>Higher income</td>
<td>▲</td>
</tr>
<tr>
<td><strong>Health status</strong></td>
<td></td>
</tr>
<tr>
<td>Poorer self-reported health</td>
<td>▼</td>
</tr>
<tr>
<td>Poorer mental health</td>
<td>–</td>
</tr>
<tr>
<td>Longstanding illness</td>
<td>–</td>
</tr>
<tr>
<td>Number of chronic diseases</td>
<td>–</td>
</tr>
<tr>
<td>Stroke (yes)</td>
<td>–</td>
</tr>
<tr>
<td>Diabetes (yes)</td>
<td>▼</td>
</tr>
<tr>
<td>Arthritis/musculoskeletal conditions (yes)</td>
<td>–</td>
</tr>
<tr>
<td>Fall in last year</td>
<td>–</td>
</tr>
<tr>
<td>Medication use</td>
<td>– (≥4)</td>
</tr>
<tr>
<td>Pain</td>
<td>–</td>
</tr>
<tr>
<td><strong>Disability</strong></td>
<td></td>
</tr>
<tr>
<td>Moderate/severe disability</td>
<td>▼</td>
</tr>
<tr>
<td>Mobility aid</td>
<td>–</td>
</tr>
<tr>
<td><strong>Risk factors for cardiovascular disease</strong></td>
<td></td>
</tr>
<tr>
<td>Overweight or obese</td>
<td>▼</td>
</tr>
<tr>
<td>Higher waist circumference</td>
<td>–</td>
</tr>
<tr>
<td>Smoking</td>
<td>–</td>
</tr>
<tr>
<td><strong>Psychological and cognitive factors</strong></td>
<td></td>
</tr>
<tr>
<td>Higher exercise self-efficacy</td>
<td>▲</td>
</tr>
<tr>
<td>Higher perceived exercise control</td>
<td>▲</td>
</tr>
<tr>
<td>More positive attitudes towards exercise</td>
<td>▲</td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td>–</td>
</tr>
<tr>
<td>Loneliness</td>
<td>–</td>
</tr>
<tr>
<td>No exercise habit</td>
<td>–</td>
</tr>
</tbody>
</table>

▼ – significantly worse; ▲ – significantly better; – - no effect; empty cells indicate that the correlate was not included in the study.

Harris et al. (2009) – U.K. study, 65 years and over, physical activity, objectively measured (n=238)
Chad et al. (2005) – Canada, 50 years and over, mainly women, physical activity (n=764); some findings are shown for those aged 80+
Mesters et al. (2014) – Netherlands, 45-70 years, physical activity (n=2,881)
Ory et al. (2016) – U.S., 60 years and over, frequency of walking (n=272)
2.6.2 Self-efficacy

Several studies have focused on self-efficacy for walking among older adults. Self-efficacy encompasses prior experience and mastery of an activity which in turn facilitates confidence to continue performing the activity. (See Section 2.8.2 for further discussion about self-efficacy theory). In an exploratory study, older women with lower self-efficacy were less likely to achieve 10,000 steps per day (Hall & McAuley, 2010). In an intervention study by Findorff et al. (2007), older women (70 years and over) who were assigned 30 minutes of walking per day, five days per week, plus balance exercises twice per week, were more likely to maintain their new exercise habits after one year than the control group who received information about health topics of interest to older women but excluded advice about exercise. The authors attributed continuing with the exercise program to those women’s self-efficacy. Factors that influence self-efficacy for walking may also differ between older men and women. Gallagher et al. (2014), examined individual and neighbourhood factors associated with walking in older men and women (60-99 years). While self-efficacy for walking was important to both men and women, overcoming individual barriers to physical activity was more important to women, whereas overcoming neighbourhood barriers was more important to men.

2.6.3 Opportunities to socialise

Opportunities to socialise also play a role in walking participation among older adults, although the association is not universal. Bird et al. (2010), studied walking among a culturally diverse older population (60 years and over) in Melbourne, Australia and concluded that opportunities to socialise, such as group walking, were important, although there was considerable variation based on ethnicity and gender within the sample. In another Australian study in Perth, opportunities to socialise emerged as a reason for walking among older adults (Nathan et al., 2012). However, in a study of walking in older adults in the U.S., having someone to walk with was not associated with walking frequency or walking for 150 minutes or more per week (Ory et al., 2016).
2.6.4 Physical environment

The physical environment as a barrier or motivator to walking in adults of all ages (both WfE and WfT) has been investigated extensively in the last 10-15 years. Elements of the built environment which have been studied include:

- Walkability (street connectivity, mixed land use, housing/urban density);
- Walking facilities (footpath quality, pedestrian crossings);
- Access and distance to parks and recreation facilities, shops, services, seating, public transport connections;
- Traffic (volume, noise, behaviour of road users);
- Safety (from crime, familiarity, lighting, presence of other persons, fear of falling);
- Aesthetics (buildings, trees, noise and smell, openness, maintenance of public spaces, litter, vandalism); and
- Terrain (flat or hilly).

(Barr et al., 2016; Cain et al., 2014; Frank et al., 2006; Glicksman et al., 2013; Hall & McAuley, 2010; Lee & Moudon, 2006; McCormack et al., 2010; Moran et al., 2016; Owen et al., 2004; Saelens & Handy, 2008; Van Cauwenberg et al., 2012).

The importance of these environmental elements to walking among older adults has been less extensively studied compared with research undertaken in younger and middle-aged adults (up to 64 years). It is likely that their relative importance as a barrier or facilitator of walking differs between age groups, particularly given changes in health and mobility as people age, and between domains of walking. For example, the importance of environmental attributes and WfT was less apparent among older age groups (66 years and over) than younger adults (Shigematsu et al., 2009). In a U.S. study of older adults (mean age of 74 years), the built environment was not associated with walking, although among those who did walk, traffic density and commercial destinations were associated with total time spent walking per week (Nagel et al., 2008). In a recent review and meta-analyses of the neighbourhood physical environment and active travel in older adults (mean age was 65 years or older) (Cerin et al., 2017), several environmental factors positively influenced within-neighbourhood WfT (street connectivity, access to destinations/services and destination diversity, food outlets, parks/open space, pedestrian-friendly features, benches/sitting facilities and
easy access to building entrances). However, no associations were observed between WfT and residential density, access to shops, religious destinations, public toilets, pedestrian safety and pleasant scenery.

Carlson et al. (2012), reported that favourable elements in the built environment did not compensate for lower psycho-social resources among older adults even though WfT was associated with walkability and WfE was associated with the availability of walking facilities, such as parks and recreation areas. In a study of older adults, mainly women, in Hong Kong (i.e., very high urban density), access to services increased the likelihood of WfT and WfE among those with hearing impairment or genito-urinary conditions; whereas aesthetics positively influenced WfE and WfT among those without vision impairment (Barnett, A. et al., 2016).

### 2.7 Walking and mobility

In an editorial by Prohaska et al. (2011), walking as a form of mobility among the elderly was identified as one means (within the context of a multi-pronged approach) that would have the “greatest potential for reach and population level impact” (p. 2). Satariano et al. (2012) considered “optimal mobility” (p. 1508) to be fundamental to ageing well and that walking, as well as driving, were integral to the maintenance of mobility in ageing populations. By contrast, loss of mobility with age, including an inability to walk in one's neighbourhood, increased the likelihood of moving into residential care (Saajanaho et al., 2014) whereas maintaining the ability to walk unaided outside the home increased the likelihood of continuing to live independently (Chou et al., 2012; Pahor et al., 2014).

#### 2.7.1 Mobility and health

Staying mobile in older age is essential to staying well (Webber et al., 2010). The importance of mobility in later life to health was reported by Mackey et al. (2016), who found that reduced life-space mobility\(^\text{12}\) in elderly women significantly increased all-cause mortality risk. In turn, mobility can be interpreted as a surrogate marker of ageing well because it is a component of physical function and physical independence.

\(^{12}\) ‘Life space mobility’ includes the places people move through, such as the home, through to the neighbourhood and beyond.
(Anton et al., 2015). The very elderly and older women are at greatest risk of mobility loss (Tiainen et al., 2015; Yeom et al., 2008). In an Australian study, loss of, or impaired mobility, increased the risk of social isolation (Stanley et al., 2011) and maintaining “social networks enables older people to contribute and connect with society and is associated with positive mental and physical health, facilitating independence and physical activity while reducing social isolation” (Musselwhite et al., 2015, p. 1).

2.7.2 The importance of the car

The car remains an important means of transport well into older age. In Australian research among older adults aged 60 years and over (King & Scott-Parker, 2016), more time was spent driving oneself than being a passenger or walking. The authors did not report any age or gender differences although with increasing age, reduced time spent driving was not replaced by increased travel as a passenger or pedestrian. Thus, increasing age reduced travel overall. Similarly, in a U.S. study involving interviews with 778 individuals aged 45 to 94 years (Menec et al., 2016), the majority of participants drove to get to various destinations that were within walking distance of their homes. Among those who did walk within their neighbourhood, self-reported walking to certain amenities (e.g., a park) contributed to overall activity. This study underscores the impact of a car culture where the tendency to drive is paramount. Nonetheless, in a study of adults aged 25 years and over, Deka (2016) highlighted the psychological benefits of driving oneself when walking becomes difficult.

In a short article by Musselwhite et al. (2015), the authors discussed the importance of access to multiple forms of transport for the health of older adults. They referred to walking in the context of active travel and its associated health benefits but considered that reliance on the car for lifelong mobility and independence was likely to remain as an important source of personal mobility. Similarly, Lord et al. (2011) observed that the car was integral to maintaining independence in suburban life in a study involving older men and women (62 to 89 years). However, in a qualitative study in Norway involving older women (Nordbakke, 2013), cars and other forms of transport were important to their mobility, but walking was key to maintaining their independence despite the personal and neighbourhood challenges in their ability to walk outdoors. This latter
study highlights differences in perceptions and mobility preferences between different geographical locations.

2.8 Theoretical perspectives

This section describes theoretical perspectives (or explanatory models) that inform the thesis rationale and assist in the interpretation of findings. Nigg and Durand (2016), recommended that selection of a theory for physical activity research consider 1) specificity of the behaviour; 2) clarification of the study population; and 3) specificity of the setting. Giles-Corti (2006), also argued that relying on just one theory to understand and potentially increase physical activity was unlikely to be sufficient. Hence, the investigation of walking in community-dwelling older adults aged 75 years and over, with a focus on elderly women, lends itself to consideration of several theories. Thus, theories of ageing, self-efficacy theory and socio-ecological models of health behaviour are included in this thesis.

2.8.1 Theories of ageing

While chronological age and its associated biological and physiological effects will affect behaviour at any age, numerous other factors also influence the values and beliefs of older people. Theories of ageing offer a window of understanding into these potential factors.

Lawton's Theory of Environmental Press

Lawton's theory of environmental press (Lawton, 1982) helps to understand why interventions in more stressful environments may have a greater effect on health than interventions in less stressful environments. Lawton proposed that there was a dynamic relationship between the individual and their environment and that each has an effect on the other. However, for an older or frail individual, the influence of the environment is potentially amplified because they are less able to modify their environment to reduce or enhance its effect (Glicksman et al., 2013). Thus, the environment ‘presses’ in on them and potentially limits their life experience.
Activity theory
The Activity theory of ageing emerged in response to the earlier disengagement theory of ageing (Wadensten, 2003) – understanding the latter provides a context for understanding the former. Disengagement theory postulates that ageism and discrimination cause older individuals to withdraw from society; thus, disengagement is not an option freely chosen but is imposed by ageist stereotypes (Ory et al., 2003). Disengagement theory implies therefore, that external forces acting on the individual (not dissimilar to Lawton’s theory of environmental press) exert a greater influence on behaviour than the individual’s ability to respond to the external stimuli. By contrast, activity theory postulates that individuals do not fundamentally change when they grow older but remain the same person throughout their lives albeit with more physical (and potentially cognitive) limitations due to age. As such, according to activity theory, the best way for older adults to age well is to continue participating in the social and physical activities similar to (but necessarily the same as) those of their younger years, if they are able to or wish to do so. The more engagement, it is thought, the better one will do; whereas disengagement is thought to be detrimental to the individual and society in general.

Atchley’s Continuity Theory of Normal Ageing
According to Atchley’s Continuity Theory of Normal Ageing (Atchley, 1989), patterns of adult behaviour stabilise in middle and older age but adapt to changing circumstances based on these established patterns. Atchley defined normal ageing as not necessarily free from disease but in sufficient health to live an independent life. While this definition was later amended to accommodate the ill-health and disability experienced in older age (Atchley, 1999), healthy older adults remained the focus of this research. Thus, while Atchley’s Continuity Theory of Normal Ageing is a behavioural theory based on the continuity of identity established in earlier life (similar to activity theory), the theory accommodates the inevitable changes associated with ageing. Atchley (1989) further divided the premise of continuity into ‘internal continuity’ and ‘external continuity’. Internal continuity reflects the stable, unchanging self, developed over a lifetime and is a useful tool to cope with the demands of ageing so as to age well. External continuity is exhibited in actions which are obvious to others, such as stable
roles and behaviours – walking outdoors over an extended period of one's life may be one of these behaviours.

Recent qualitative research illustrates the relevance of Atchley’s theory to older age and ageing. "Continuity and change” was the overarching theme in an investigation of perceptions of being old and the ageing process among persons aged 50-92 years (Shaw & Langman, 2017, p. 115). Arnautovska et al. (2017), also framed their qualitative research around Atchley's theory when examining the perceptions of physical activity by older adults in the context of ageing. Thus, although this theory focuses on the individual, at a population level continuity theory accommodates the heterogeneity of older age whereby individual experiences over a lifetime lead to considerable variation within older populations.

**Life course perspective**

Life course theories take a broader approach than the theories of ageing discussed above, by proposing that several life factors experienced over time influence the ageing process. Much work has been done under the umbrella of life course theory (Bronfenbrenner, 1979; Dannefer, 2001; Dannefer & Kelley-Moore, 2009; Elder 1998; Ferraro, Shippee, & Schafer, 2009). The theory posits that individuals are born into a cohort which ages together through time and where the prevailing social, economic and political circumstances influence individual behaviour as well as the cohort as a whole. Thus, the theory adds an historical context to the experience of ageing that accommodates life's transitions and turning points as well as cumulative advantage and disadvantage across the lifespan. A typical life transition is retirement, where an individual might give more thought to how they are going to spend their time because they potentially have more of it at their disposal. A turning point could be the diagnosis of a chronic disease or death of a spouse; something which could occur at any age and which might affect an individual's attitude to their health, particularly if they had previously given it scant regard.
2.8.2  **Self-efficacy theory**

Self-efficacy theory is about perceptions and beliefs in one’s ability to exercise control over one’s behaviour (Bandura, 2004). For example, if a new, healthier behaviour is to be adopted an individual must believe they can adopt the behaviour before they will attempt it. Change requires practice to acquire the skills, such that the new behaviour becomes a habit. If someone has never walked in their neighbourhood, or has not done so for a long time, they may have difficulty imagining themselves doing so; thus they lack self-efficacy for this particular behaviour. It is a personal perception rather than a physical limitation, but self-efficacy exerts a powerful influence over individual behaviour. In a randomised controlled trial involving older men and women, “walking was associated with self-efficacy for walking” (Gallagher et al., 2014, p. 1), while lower self-efficacy for walking was a contributing factor in older women not achieving 10,000 steps per day (Hall & McAuley, 2010). In a review of the psychological barriers to physical activity in older people, Lee et al. (2008) concluded that exercise self-efficacy may be more important in initiating exercise than in maintaining exercise. By contrast, McAuley et al. (2003) concluded that self-efficacy predicted long term maintenance of physical activity in older adults.

2.8.3  **Socio-ecological models of health behaviour**

Socio-ecological models of health behaviour (sometimes referred to as just ‘ecological’ models) have been “central to health promotion for several decades” (Sallis et al., 2008, p. 479). Their premise is that human behaviour is influenced by (and interacts with) multiple factors, which in turn, provide opportunities for multiple interventions to effect behaviour change. Most importantly, they shift the emphasis from personal responsibility for healthy behaviour to include social and environmental influences on behaviour (Prohaska et al., 2006) and in doing so provide a framework for identifying the causes of these behaviours (Hendricks & Hatch, 2009, p. 443). Thus, socio-ecological models consider the individual and the external forces acting on them that influence their behaviour. However, the model has been criticised because of its lack of specificity in relation to human behaviour.

Nonetheless, King and King (2010) supported the application of an ecological model of health behaviour to ageing because it accommodates the “many of the values and beliefs
that are held dear by many in the older community” (p. 420). Socio-ecological models have been used to understand the factors that influence physical activity, and this has resulted in a greater emphasis on environmental correlates (Giles-Corti et al., 2005) as well as the social and policy environment (Brownson et al., 2009, p. 450). Despite their widespread use as a framework for understanding physical activity behaviour, ecological models have been criticised because they have largely been used to explore correlates of behaviour, thus failing to account for the life course effect as an individual ages (Giles-Corti & King, 2009). Giles-Corti et al. (2005) in their selective review of the literature, examined whether increased specificity of the explanatory variables might improve the predictive capacity of ecological studies.

2.9 Chapter summary

2.9.1 What is known?
Walking has a long history of being the primary means of transport for humans although only in relatively recent history has walking become an optional mode of transport and a means of leisure and exercise for many. Nonetheless, continuing to walk well into old age has numerous health and functional benefits, and as some of the evidence suggests, these benefits accrue at low levels of walking and irrespective of participation in other physical activity. Among older women who do participate in regular physical activity, walking is the most commonly reported activity, although participation in walking declines with age. Factors that motivate older women to walk are many and include: for health, for transport, to facilitate social activity and to maintain their independence, as well as dog ownership. Barriers to participation include lack of self-efficacy for walking outdoors, pre-existing injuries, health conditions and pain, lack of time, family commitments and recent major life events. The physical environment can act as a motivator and a barrier to physical activity, but among older women, its influence might well be superseded by other psycho-social factors. Numerous socio-demographic correlates of walking have also been identified, but these relate largely to older men and women combined.
2.9.2 Opportunities for further research

The literature review above has highlighted gaps in knowledge that represent opportunities for further research on walking and elderly women including: differentiating between older adults and the elderly, elderly women compared with elderly men, and focusing on walking as opposed to all physical activity. These distinctions define the scope of this thesis. In addition, the role of walking in maintaining mobility among elderly women as they age has not been examined beyond a follow-up period of 12 months (Simonsick et al., 2005) despite the potential for walking as an important form of mobility among the elderly as they age (Prohaska et al., 2011). Also, many studies on walking in elderly people do not distinguish between different purposes of walking. Furthermore, Pollard and Wagnild (2017) noted the need for further research on walking across the life-course. While this thesis does not involve a prospective analysis of walking over a lifetime, a qualitative investigation offers an opportunity to retrospectively consider the experience and meaning of walking in the lives of a sample of elderly women. Studies that apply theories of ageing to walking and elderly women are also scarce; hence this thesis frames the qualitative research in the context of theories of ageing and examines the findings in light of various relevant theories. This approach, in turn, leads to the potential to develop a conceptual model of the contribution of walking to elderly women ageing well.
Chapter 3: Gender differences in walking among elderly men and women – perspectives from cross-sectional studies

Walking is a man’s [and a woman’s] best medicine.
Hippocrates

This chapter describes the quantitative component of the thesis that draws on cross-sectional studies and includes Papers 1 and 2.

3.1 Purpose

The purpose of this chapter is to examine walking in elderly men and women, factors contributing to walking, and whether participation in walking has changed in recent years. While the focus of this thesis is on elderly women, the findings from Papers 1 and 2 provided the context for walking among elderly women compared with elderly men.

3.2 Research question

Are there gender differences or changes over time in walking among Australian adults aged 75 years and over?

3.3 Summary of methods

Papers 1 and 2 use data from three national health surveys undertaken by the Australian Bureau of Statistics. The surveys were used in this research to investigate gender differences and changes over time in walking among adults aged 75 years and over. The surveys were the 2011-12 National Nutrition and Physical Activity Survey (NNPAS) (Paper 1) and the 2007-08 and 2014-15 National Health Surveys (NHS) (Paper 2). However, as the national health surveys employed a cross-sectional study design (i.e., data were obtained from different individuals in each survey), conclusions about

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13 The 2011-12 NNPAS was used in Paper 1 due to the availability of these data at the time the analyses was undertaken. Once the 2014-15 NHS data were available, these data could be compared with the 2007-08 NHS data to examine changes over time in Paper 2 – a period of 7-8 years elapsed time was deemed necessary in order to observe a change in walking participation.
associations can be drawn, but predictive inferences cannot be made. The data sources were chosen because they include nationally representative samples of men and women aged 75 years and over. Each survey also includes similar questions about walking and other physical activity as well as socio-demographic status, health and disability status, and health risk factor variables. The majority of data were self-reported. Multivariate regression analyses were employed in Paper 1 to examine the association of cardiovascular disease and diabetes with walking. Multivariate decomposition analyses were employed in Paper 2 to examine temporal and gender differences in WfE and WfT.

Paper 1 addressed the high prevalence of cardiovascular disease and diabetes among elderly men and women in Australia, and its influence on walking participation and duration.

Paper 2 compared participation in WfE and WfT among elderly men and women at two time periods and gender differences in WfE and WfT at similar periods in time. Correlates of WfE and WfT among elderly men and women were also examined.

### 3.4 Summary of findings

Paper 1 concluded that neither cardiovascular disease nor diabetes influenced walking among elderly men or women. Women walked for a shorter duration compared with men, and men and women combined aged 85 years and over were less likely to walk compared with men and women aged 75 to 84 years. A similar age effect was not observed for walking duration. This was attributed, in part, to the better health and functional ability of study participants living in the community who were included in the 2011-12 NNPAS compared with those in institutional care who were excluded from the 2011-12 NNPAS.

Paper 2 found no temporal differences in WfE or WfT among men and women aged 75 years and over. Gender differences were not apparent in WfT, but WfE differed between elderly men and women in both survey years (men walked for exercise more than women) with preliminary evidence suggesting the gender gap may be widening over time. The findings indicated a greater number of correlates of WfE than WfT.
Paper 1: Cardiovascular disease and diabetes are not barriers to walking among the very elderly: findings from a national Australian survey
FORM E: DECLARATION OF CO-AUTHORED PUBLICATION CHAPTER

For use in theses which include publications. This declaration must be completed for each co-authored publication and to be placed at the start of the thesis chapter in which the publication appears.

Declaration for Thesis Chapter 3 – Paper 1

Declaration by candidate

In the case of Chapter 3 – Paper 1 the nature and extent of my contribution to the work was the following:

<table>
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<th>Nature of contribution</th>
<th>Extent of contribution (%)</th>
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<tr>
<td>Designed, analysed, prepared and submitted the article for publication.</td>
<td>90%</td>
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The following co-authors contributed to the work.

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<th>Name</th>
<th>Nature of contribution</th>
<th>Contributor is also a student at UC</th>
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<tbody>
<tr>
<td>Dr Yohannes Kinfu</td>
<td>Advised on data analysis and reviewed paper.</td>
<td>N</td>
</tr>
<tr>
<td>Prof Tom Cochrane</td>
<td>Reviewed paper.</td>
<td>N</td>
</tr>
<tr>
<td>Prof Rachel Davey</td>
<td>Reviewed paper.</td>
<td>N</td>
</tr>
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Candidate’s Signature [Signature]

Date [2 Aug 2017]

Declaration by co-authors

The undersigned hereby certify that:

1. the above declaration correctly reflects the nature and extent of the candidate’s contribution to this work, and the nature of the contribution of each of the co-authors.
2. they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;
3. they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
4. there are no other authors of the publication according to these criteria;
(5) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
(6) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

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[Please note that the location(s) must be institutional in nature, and should be indicated here as a department, centre or institute, with specific campus identification where relevant.]

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<th>Signature 1</th>
<th>Johannes Kinlin</th>
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<td>Signature 2</td>
<td>Tom Cochrane</td>
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Cardiovascular disease and diabetes are not barriers to walking among the very elderly: findings from a national Australian survey

Bonnie Field, MPH,* Tom Cochrane, PhD, Rachel Davey, PhD, Yohannes Kinfu, PhD

Background: Walking has numerous health benefits and is an accessible option for most elderly people. This study explored the effects of age and sex on walking in community-dwelling respondents aged 75 years and older and the influence of chronic disease on this association.

Methods: Cross-sectional data on 349 men and 499 women from the Australian 2011–2012 National Nutrition and Physical Activity Survey were used. Data were weighted to enable generalization of the findings to the Australian population aged 75 years and older. Outcome measures were self-reported participation in walking and duration of walking. Chronic diseases considered were ischemic heart disease, angina, heart failure, cerebrovascular disease, and diabetes.

Results: No difference in walking participation was seen between men and women, but among those who walked, men walked for longer than women. Those aged 85 years and older were less likely to walk than those aged 75–79 years, but age was not associated with walking duration among older adults. Cardiovascular disease and/or diabetes had no effect on walking participation or duration.

Conclusion: There is a cohort of active older Australian men and women who continue to walk well into very old age, irrespective of cardiovascular disease and/or diabetes.

Keywords: Aged, Australia, Health surveys, Public health, Walking

Walking in older age, independent of other physical activity, is associated with multiple health benefits including the maintenance of mobility,[1] independent living,[2] protection against arthritis,[3] better health-related quality of life,[4] and improved sleep quality.[5] In addition, while few preventive measures have been identified to reduce the risk of dementia, a recent meta-analysis of prospective studies[6] concluded that increased physical activity among older adults, including walking, was associated with a reduced risk of Alzheimer’s disease. Walking offers a means to increase physical activity among the most sedentary of adults,[7] and low intensity exercise (eg, walking at a slower pace than brisk walking) also confers a health benefit.[8]

Few studies have investigated walking in older people, and there are mixed results from those that have. Among studies of adults aged 65 years and older, differences between men and women and walking outcomes have been observed in both Australian[9,10] and US[11,12] research. A Norwegian study that compared differences across age groups reported that 65–69 years olds accumulated more than double the number of daily steps than 80–85 year olds, but differences between men and women were not apparent when similar age groups were compared.[13] A systematic review of total physical activity, including walking, among older adults aged 50 years and older[14] reported substantial sex differences in the types of physical activity performed: women walked more than men, but men were about 10% more physically active than women of a similar age. In a New Zealand study involving adults aged 80–90 years[15] no differences were reported in walking frequency (number of times walked in the previous week) among non-Māori men and women, but differences in walking duration were observed in this population. Thus, although results are varied and limited data exist for the very old, age and sex may influence walking among older adults.

In studies of physical activity preferences, most older adults reported that walking was their preferred form of exercise[16–18]. Data from the 2011 to 2013 Australian Health Survey indicated that physical activity declined with age, particularly between the ages of 65 and 74 years, and more so for women than men, in those aged 75 years and older[19]. However, data comparing differences in walking, separate from other forms of physical activity, were not reported. In addition, no further age or sex distinctions were made for adults aged 75 years and older, despite the prevalence of considerable socio-demographic, health, and functional status diversity in this older age group.[20]

Hence, the purpose of this study was to explore whether age and sex was associated with participation in and duration of walking, independent of other forms of physical activity, among men and women aged 75 years and older. We also aimed to assess whether cardiovascular disease and/or diabetes influenced...
participation in or duration of walking because of the high prevalence of these chronic diseases in this older age group\textsuperscript{[23]}.

**Methods**

**Design**

Data from the 2011 to 2012 National Nutrition and Physical Activity Survey (NNPAS) were used. The NNPAS was a component of the Australian Health Survey undertaken by the Australian Bureau of Statistics in 2011–2013. Detailed demographic, health risk factor, and nutrition and physical activity data were collected, as well as self-reported information about selected chronic diseases from 1 adult (aged 18 y or older) in a participating household. Data were obtained by face-to-face interviews conducted in private dwellings using trained personnel. The sample was drawn from predetermined geographic locations to ensure sufficient numbers of participants representative of the Australian population from each state, territory, capital city, and other broad geographic regions. For further details about the design and methods used in the Australian Health Survey 2011–2013, including the NNPAS see Australian Bureau of Statistics\textsuperscript{[22]}.

**Participants**

This study included 349 men and 499 women aged 75 years and older who completed the NNPAS. No exclusions were imposed. Participant characteristics included: age, sex, geographic region, marital status, country of birth, education level, Socio-Economic Indexes for Areas, self-assessed health status, cardiovascular disease and/or diabetes (where cardiovascular disease included ischemic heart disease, angina, heart failure, and cerebrovascular disease), body mass index (BMI), smoking status, and other physical activity (which included participation in either moderate or vigorous physical activity, apart from walking, for ≥10 minutes per week). With the exception of BMI, which was derived from objectively measured height and weight, all data were self-reported. Age and sex were the correlates of interest and the remaining variables were treated as control variables.

**Outcome of interest**

Data were collected on how much time participants spent “walking for exercise”, that is, the total time in the previous week spent “walking for fitness, recreation or sport,” and “walking for transport,” that is, the total time in the previous week spent “walking for at least 10 minutes to get to or from places.” Responses to these questions were not directly available in the NNPAS data set but were calculated from self-reported physical activity data. Hence, total time walked in the previous week (minute) was derived from total time spent doing physical activity (which included time spent walking for exercise and transport, but excluded time spent doing vigorous gardening or household chores), minus the time spent doing moderate or vigorous physical activity in the previous week. The outcome variable of interest, total time walked, was then subdivided into 2 variables: (1) participation in walking (yes/no, where “yes” was ≥10 min/wk), and (2) duration of walking (min/wk among those who walked).

**Data analysis**

The Pearson χ\textsuperscript{2} analyses were used to examine differences between the characteristics of men and women and between age groups, and to examine differences in walking patterns between men and women by age. Multivariate binary logistic regression was used to analyze walking participation and multivariate negative binomial regression was used to analyze walking duration. Multivariate Poisson regression was initially considered to analyze count data for walking duration, but as these data were highly dispersed (men: mean = 253 min/wk, SD = 319; women: mean = 159 min/wk, SD = 178), multivariate negative binomial regression was preferred. Walking duration was positively skewed (with a substantial proportion of zeros representing persons who did not walk at all); hence percentiles were reported rather than means.

Seasonally adjusted weighted data were used in the analysis enabling the findings to be generalized to the Australian population aged 75 years and older. Weights were included as part of the release of the data set by the Australian Bureau of Statistics. All analyses were performed using Stata software, version 13.1.

**Approach to missing data**

Missing walking data for 0.1% of men (n = 2) and 0.8% of women (n = 3) were excluded from the analysis. Less than 2% of data were missing for the control variables “education” (n = 17) and “other physical activity” (n = 5), hence their effect on the analysis was deemed minimal. However, 21% of male participants (n = 77) and 24% of females (n = 124) had missing BMI data. This was considered an important control variable in both walking participation and duration, and our findings would have been biased if participants lacking these data were excluded.

Therefore, we investigated whether multiple imputation of the missing data was appropriate; in particular whether BMI was “missing at random,”\textsuperscript{[23]} by running a Heckman selection model using BMI as the dependent variable. The selection model had 2 components: (1) variables contributing to the missingness of BMI (where BMI was coded as a binary variable), and (2) variables predicting BMI (where BMI for nonmissing cases were treated as a continuous variable and missing data were coded as 0). On the basis of univariate analysis, age and marital status were significantly correlated with missingness of BMI (r = 0.10 and r = −0.12, respectively, P < 0.01) although only marital status was correlated with missingness (r = −0.12, P < 0.01) after applying the Bonferroni adjustment of significance levels.

The Heckman selection model was run sequentially using different combinations of variables for each of the 2 model components. This process was informed by, but not constrained to, the univariate association between independent variables and BMI missingness. A statistically significant model was identified (χ\textsuperscript{2} = 85.67, P < 0.01), where age and marital status predicted the missingness of BMI, and age, sex, cardiovascular disease and/or diabetes, and walking predicted BMI. Thus, it was concluded that multiple imputation of BMI was appropriate because it could be derived from observed data.

To impute missing BMI data, the Stata command “mi impute chained (logit)” and age and marital status were used as the predictor variables. Cardiovascular disease and/or diabetes was originally included in the imputation, but after exclusion made negligible difference to the results. A variable representing the ratio of energy intake to basal metabolic rate for each observation was also considered, but the proportion of missing data for this variable was substantial (> 20%); hence, it was excluded. The
number of imputations was set at 25 because ~22% of BMI data for men and women combined were missing.

Independent regression models were run for each outcome: walking participation and walking duration. For each of these, a fully adjusted model (Model 1) and a parsimonious model (Model 2) were developed. Model 1 included the correlates of interest (age and sex) and all control variables. Model 2 comprised age and sex and those control variables found to be statistically different between men and women and between age groups in the univariate analysis. The effect of chronic disease (cardiovascular disease and/or diabetes) on walking participation and duration among men and women combined was also analyzed.

Results

Study participants

Significantly more women than men were included in our study, and men and women's characteristics differed on the basis of marital status, education, cardiovascular disease, and/or diabetes and BMI (Table 1). Men aged 75 years and older were significantly more likely to be married, have postschool qualifications, cardiovascular disease and/or diabetes, and a higher BMI than women of the same age. Age differences occurred by geographic region, marital status, education, health status, and BMI. On the basis of univariate analysis, walking participation did not differ between men or women, or between age groups.

Walking patterns

The proportion of older men and women who did not walk at all did not change significantly with age (Table 2). Of those who did some walking, most men and women across all age groups participated in walking only (ie, they did not report participation in other physical activity) and about 25% of men and 20% of women fulfilled the recommended duration of 150 minutes of weekly physical activity from walking alone.

Sex differences in walking participation and duration

Walking participation did not differ between men or women in either model 1 or 2 (Table 3). By contrast, sex differences in walking duration were consistent and strong in both models, with men walking longer than women.

Effect of age on walking participation and duration

Participation in walking declined with age in men and women combined, and was significantly different among men and women aged 85 years and older compared with those aged 75–79 years (Table 4). However, walking duration was not significantly different between men and women aged 75–79 years and those aged 80 years and older, despite most elderly men and women walking for longer (median of 150 min/wk) than younger age groups (median of 120 min/wk).

Effect of chronic disease on walking participation and duration

The presence of chronic disease (cardiovascular disease and/or diabetes) had no effect on walking participation or duration among men and women combined (Table 5).

Discussion

Our findings indicate that age is associated with walking participation (older age groups were less likely to walk) and sex with walking duration (men walked for longer than women). However, our negative results are equally important. After adjusting for potential confounding variables, we found no statistically significant difference in walking participation between men and women, or between those who did some walking (58% of men and 50% of women). Increasing age had no appreciable effect on walking duration.

The unexpected lack of an age effect on walking duration may be because the NNPAS excluded persons living in institutional care; hence, study participants may have been in better health and with better functional mobility than the general community-dwelling population of Australians aged 75 years and older. Nevertheless, the finding suggests that although walking participation declined with age, among those who did walk, a substantial proportion of older men and women continued to walk well into their old age and many of these walked for the recommended 150 minutes or more per week. As the data were cross-sectional we could not determine whether the same individuals continued to walk as they aged, or whether some individuals who walked in their 70s stopped as they got older, while at the same time others only started walking in their 80s when they had previously not walked. A prospective study of walking patterns in this age group is needed to answer these questions.

There are few studies of this age group with which we can compare our findings, and no studies that enable comparisons of different ages between older adults aged 75 years and older. The differences we observed in walking duration between men and women were similar to those seen in the New Zealand study[15], which found that non-Māori men aged 80–90 years walked for a longer duration than non-Māori women in this age group. However, this study did not report walking participation. We observed no difference in walking participation between men and women, but findings of studies involving younger age groups and walking participation have been mixed. In a US study[12], older men aged 60 years and older (the majority of which were over 70 y) were more likely to be regular walkers (defined as walking 6 miles/wk) than women. However, in an Australian study of culturally diverse adults aged 60 years and older[10], no significant difference was found in walking participation for exercise between men and women. By contrast, when our data were adjusted for country of birth in our fully adjusted model, no significant difference in walking participation between men and women was observed. Thus, differences between our results and the findings from the few available studies could be explained by the inclusion of younger older adults (60 y and above of age compared with 75 y and above in our study) and a focus on a specific population of interest rather than a representative sample of older adults. All studies, including ours, relied on self-reported walking; hence, this factor was unlikely to contribute to differences between findings.

The lack of an effect of chronic disease (cardiovascular disease and/or diabetes) on walking participation was not unexpected. The relatively high prevalence of these diseases in this age group, coupled with the possibility that being diagnosed with cardiovascular disease or diabetes might increase a person’s likelihood to start or continue to walk, may both contribute to this finding. Two recent studies also investigated the effect of chronic disease
### Table 1
Characteristics of study participants.

<table>
<thead>
<tr>
<th></th>
<th>Sex</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% Men</td>
<td>% Women</td>
</tr>
<tr>
<td>(n = 349)</td>
<td>(n = 499)</td>
<td></td>
</tr>
<tr>
<td>Socio-economic status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>44.5</td>
<td>—</td>
</tr>
<tr>
<td>Women</td>
<td>55.5</td>
<td>—</td>
</tr>
<tr>
<td>Age (y)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75–79</td>
<td>49.7</td>
<td>48.1</td>
</tr>
<tr>
<td>80–84</td>
<td>29.5</td>
<td>29.0</td>
</tr>
<tr>
<td>85+</td>
<td>20.8</td>
<td>23.0</td>
</tr>
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<td>Geographic region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major city</td>
<td>68.7</td>
<td>70.2</td>
</tr>
<tr>
<td>Other†</td>
<td>31.3</td>
<td>29.8</td>
</tr>
<tr>
<td>Marital status</td>
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<td></td>
</tr>
<tr>
<td>Married (including de facto)</td>
<td>74.1</td>
<td>39.8</td>
</tr>
<tr>
<td>Not married</td>
<td>25.9</td>
<td>60.2</td>
</tr>
<tr>
<td>Country of birth</td>
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<td></td>
</tr>
<tr>
<td>Australia</td>
<td>69.3</td>
<td>73.5</td>
</tr>
<tr>
<td>Other</td>
<td>30.7</td>
<td>26.5</td>
</tr>
<tr>
<td>Education</td>
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<td></td>
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<tr>
<td>School only</td>
<td>46.7</td>
<td>75.4</td>
</tr>
<tr>
<td>Postschool qualification</td>
<td>50.6</td>
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<td>Missing</td>
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<td>0.7</td>
</tr>
<tr>
<td>Socio-Economic Indexes for Areas (SEIFA) [24]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1–2nd quintile (lowest)</td>
<td>42.1</td>
<td>45.3</td>
</tr>
<tr>
<td>3–5th quintile (highest)</td>
<td>57.9</td>
<td>54.7</td>
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<td>Health status</td>
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<td></td>
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<tr>
<td>Self-assessed health status</td>
<td></td>
<td></td>
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<tr>
<td>Excellent/very good/good</td>
<td>65.5</td>
<td>63.1</td>
</tr>
<tr>
<td>Fair/poor</td>
<td>34.5</td>
<td>36.9</td>
</tr>
<tr>
<td>CVD and/or diabetes‡</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No CVD or diabetes</td>
<td>52.8</td>
<td>69.4</td>
</tr>
<tr>
<td>CVD or diabetes</td>
<td>41.5</td>
<td>27.5</td>
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<td>CVD and diabetes</td>
<td>5.8</td>
<td>3.2</td>
</tr>
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<td></td>
</tr>
<tr>
<td>BMI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 25</td>
<td>20.2</td>
<td>27.8</td>
</tr>
<tr>
<td>≥ 25</td>
<td>59.0</td>
<td>48.6</td>
</tr>
<tr>
<td>Missing</td>
<td>20.8</td>
<td>23.5</td>
</tr>
<tr>
<td>Smoking</td>
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<td></td>
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<tr>
<td>Never/ex</td>
<td>95.4</td>
<td>96.4</td>
</tr>
<tr>
<td>Current</td>
<td>4.6</td>
<td>3.6</td>
</tr>
<tr>
<td>Physical activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other exercise§</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>82.4</td>
<td>84.0</td>
</tr>
<tr>
<td>Some (≥ 10 min in previous week)</td>
<td>17.5</td>
<td>15.3</td>
</tr>
<tr>
<td>Missing</td>
<td>0.1</td>
<td>0.8</td>
</tr>
<tr>
<td>Walking¶</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>41.6</td>
<td>49.7</td>
</tr>
<tr>
<td>Some (≥ 10 min in previous week)</td>
<td>58.4</td>
<td>49.5</td>
</tr>
<tr>
<td>Missing</td>
<td>0.1</td>
<td>0.8</td>
</tr>
</tbody>
</table>

All data were based on self-reported information, except BMI, which was derived from measured height and weight. Proportions were based on weighted data.

†"Other" geographic regions included inner regional, outer regional, remote Australia, and very remote Australia.

‡"Cardiovascular disease and/or diabetes" included any ischemic heart disease, angina, heart failure, cerebrovascular disease, or diabetes.

§"Other exercise" included participation in either moderate or vigorous physical activity, apart from walking.

¶Walking (min) = total physical activity (min) – (moderate physical activity (min) + vigorous physical activity (min)). Note that total physical activity excluded vigorous gardening and household chores but included walking for transport.

BMI indicates body mass index; CVD, cardiovascular disease; NS, not significant.

*Significant difference at (P < 0.05) level.
on physical activity participation among older adults. In support of our findings, McKee et al\[25\] noted that only when long-term illness was severe enough to interfere with functional ability did it adversely influence adults\(^\text{†}\) (aged 65 y and above) participation in physical activity. By contrast, Smith et al\[26\], in their sample of adults aged 60 years and over, found that diabetes in men and women, and heart disease in women, significantly decreased the likelihood of participating in physical activity, including walking for pleasure. This finding was unusual because participants were older adults who self-identified as not having an illness or health condition that would restrict their participation in physical activity. Thus, in Smith and colleague’s study, although a statistical association was found between some chronic diseases and nonparticipation, the presence of these diseases was not the reason for nonparticipation. As such, results from their self-selected sample of “healthy” older adults concur with the lack of association between cardiovascular disease and diabetes and walking in our study.

A strength of our study was the focus on adults aged 75 years and older; most studies in the current literature have involved older adults aged 60 years and older. Unless studies report their findings by age group as opposed to older adults as a whole, the inclusion of younger ages in studies on walking may mask differences between older adults and the very elderly. We also examined age and sex differences in walking duration based on those who walked, rather than including a comparison of all study participants; to our knowledge no other study has made this comparison in this age group. Weighting of the study sample further enabled generalization of the findings to the Australian population aged 75 years and older. The 2011-2012 NNAPAS collected walking data, as well as data about other physical activity, which allowed adjustment of the models for participation in other physical activity. However, interestingly at this older age, participation in other physical activity was not a significant confounder and hence was not included in our parsimonious model.

The study also had several limitations. All data, except BMI, were based on self-reported information from study participants. In a review of the validity of self-reported physical activity among older adults, Heesch et al\[27\] noted that, in the Active Australia questionnaire (a modified version of which was used in the 2011-2012 NNAPAS), the same activity could be reported multiple times. They also noted that walking was more likely to be included in answers to the question about moderate activity. Hence, our focus on walking as the outcome of interest may make it less vulnerable to over-reporting than if we had focused on all

### Table 2

**Walking patterns.**

<table>
<thead>
<tr>
<th>Walking Status</th>
<th>Men (%)</th>
<th>Women (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>75–79</td>
<td>80–84</td>
</tr>
<tr>
<td>Participation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No walking ($&lt;$10 min/wk)</td>
<td>39.1 (78.7)</td>
<td>47.4 (80.1)</td>
</tr>
<tr>
<td>Some walking†</td>
<td>68.9 (40.8)</td>
<td>59.2</td>
</tr>
<tr>
<td>Duration‡</td>
<td>10–$&lt;$60 min/wk</td>
<td>15.1</td>
</tr>
<tr>
<td></td>
<td>$\geq$60 min/wk</td>
<td>14.4</td>
</tr>
<tr>
<td>Only walking§</td>
<td>31.4 (25.2)</td>
<td>22.2 (29.5)</td>
</tr>
</tbody>
</table>

Proportions were based on weighted data. Missing walking data were included in the proportion who did no walking.

†“Some walking” included those study participants who did other physical activity in addition to walking in the previous week.

‡“Duration of walking” is the time walked among those who did some walking.

§“Only walking” is the proportion of study participants whose only reported physical activity in the previous week was walking and in brackets expressed as a proportion of those who walk.

NS indicates not significant.

### Table 3

**Sex differences in participation and duration of walking.**

<table>
<thead>
<tr>
<th>Participation</th>
<th>Proportion of Walkers (%)</th>
<th>Men Compared With Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women</td>
</tr>
<tr>
<td>Walking status</td>
<td>58.4</td>
<td>49.5</td>
</tr>
<tr>
<td>Duration</td>
<td>Minutes walked per week among walkers</td>
<td></td>
</tr>
<tr>
<td>25th percentile</td>
<td>60</td>
<td>55</td>
</tr>
<tr>
<td>Median</td>
<td>140</td>
<td>120</td>
</tr>
<tr>
<td>75th percentile</td>
<td>330</td>
<td>210</td>
</tr>
</tbody>
</table>

Proportions and percentiles were based on weighted data. Missing walking data (0.1% of men and 0.6% of women) were excluded from the analysis.

*Model 1 included the correlate sex and was adjusted for age, geographic region, marital status, country of birth, education, Socio-Economic Indexes for Areas (SEIFA), health status, cardiovascular disease and/or diabetes, BMI, smoking status, and other physical activity.

†Model 2 included the correlate sex and was adjusted for age, marital status, country of birth, education, cardio vascular disease and/or diabetes, BMI, smoking status, and other physical activity.

β indicates regression coefficient; BMI, body mass index; CI, confidence interval.
Age differences in participation and duration of walking.

### Table 4

<table>
<thead>
<tr>
<th>Participation</th>
<th>Men and Women Proportion of Walkers (%)</th>
<th>All Age Groups Compared</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Model 1* [β (95% CI)]</td>
</tr>
<tr>
<td>75–79 y</td>
<td></td>
<td>Ref</td>
</tr>
<tr>
<td>80–84 y</td>
<td></td>
<td>−0.10 (−0.51, 0.31)</td>
</tr>
<tr>
<td>85 + y</td>
<td></td>
<td>−0.65 (−1.13, −0.17)</td>
</tr>
<tr>
<td>Duration</td>
<td>Minutes walked per week among walkers (mean, median)</td>
<td></td>
</tr>
<tr>
<td>75–79 y</td>
<td>217, 120</td>
<td>Ref</td>
</tr>
<tr>
<td>80–84 y</td>
<td>183, 115</td>
<td>−0.19 (−0.49, 0.10)</td>
</tr>
<tr>
<td>85 + y</td>
<td>201, 150</td>
<td>−0.13 (−0.43, 0.18)</td>
</tr>
</tbody>
</table>

Proportions and percentiles were based on weighted data. Missing walking data (0.1% of men and 0.8% of women) were excluded from the analysis.

*Model 1 included the correlate age and was adjusted for sex, geographic region, marital status, country of birth, education, Socio-Economic Indexes for Areas (SEIFA), health status, cardiovascular disease and/or diabetes, BMI, smoking status, and other physical activity.
†Model 2 included the correlate age and was adjusted for sex, geographic region, marital status, education, health status, and BMI.

β indicates regression coefficient; BMI, body mass index; CI, confidence interval.

Table 5

<table>
<thead>
<tr>
<th>Participation</th>
<th>Comparison of the Presence or Absence of Chronic Disease [β (95% CI)]*</th>
<th>Men and Women Walking Status Proportion of Walkers (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No CVD or diabetes</td>
<td>Ref</td>
<td>54.5</td>
</tr>
<tr>
<td>CVD or diabetes</td>
<td>−0.16 (−0.56, 0.22)</td>
<td>51.0</td>
</tr>
<tr>
<td>CVD and diabetes</td>
<td>0.09 (−0.80, 0.96)</td>
<td>57.0</td>
</tr>
<tr>
<td>Duration</td>
<td>Comparison of the Presence or Absence of Chronic Disease [β (95% CI)]†</td>
<td>Minutes Walked per Week Among Walkers (mean, median)</td>
</tr>
<tr>
<td>No CVD or diabetes</td>
<td>Ref</td>
<td>189, 120</td>
</tr>
<tr>
<td>CVD or diabetes</td>
<td>0.09 (−0.17, 0.36)</td>
<td>237, 140</td>
</tr>
<tr>
<td>CVD and diabetes</td>
<td>−0.31 (−0.83, 0.21)</td>
<td>172, 180</td>
</tr>
</tbody>
</table>

Proportions, means and percentiles were based on weighted data. Missing walking data (0.1% of men and 0.8% of women) were excluded from the analysis.

*Model included the correlate cardiovascular disease and/or diabetes and was adjusted for age, sex, geographic region, marital status, education, and BMI.
†Model included the correlate cardiovascular disease and/or diabetes and was adjusted for age, sex, marital status, and education.

β indicates regression coefficient; BMI, body mass index; CI, confidence interval; CVD, cardiovascular disease.

### Conclusions

By analyzing existing data representative of older adults in Australia aged 75 years and older, we have identified differences and similarities in walking participation and duration in this age group. The findings indicate that age but not sex, influences walking participation, and sex but not age, is associated with walking duration. This latter finding suggests the presence of a cohort of active older men and women who maintain their walking activity well into very old age. Although physical activity studies across all age groups have focused on barriers to participation, further investigation of this active group is warranted to understand predictors of ongoing walking participation and duration as older adults age, and to potentially increase walking participation among the nonwalking elderly. As our study found that the presence of chronic disease did not seem to be a barrier to walking in this age group, further study in this area is also warranted.

### Conflict of interest statement

The authors declare that they have no financial conflict of interest with regard to the content of this report.

### References


Physical activity. Despite this, recall affected the validity of reported walking participation and duration, particularly incidental walking such as walking for transport, which was included in total walking estimates.

Data were based on a cross-sectional study design; hence, we only investigated the effects of age and sex on walking at a single point in time, rather than over time. In addition, as this study was based on secondary analysis of the 2011–2012 NNIPAS, available data limited the control variables we could include. Social and environmental factors (in particular destinations) also influence walking participation among older adults and contribute to differences between sexes and among different age groups. In addition, participation in physical activity earlier in life, in particular competitive sports, has been associated with current physical activity in older men and women, but to our knowledge, no study has investigated lifelong participation in physical activity or walking and its effect on walking participation among adults aged 75 years and older. This study also did not distinguish between walking for exercise and walking for transport—both of which may vary between age and sex in older age.

### Table 5

Effect of cardiovascular disease or diabetes on participation and duration of walking.

<table>
<thead>
<tr>
<th>Participation</th>
<th>Comparison of the Presence or Absence of Chronic Disease [β (95% CI)]*</th>
<th>Men and Women Proportion of Walkers (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No CVD or diabetes</td>
<td>Ref</td>
<td>54.5</td>
</tr>
<tr>
<td>CVD or diabetes</td>
<td>−0.16 (−0.56, 0.22)</td>
<td>51.0</td>
</tr>
<tr>
<td>CVD and diabetes</td>
<td>0.09 (−0.80, 0.96)</td>
<td>57.0</td>
</tr>
<tr>
<td>Duration</td>
<td>Comparison of the Presence or Absence of Chronic Disease [β (95% CI)]†</td>
<td>Minutes Walked per Week Among Walkers (mean, median)</td>
</tr>
<tr>
<td>No CVD or diabetes</td>
<td>Ref</td>
<td>189, 120</td>
</tr>
<tr>
<td>CVD or diabetes</td>
<td>0.09 (−0.17, 0.36)</td>
<td>237, 140</td>
</tr>
<tr>
<td>CVD and diabetes</td>
<td>−0.31 (−0.83, 0.21)</td>
<td>172, 180</td>
</tr>
</tbody>
</table>

Proportions, means and percentiles were based on weighted data. Missing walking data (0.1% of men and 0.8% of women) were excluded from the analysis.

*Model included the correlate cardiovascular disease and/or diabetes and was adjusted for age, sex, geographic region, marital status, education, and BMI.
†Model included the correlate cardiovascular disease and/or diabetes and was adjusted for age, sex, marital status, and education.

β indicates regression coefficient; BMI, body mass index; CI, confidence interval; CVD, cardiovascular disease.


Paper 2: Walking for exercise and walking for transport among Australian adults aged 75 years and over: trends, gender differences and correlates
FORM E: DECLARATION OF CO-AUTHORED PUBLICATION CHAPTER

For use in theses which include publications. This declaration must be completed for each co-authored publication and to be placed at the start of the thesis chapter in which the publication appears.

Declaration for Thesis Chapter 3 – Paper 2

Declaration by candidate

In the case of Chapter 3 – Paper 2 the nature and extent of my contribution to the work was the following:

<table>
<thead>
<tr>
<th>Nature of contribution</th>
<th>Extent of contribution (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designed, analysed, prepared and submitted the article for publication.</td>
<td>90%</td>
</tr>
</tbody>
</table>

The following co-authors contributed to the work.

<table>
<thead>
<tr>
<th>Name</th>
<th>Nature of contribution</th>
<th>Contributor is also a student at UC Y/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Yohannes Kinfu</td>
<td>Advised on data analysis and reviewed paper.</td>
<td>N</td>
</tr>
<tr>
<td>Prof Tom Cochrane</td>
<td>Reviewed paper.</td>
<td>N</td>
</tr>
</tbody>
</table>

Candidate’s Signature  

Candidate’s Signature  

Date 2 Aug 2017

Declaration by co-authors

The undersigned hereby certify that:

1) the above declaration correctly reflects the nature and extent of the candidate’s contribution to this work, and the nature of the contribution of each of the co-authors.
2) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;
3) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;
4) there are no other authors of the publication according to these criteria;
(5) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and

(6) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

<table>
<thead>
<tr>
<th>Location(s)</th>
<th>University of Canberra</th>
</tr>
</thead>
</table>

[Please note that the location(s) must be institutional in nature, and should be indicated here as a department, centre or institute, with specific campus identification where relevant.]

<table>
<thead>
<tr>
<th>Signature 1</th>
<th>Signature 2</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T. Cochran</td>
<td>02-08-2013</td>
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<tr>
<td></td>
<td>T. Cochran</td>
<td>02-08-2013</td>
</tr>
</tbody>
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Walking for exercise and walking for transport among Australian adults aged 75 years and over: trends, gender differences and correlates

Bonnie Field1*, Tom Cochrane1, Yohannes Kinfu1

1 Health Research Institute, University of Canberra, Australia

* Corresponding author
Email: bonnie.field@canberra.edu.au

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Abstract

Walking offers a means of increasing physical activity among the most sedentary of adults, and the very elderly are the least active of all population sub-groups. This study examines whether participation in walking had changed recently among men and women aged 75 years and older. Study participants were 1,332 men and women aged 75 years and over in the 2007-08 Australian National Health Survey (NHS) and 1,255 men and women aged 75 years and older in the 2014-15 NHS. All participants lived in the community. Persons who reported having a severe physical disability were excluded. The outcome variables were participation in walking for exercise (WfE) and walking for transport (WfT). Multivariate non-linear decomposition models were used to identify change in WfE and WfT between 2007-08 and 2014-15 and gender differences in each survey year. Logistic regression models were used to determine correlates of WfE and WfT. Participation in WfE or WfT among elderly men and women remained relatively low (between 30% and 45%) and did not change between 2007-08 and 2014-15. No significant gender differences in WfT were observed. Significant gender differences, attributed primarily to socio-demographic differences, were observed in WfE in both survey years, with elderly men walking for exercise more than elderly women and the evidence suggesting that this gap is widening. The regression models identified a greater number of correlates of WfE than WfT. While poor health and disability status were associated with lower participation in both WfE and WfT, the presence of cardiovascular disease and/or diabetes, and arthritis was not. In conclusion, opportunities exist to improve participation in WfE and WfT among both elderly men and women, in particular in WfT, because of its role as an alternative form of mobility as driving diminishes.
Introduction

Walking outdoors, at any age, contributes to accumulated physical activity while also providing a means of transport. Walking also offers a means of increasing physical activity among the most sedentary of adults [1]. Several studies have reported that among older adults 65 years and over, walking is the main contributor to overall physical activity [2, 3] although, in Australia, participation in walking among adults aged 75 years and over is low [4]. In 2016, there were an estimated 1.6 million people aged 75 years and over or 6.6% of the Australian population [5], and this is conservatively estimated to increase to 9.0% in 2036 [6]. Hence, as is occurring throughout the developed world, this age group is expected to occupy an increasing proportion of the Australian population in the coming decades.

In 2010, evidence-based physical activity recommendations targeted at older adults aged 65 years and over were published [7]. Of the five recommendations proposed, two with the strongest evidence were: ‘older people should do some form of physical activity, no matter what their age, weight, health problems or abilities’ and ‘older people should accumulate at least 30 minutes of moderate intensity physical activity on most, preferably all, days’. The egalitarian nature of walking offers an opportunity for the majority of adults aged 75 years and over to meet these two recommendations if they are capable of walking outside the home – either with or without assistance.

Research on walking for different purposes among older adults is limited, although there are several Australian studies involving younger adults. In one study involving men and women aged 18 years and over, Cole et al. [8] examined the socio-demographic variations in WfE and WfT and found that age was a significant contributor to the variability among men and women. In 2007, Owen et al. [9] investigated the moderating effect of neighbourhood walkability on WfE and WfT among adults aged 20-65 years in an Australian city and found that walkability was related to higher frequency of WfT but not WfE. Two recent papers have reported their findings from the HABITAT study, a longitudinal Australian study involving over 11,000 adults and 200 neighbourhoods in Brisbane. Turrell et al. [10] found that among adults aged 40-70 years, WfT declined as people aged, irrespective of neighbourhood differences. Ghani et
al. [11] reported that WfE was more common than WfT among adults aged 42 to 68 years, and among women compared with men in this age group, although this finding was not consistent across neighbourhood types. Previously, Giles-Corti and Donovan [12] had reported that summary measures of individual, social and environmental factors were equally important correlates of walking (derived from the frequency and duration of WfE and WfT combined) among adults less than 60 years of age. Thus, several studies have investigated socio-demographic and environmental factors influencing participation in WfE and WfT among younger adults, but none has analysed change over time and gender differences among the very elderly.

The Australian National Health Survey (NHS) series, conducted by the Australian Bureau of Statistics every 4-5 years, offers an opportunity to investigate possible temporal changes and gender differences in walking among representative samples of elderly Australians. The NHS series collects detailed personal information about health and health service use but does not gather information on environmental attributes about where an individual lives. Thus, the aim of this study was to investigate whether participation in WfE and WfT had changed between 2007-08 and 2014-15 and whether participation in WfE and WfT differed between men and women aged 75 years and over. We also investigated the influence of socio-demographic, health status and cardiovascular disease risk factor on WfE and WfT among men and women as a means of interpreting any observed significant temporal changes or gender differences.

**Methods**

**Study design**

We used data from participants aged 75 years and over in the 2007-08 and the 2014-15 NHS. The 2007-08 NHS was conducted between August 2007 and June 2008 and the 2014-15 NHS between July 2014 and June 2015. Both surveys used a cross-sectional design and data were obtained from different individuals in each survey. Persons in non-private dwellings such as hospitals and nursing homes were excluded. Detailed demographic, health-related and physical activity data from both surveys were collected using trained personnel who conducted face-to-face interviews with one adult aged 18 years and over in private households. The samples were drawn from pre-
determined geographic locations to ensure that sufficient numbers were obtained in each Australian state and territory, each capital city and other broad geographic regions, thereby providing data for a representative sample of the Australian population in each survey. For further details about the design and methods used in the 2007-08 NHS see Australian Bureau of Statistics [13] and in the 2014-15 NHS see Australian Bureau of Statistics [14]. Ethical approval for this research was obtained from the Human Research Ethics Committee at the University of Canberra (HREC: 14-226).

**Participants**

The study included 1,332 men and women aged 75 years and over in the 2007-08 NHS and 1,255 men and women aged 75 years and over in the 2014-15 NHS. All participants lived in the community. In the 2014-15 NHS, a small proportion (<1%) of eligible participants reported being permanently unable to walk, but this information was not collected in the 2007-08 NHS although measures of disability were collected in both surveys. Thus, we excluded persons aged 75 years and over in both surveys who reported having either a profound or severe physical disability (n=131 in the 2007-08 NHS and n=94 in the 2014-15 NHS), but included persons with a profound or severe non-physical disability.

**Dependent variables**

The dependent variables in our study were WfE and WfT. Similar questions were used in both surveys to determine participation in these walking domains. WfE was based on survey participants’ responses to the total time in the last week spent ‘walking for sport, recreation or fitness for at least 10 minutes continuously’. WfT was based on the total time in the last week spent ‘walking for transport for at least 10 minutes continuously’.

**Explanatory variables**

Participant characteristics included in the study as explanatory variables were: age, geographic region, country of birth, education, household composition, household income, health status, CVD and/or diabetes, arthritis, body mass index (BMI), smoking status and other physical activity (excluding walking). All data were self-reported by the participant, apart from BMI which was derived from measured height and weight. These variables were included in our analyses because of their reported association
with walking (including step counts) or physical activity among older adults [10, 15, 16].

**Data analysis**

We examined differences in the characteristics of men and women in our study sample between 2007-08 and 2014-15 using Pearson Chi-square ($\chi^2$) analysis (Table 1). For the variables education, cardiovascular disease and diabetes, and arthritis, <1% were coded as ‘not stated’ or ‘not known’ or were not recorded. As these proportions were small, we considered their effect on the analyses to be minimal. However, a substantial proportion of missing data was recorded for household income and BMI. In the 2007-08 NHS, about 12% of household income data was missing, and in the 2014-15 NHS, about 23% was missing. We imputed the missing observations for household income for both surveys using age, sex and household composition. In the 2007-08 NHS, 33% of women and 28% of men had missing BMI data. The ABS reported a similar proportion of missing BMI data for men and women aged 75 years and over in the 2014-15 NHS (31%) but released these data containing imputed BMI data. The ABS imputed the missing BMI observations in the 2014-15 NHS using the variables age, sex, geographic region (capital city or other), self-perceived body mass (underweight, acceptable or overweight), exercise (sedentary, low, moderate or high) and high cholesterol as a long-term condition [17]. Thus, we imputed missing BMI data in the 2007-08 NHS (28% of men and 34% of women) using the same predictor variables; the imputed data were based on the median value derived from running the multiple imputation procedure 1,000 times.

We analysed temporal changes and gender differences in participation in WfE and WfT using data from the 2007-08 and 2014-15 national health surveys. WfE and WfT were coded as binary variables (<20 min/week or ≥20 min/week). We used multivariate non-linear decomposition logit models to undertake this analysis because the technique accounts for changes in population characteristics between survey years or between genders (also referred to as the explained portion) and changes in behaviour between survey years or between genders (also referred to as the unexplained portion) [18]. Temporal changes were investigated by developing separate models for men and women and comparing WfE and WfT between 2007-08 and 2014-15. Gender
differences were examined by developing different models for each survey year and comparing WfE and WfT between men and women. If change over time or gender differences were significant, we compared the relative contribution of the explained and unexplained portion (expressed as a percentage) to the outcome variable. We analysed correlates of participation in WfE and WfT for each survey year using logistic regression. Correlates were coded as either binary variables or categorical variables.

All analyses were undertaken on population weighted data, except the Pearson Chi-square ($\chi^2$) analysis, to enable generalisation of the findings to the Australian population aged 75 years and over; 95% confidence intervals were reported. The weights were those provided by the ABS as part of the public release of each NHS data set. Population weighted data were not used in the Pearson Chi-square ($\chi^2$) analysis because weighting resulted in large numbers leading to statistical significance in every case. All analyses were performed using Stata Version 13.1. The ‘mvdcmp’ Stata command was used for the multivariate decomposition analysis.

Results

Study participants and participation in walking

Table 1 presents the descriptive statistics for each explanatory variable and the two outcome variables. Based on unweighted proportions, several statistically significant differences were evident between the two surveys in the characteristics of men and women. Between 2007-08 and 2014-15, CVD and/or diabetes, arthritis and disability status changed in men, and health status, arthritis and disability status changed in women. Differences between men and women within surveys also occurred, most notably in education, household composition, arthritis, BMI, smoking status, other physical activity and WfE. In both survey years, a higher proportion of men and women participated in WfT compared with WfE, but a greater proportion of men and women walked for exercise for 150 minutes per week or more than walked for transport for 150 minutes per week.
### Table 1: Characteristics of participants

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<td>&lt;20 (no walking)</td>
<td>61.0</td>
<td>57.6</td>
<td>67.3</td>
<td>69.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 to &lt;150</td>
<td>16.4</td>
<td>22.4</td>
<td>18.5</td>
<td>14.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥150</td>
<td>22.6</td>
<td>20.0</td>
<td>NS</td>
<td>14.2</td>
<td>15.8</td>
<td>NS</td>
<td>&lt;0.05</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Walking for transport (min/week)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20 (no walking)</td>
<td>54.2</td>
<td>55.4</td>
<td>56.0</td>
<td>57.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 to &lt;150</td>
<td>34.2</td>
<td>29.9</td>
<td>35.4</td>
<td>34.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥150</td>
<td>11.6</td>
<td>14.7</td>
<td>NS</td>
<td>8.6</td>
<td>8.5</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

1. Percentages were based on population weighted data. 2. The change between years was based on unweighted data. Pearson Chi-square (χ²) analyses of weighted data return statistically significant differences for all variables, except geographic region in men, because of the large sample size arising from the allocation of the population weights. 3. ‘Other’ geographic regions included inner regional and other. Very remote areas were not included in the study. 4. Data are imputed. Pearson Chi-square (χ²) analyses were run on imputed proportions. 5. Observations coded as ‘not known’ or ‘not stated’ were included in ‘No CVD or diabetes’. 6. Observations coded as ‘not stated’ were included in ‘No arthritis’. NS – not significant.
Temporal changes and gender differences in participation in WfE and WfT

Table 2 shows the results of the decomposition analysis used to investigate temporal changes and gender differences in WfE and WfT. We found no change in participation in WfE or WfT, between 2007-08 and 2014-15, in either men or women and no gender differences in WfT. Consistent with the univariate analysis, however, we did observe a significant gender difference in participation in WfE in both survey years (39% vs. 33% in 2007-08 and 42% vs. 31% in 2014-15). The findings also suggest that the gender gap in participation in WfE widened between the two survey periods.

Table 2: Temporal changes and gender differences in participation in WfE and WfT

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
<th>Difference between men and women</th>
<th>Difference between men and women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2007-08</td>
<td>2014-15</td>
<td>Change over time</td>
<td>2007-08</td>
</tr>
<tr>
<td>WfE ≥20 min/week</td>
<td>39.0%</td>
<td>42.4%</td>
<td>0.03 (-0.04 to 0.10)</td>
<td>32.7%</td>
</tr>
<tr>
<td>WfT ≥20 min/week</td>
<td>45.8%</td>
<td>44.6%</td>
<td>-0.00 (-0.08 to 0.07)</td>
<td>44.0%</td>
</tr>
</tbody>
</table>

1. Missing walking data were included in the proportion of non-walkers. 2. Models were adjusted for age, geographic region, country of birth, education, household composition, household income, health status, CVD and/or diabetes, arthritis, disability status, BMI, smoking and other physical activity. 3. The reference group is 2007-08. Thus, a negative regression coefficient indicates that a greater proportion in 2007-08 WfE/WfT than in 2014-15. 4. The reference group is men. Thus, a negative regression coefficient indicates that a greater proportion of men WfE/WfT than women. 5. Percentages were based on population weighted data.

WfE – walking for exercise; WfT – walking for transport

Decomposition analysis of gender differences in WfE

Table 3 shows the results of the decomposition analysis used to investigate the factors contributing to the significant difference in WfE between men and women in 2007-08 and 2014-15. The findings show a shift towards greater emphasis on differences in population characteristics between men and women in 2014-15 (57%) compared with 2007-08 (53%). In both surveys, gender differences in socio-demographic characteristics contributed more to the gender differences in WfE than health and functional status and CVD risk factor characteristics combined. However, the effect of socio-demographic differences between men and women lessened in 2014-15, and CVD
risk factor characteristics assumed a greater role in the gender differences in WfE. In Table 1, several significant socio-demographic and CVD risk factor differences were apparent between men and women. Compared with men in 2014-15, women were less educated, were more likely to live alone, to have lower household income, to currently smoke or be ex-smokers, and to participate in other physical activity. These gender differences in population characteristics are likely to underpin the gender differences in WfE.

Table 3: Decomposition analysis of gender differences in WfE by year

<table>
<thead>
<tr>
<th>Characteristics of men and women</th>
<th>2007-08</th>
<th>2014-15</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOTAL gender differences in behaviour</strong></td>
<td>47.5 %</td>
<td>43.4 %</td>
</tr>
<tr>
<td><strong>TOTAL gender differences in population characteristics</strong></td>
<td>52.5 %</td>
<td>56.6 %</td>
</tr>
<tr>
<td>Socio-demographic characteristics</td>
<td>48.2 %</td>
<td>38.5 %</td>
</tr>
<tr>
<td>Health and functional status</td>
<td>7.1 %</td>
<td>5.8 %</td>
</tr>
<tr>
<td>CVD risk factors</td>
<td>-2.5 %</td>
<td>11.8 %</td>
</tr>
</tbody>
</table>

| TOTAL | 100.0 | 100.0 |

1 The reference group is men. 2 A difference in the behaviour (i.e. a value ≠ zero) assumes that the population characteristics remain constant; thus a difference in WfE is attributed to behaviour change. 3 A difference in the population characteristics (i.e. a value ≠ zero) assumes that WfE remains constant; thus a difference in WfE is attributed to differences in the population characteristics between men and women. 4 Total gender differences in population characteristics differ from the sum of the individual characteristics due to rounding.

WfE – walking for exercise

Correlates of participation in WfE and WfT

Table 4 shows the results from the logistic regression models based on men and women combined. The variables included in the models are shown as well as the reference category used for each variable. The findings indicate a greater number of correlates of WfE than WfT. Similar to the decomposition analysis, gender contributed significantly to differences in WfE, but not WfT. Health status and disability status were significantly associated with both WfE and WfT in both survey years, and healthy weight (BMI<25) and higher education were significantly associated with WfE in 2014-15, but not with WfT. There was also no association between several variables that might be expected to influence participation in WfE or WfT, specifically, older adults with CVD and/or diabetes or with arthritis.
Table 4: Correlates of participation in WfE and WfT by year (men and women combined)

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds ratios</td>
<td></td>
<td>Odds ratios</td>
<td></td>
</tr>
<tr>
<td><strong>Socio-demographic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex (Men)</td>
<td>0.7*</td>
<td>0.6*</td>
<td>0.9</td>
<td>0.9</td>
</tr>
<tr>
<td>Age (75-79)</td>
<td>0.7***</td>
<td>0.7***</td>
<td>0.8*</td>
<td>0.9</td>
</tr>
<tr>
<td>Geographic region (Major city)</td>
<td>0.7*</td>
<td>0.6**</td>
<td>0.7*</td>
<td>0.7</td>
</tr>
<tr>
<td>Country of birth (Australia)</td>
<td>1.0</td>
<td>1.1</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Education (Degree/diploma)</td>
<td>0.9</td>
<td>0.8*</td>
<td>0.9</td>
<td>0.9</td>
</tr>
<tr>
<td>Household composition (Non-single)</td>
<td>1.1</td>
<td>1.2</td>
<td>1.3</td>
<td>1.1</td>
</tr>
<tr>
<td>Household income (1st to 2nd deciles)</td>
<td>1.5*</td>
<td>1.2</td>
<td>1.5**</td>
<td>0.9</td>
</tr>
<tr>
<td><strong>Health and functional status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health status (Excellent/very good)</td>
<td>0.5***</td>
<td>0.4***</td>
<td>0.6**</td>
<td>0.6**</td>
</tr>
<tr>
<td>CVD and/or diabetes (No CVD/diabetes)</td>
<td>1.1</td>
<td>1.0</td>
<td>0.9</td>
<td>1.0</td>
</tr>
<tr>
<td>Arthritis (No arthritis)</td>
<td>1.2</td>
<td>1.0</td>
<td>1.1</td>
<td>0.9</td>
</tr>
<tr>
<td>Disability status (No disability)</td>
<td>0.7*</td>
<td>0.7**</td>
<td>0.7**</td>
<td>0.7**</td>
</tr>
<tr>
<td><strong>CVD risk factors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI (&lt;25)</td>
<td>0.6***</td>
<td>0.9*</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Smoking (Never)</td>
<td>1.0</td>
<td>1.0</td>
<td>0.8</td>
<td>0.9</td>
</tr>
<tr>
<td>Other physical activity, excluding walking (&lt;20 min/week)</td>
<td>1.2</td>
<td>1.6**</td>
<td>1.2</td>
<td>1.2</td>
</tr>
</tbody>
</table>

*<0.05 **<0.01 ***<0.001

1 Reference category for each variable shown = 1. Thus, if the reference category for age is 75-79 years, odds ratios < 1 indicate that older age groups are less likely to participate in WfE or WfT than those aged 75-79 years.

**Discussion**

This study did not find a significant temporal change in participation in WfE or WfT among men and women aged 75 years and over. We did, however, find significant gender differences in participation in WfE with women less likely to walk for exercise than men in both 2007-08 and 2014-15. The evidence was also suggestive of a widening of the gender gap in WfE over time and was apparent in both the findings from the multivariate decomposition analysis (shown as an increase in the regression coefficients) and the logistic regression analysis (evident in a fall in the odds ratio). We observed no significant gender differences in WfT in either survey period. Nonetheless, participation rates in WfE and WfT in both genders, while neither increasing nor decreasing, remain relatively low (<50%), particularly given that our study excludes elderly adults with a severe or profound physical disability.
Our findings do not accord with a recently reported increase in participation in ‘exercise or physical recreation’ among older adults aged 65 years and over between 2012 and 2015 from 45% to 49% [19]. Although the questions about physical activity participation were different and included persons aged 65 years and over, for comparison, we analysed change in participation in other physical activity, excluding walking, and all physical activity in the previous week between the two surveys. Physical activity comprised the sum in minutes per week of WfE, WfT and other physical activity the two surveys. We did not observe a significant difference in any of these outcomes (data not shown). Thus, among adults aged 75 years and over, participation in WfE and WfT, as well as in other physical activity, appears to have been relatively stable in recent years in both men and women, despite the publication of physical activity guidelines in 2010 encouraging all older adults to be physically active [7].

Consistent with previously reported findings [3], walking continues to be the most common form of exercise in older age with participation in other physical activity considerably lower than WfE or WfT (Table 1). Although some study participants may walk and participate in other physical activity, the majority of elderly adults who walk do not participate in any other physical activity [4]. Our findings for WfE and WfT suggest two contrasting patterns. Firstly, based on higher participation levels in WfT compared with WfE, walking for transport is an important means of mobility for older adults. Secondly, based on the proportion who meet or exceed 150 minutes per week of WfE, an active group of elderly adults (men, more so than women) achieve sufficient physical activity from WfE, alone. Among younger adults, the pattern of walking is different from that of older adults. Ghani et al. [11] found that, among adults aged 42 to 68 years, a greater proportion walked for exercise than for transport (72% vs. 38%). Tudor-Locke et al. [20] reported that among adults aged 15 years and over, WfT contributed more to meeting the public health recommendations than WfE. This latter finding highlights the association of employment with WfT in younger age groups. While employment, as a correlate of WfT is less relevant in persons aged 75 years and over, this age group has potentially more time to use public transport as well as driving less as they age (either voluntarily or following medical advice), particularly those aged
85 years and over. Thus, the association of WfT and public transport use warrants further investigation in this age group.

We observed no gender differences in WfT in either 2007-08 or 2014-15. Owen et al. [9] reported that among adults aged 20-65 years, gender was not associated with duration of WfT (min/week), although women walked less frequently for transport than men. Ghani et al. [11] also found that gender was not associated with WfT or WfE among middle-aged men and women, although across different neighbourhoods, gender was associated with WfT. In both these studies, depending on the aspect of walking that was measured, gender was more likely to be associated with WfT than WfE. However, these studies involved younger age groups and, as such, are not directly comparable with our study.

Similarly, we observed no temporal differences in either WfE or WfT. In one Australian study involving younger age groups some differences in WfT over time have been reported although the findings between the two studies are not directly comparable for several reasons. Turrell et al. [10] found that among adults aged 40-70 years living in an urban environment but within different neighbourhood types, average minutes of WfT per week declined over time, and more so among the older participants. Their study was a longitudinal study; hence they followed the same individuals over time and observed a not unexpected decline in WfT (i.e. as study participants aged); whereas we compared different individuals in the same age group but at different points in time. Their study also focused on duration of WfT whereas we focused on participation. Our focus on participation was intentional because among this elderly population even small amounts of physical activity, such as walking, are beneficial to the health and mobility of elderly adults [21].

The findings from the multivariate decomposition analysis highlight several differences in the characteristics of elderly men and women that are contributing to the gender differences in WfE. The educational attainment of women, while still significantly different from men in this older age group, is expected to lessen as the population ages [22] and differences in the age structure and country of birth of elderly men and women are also narrowing (Table 1). Thus, despite evidence of the gender gap in WfE widening
between 2007-08 and 2014-15, these anticipated changes may, in turn, narrow the
gender gap in WfE in the future.

Several correlates of WfE were observed in 2014-15. Men and women who were
younger, had higher education and lived in a major city were more likely to participate
in WfE. While our findings cover all geographic regions in Australia, excluding very
remote areas, recent Australian research conducted in regional areas also reported a
predominance of socio-demographic correlates of walking among middle-aged and
older adults [23]. The lack of association between older adults with CVD and/or
diabetes and participation in WfE or WfT is also consistent with findings from Field et
al. [4].

Few correlates of WfT were observed in 2014-15. This result is not unexpected because
the models excluded neighbourhood characteristics (e.g. residential density, access to
non-residential destinations, street connectivity and traffic volume) which have been
shown to have a greater influence on WfT than WfE in Australian urban environments
[9] and among older adults [24-27]. Shigematsu et al. [28] have reported, however, that
environmental attributes may play a lesser role in WfT among older adults compared
with younger adults.

A major strength of this study was the use of nationally representative data for the
population aged 75 years and over from two national surveys conducted eight years
apart. Data from the surveys were able to be directly compared because they employed
similar data collection methods and obtained similar information from participants.
The outcome variables, WfE and WfT, were based on self-report, but as both surveys
included a substantial number of participants, any significant temporal changes or
gender differences in WfE or WfT are likely to be real differences because of their binary
categorisation in this study [29]. One caveat to this assumption is that WfT is more
susceptible to inaccurate recall because of its incidental nature, although this is less
likely if WfT is regularly undertaken [20]. An additional strength of this study is the use
of multivariate decomposition – a statistical technique not widely used in public health
to date, but which adds additional analytical capabilities beyond that of regression
alone.
Implications

Walking for exercise and walking for transport both contribute to physical activity but the majority of persons aged 75 years and over still do no walking. Based on the findings of the current study, there is also no evidence of this trend abating in recent years, although there is preliminary evidence that the gender gap in WfE is widening with elderly men WfE more than elderly women. However, as the socio-demographic characteristics of elderly women, such as education, become more similar to that of elderly men, the gap in participation in WfE among men and women may also narrow. Nonetheless, opportunities exist to improve participation in WfE and WfT among both elderly men and women, in particular in WfT, because of its role as an alternative form of mobility at a time when driving diminishes. Older adults, in poorer health or with a disability should also be targeted and assistance to walk outdoors occasionally provided if needed.

Acknowledgments

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References

   http://dx.doi.org/10.1136/bmj.39198.722720.BE


   http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/3222.0Main+Features120 12%
   20(base)%20to%202101?OpenDocument

   http://dx.doi.org/10.1111/j.1741-6612.2009.00388.x


   http://dx.doi.org/10.1016/j.pmedr.2016.05.001


Chapter 4: Walking and mobility among elderly women as they age – perspectives from a longitudinal study

Mobility is fundamental to everyday life and is critical to an understanding of the health and well-being of older populations. (Prohaska et al., 2011, p. 1)

This chapter describes the quantitative component of the thesis that draws on data from a longitudinal study of elderly women and includes Paper 3.

4.1 Purpose

The purpose of this chapter is to examine participation in walking over time among a cohort of elderly women and whether this contributes to the maintenance of mobility.

4.2 Research questions

1. What are the determinants of walking (for any purpose) among elderly women as they age?
2. Does walking predict better mobility in elderly women as they transition from their mid-70s to their late 80s?

4.3 Summary of methods

Paper 3 used data from the older cohort (born in 1921-1926) in the Australian Longitudinal Study on Women’s Health (ALSWH) to investigate walking and mobility among elderly women. The ALSWH began in 1996 and is a prospective study of changes in the health and wellbeing of Australian women. This study included data from the survey years 1999, 2002, 2005, 2008 and 2011. Between 1999 and 2011, numbers of study participants fell dramatically, from 10,322 to 4,055, due to non-participation as well as deaths in this cohort of elderly women. These five survey years were chosen because physical activity, including walking, was measured the same way in each
survey. Walking was based on self-reported minutes walked per week. Mobility status was measured using a mobility score, use of a mobility aid and main mode of transport (e.g., drives oneself). A mobility score was developed for each participant based on self-reported ability to walk certain distances and to climb stairs. Women unable to walk at baseline were not excluded because 920 women were not asked about walking in the 1999 survey. We noted, however, that 37% of women (including the 920 women) reported doing no walking in the 1999 survey and of these the majority (based on their older age) were unlikely to report walking in later surveys. Longitudinal methods of data analyses were employed to determine the effect of walking on mobility.

4.4 Summary of findings

Paper 3 concluded that a dose-response relationship existed between walking duration per week and mobility. Walking also reduced the likelihood of using a mobility aid but was not associated with continuing to drive oneself. The characteristics of the women in the study changed substantially over the 12 year period of follow up. At 85-90 years, 62% were living alone, 22% needed assistance with daily living, and 50% had had a fall in the previous 12 months. Nonetheless, 35% were still doing some walking at this age. The majority of socio-demographic, health status, physical function, cardiovascular disease risk factors and social engagement variables influenced walking in the direction expected, except income management and the number of chronic diseases (excluding arthritis) which had no effect.
Paper 3: Walking up to one hour per week maintains mobility as older women age: findings from an Australian longitudinal study
FORM E: DECLARATION OF CO-AUTHORED PUBLICATION CHAPTER

For use in theses which include publications. This declaration must be completed for each co-authored publication and to be placed at the start of the thesis chapter in which the publication appears.

Declaration for Thesis Chapter 4 – Paper 3

Declaration by candidate

In the case of Chapter 4 – Paper 3 the nature and extent of my contribution to the work was the following:

<table>
<thead>
<tr>
<th>Nature of contribution</th>
<th>Extent of contribution (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designed, analysed, prepared and submitted the article for publication.</td>
<td>90%</td>
</tr>
</tbody>
</table>

The following co-authors contributed to the work.

<table>
<thead>
<tr>
<th>Name</th>
<th>Nature of contribution</th>
<th>Contributor is also a student at UC Y/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Yohannes Kinfu</td>
<td>Advised on data analysis and reviewed paper.</td>
<td>N</td>
</tr>
<tr>
<td>Prof Tom Cochrane</td>
<td>Reviewed paper.</td>
<td>N</td>
</tr>
<tr>
<td>Prof Rachel Davey</td>
<td>Reviewed paper.</td>
<td>N</td>
</tr>
</tbody>
</table>

Candidate’s Signature

Date 2 Aug 2017

Declaration by co-authors

The undersigned hereby certify that:

(1) the above declaration correctly reflects the nature and extent of the candidate’s contribution to this work, and the nature of the contribution of each of the co-authors.

(2) they meet the criteria for authorship in that they have participated in the conception, execution, or interpretation, of at least that part of the publication in their field of expertise;

(3) they take public responsibility for their part of the publication, except for the responsible author who accepts overall responsibility for the publication;

(4) there are no other authors of the publication according to these criteria;
(5) potential conflicts of interest have been disclosed to (a) granting bodies, (b) the editor or publisher of journals or other publications, and (c) the head of the responsible academic unit; and
(6) the original data are stored at the following location(s) and will be held for at least five years from the date indicated below:

<table>
<thead>
<tr>
<th>Location(s)</th>
<th>University of Canberra</th>
</tr>
</thead>
</table>

(Please note that the location(s) must be institutional in nature, and should be indicated here as a department, centre or institute, with specific campus identification where relevant.)

<table>
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<th>Johannes Kimfu</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signature 2</td>
<td>Tom Cochrane</td>
<td>02/08/2017</td>
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<tr>
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<td>21/8/17</td>
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Chapter 4

This chapter has been removed due to copyright restrictions.

This chapter is available as:


Links to this chapter:

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Abstract

The aim of this study was to identify determinants of walking and whether walking maintained mobility among women as they transition from their mid-70s to their late 80s. We used 12 years of follow-up data (baseline 1999) from the Australian Longitudinal Study on Women’s Health (n = 10,322). Fifteen determinants of walking were included in the analysis and three indicators of mobility. Longitudinal data analyses techniques were employed. Thirteen of the 15 determinants were significant predictors of walking. Women in their mid-70s who walked up to 1 hr per week were less likely to experience loss of mobility in very old age, including reduced likelihood of using a mobility aid. Hence, older women who do no walking should be encouraged to walk to maintain their mobility and their independence as they age, particularly women in their 70s and 80s who smoke, are overweight, have arthritis, or who have had a recent fall.

Keywords: aged, Australia, health surveys, public health, walking, mobility
Chapter 5: Experience and meaning of walking to elderly women who walk – perspectives from a qualitative study

Old age is the sole period of life in which only those individuals who inhabit it can truly know it.
(Settersten & Trauten, 2009, p. 468)

This chapter describes the qualitative phase of the thesis.

5.1 Purpose

The purpose of this chapter is to describe the methods, findings and conclusions from a qualitative study involving interviews with elderly women about their experience of walking as well as my observations of the neighbourhood walking environment in which the study participants lived. The study focused on women who walk rather than women who do not walk.

5.2 Research question

What is the experience and meaning of walking to women in their mid-70s and older, who self-identify as regular walkers in their neighbourhood?

5.3 Introduction

As far as the author was aware, no qualitative research had been published which focused on the experience of walking among elderly women who regularly walk in their neighbourhood. Thus, a better understanding of this experience may inform recommendations to promote and maintain participation in walking among women in this age group. Most notably, the meaning attributed to the experience of walking by elderly women is likely to differ from younger women, including those aged 65 to 74 years because of differences in health and functional status, as well as personal circumstances (e.g., the increased likelihood of elderly women living alone compared
with younger women). The era into which elderly women were born is also likely to influence their attitudes to walking and exercise, in general, compared with younger women.

Two theoretical perspectives (referred to in Chapter 2) informed this study. Firstly, Atchley’s Continuity Theory of Normal Ageing (Atchley, 1989) which accommodates continuity and adaptation as fundamental to the experience of ageing; such that as individuals age, they maintain a version of their former selves. Elderly women who regularly walk in their neighbourhood are likely to be continuing past patterns of behaviour while also managing and adapting to the inevitable changes associated with their ageing bodies. However, Atchley’s Continuity Theory has been criticised because of its focus on the individual to the exclusion of the influence of the external environment on adult behaviour (Achenbaum, 2009). Hence, this study was also informed by the socio-ecological model of health behaviour (Sallis et al., 2008) to take account of the effect of the social and physical environments on the health behaviour of individuals. Socio-ecological models are valued because they “acknowledge and give shape to the complexity of factors that influence human behaviour, but when applied in real world situations can mask subtle effects of the social and physical environments” (Sallis et al., 2008, p. 480). Detailed descriptions of behaviour, collected and analysed as part of a qualitative research approach, have the potential to unmask some of these effects.

Investigation of the experience and meaning of walking to elderly women was possible through the qualitative research technique of interpretive phenomenological analysis (IPA). IPA is underpinned by the theoretical perspectives of phenomenology and hermeneutics (Smith et al., 2009, p. 23) – the former being how individuals make meaning out of their lived experience and the latter being the subsequent interpretation of that experience by the researcher. The resulting interpretation, based on the individual’s description, is constrained both by the individual’s ability to describe their experience as well as the researcher’s ability to interpret that description (Larkin et al., 2006). Walking may seem an unusual phenomenon to study given its prevalence in everyday life, but it was considered to be an activity worthy of reflection in this population, particularly as regular outdoor walking is uncommon among elderly women.
(Australian Bureau of Statistics, 2013a). Furthermore, although IPA is often used to explore exceptional, life-changing experiences, Smith et al. (2009) considered that “phenomenological analysis has much to offer” (p. 187) in the examination of everyday experiences. IPA was used by Darker et al. (2007) to explore walking behaviour among adults aged 25-35 years. They found that walking was not considered ‘proper exercise’ in this age group. By contrast, the meaning of walking in elderly women was anticipated to be quite different from that of younger populations. Hence, the aim of this study was to explore the experience and meaning of walking among women aged 75 years and over who report walking regularly in their neighbourhood, both in the context of their previous walking experience as well as the neighbourhood in which they walk.

5.4 Methods

5.4.1 Study design

The design of the study was based on IPA. IPA was considered appropriate for this study because among elderly women who regularly walk in their neighbourhood walking would be an experience that could be described in some detail. IPA employs small sample sizes because the approach is concerned with the insights of individuals who share a common experience while also enabling some unique accounts of their experience to emerge (Smith et al., 2009, p. 51).

5.4.2 Participants

Study participants were identified by several means. A short advertisement about the study was placed in the Australian Capital Territory’s (ACT) Seniors e-Newsletter circulated monthly by email and as hardcopy by post by the ACT government’s Office for Ageing (see Appendix 5.1). The same advertisement was also included as a news item on the CanWALK website on 17 May 2016 and the Heart Foundation ACT assisted with disseminating information about the study. Participants were also identified by word of mouth. A Participant Information Form (see Appendix 5.2) was sent to participants who contacted the author. The form described the study in more detail, the anticipated length of the interview and assured confidentiality in all aspects of the research. The recruitment process was conducted over a period of approximately two months.
Eight women participated in the study. One woman who expressed an interest in participating was excluded because she was in her early 70s and was outside of the study's scope based on her age. All participants were asked to provide informed consent (see Appendix 5.3) to be interviewed and for the interview to be recorded. Eligible participants were community-dwelling women aged 75 years and over who self-identified as regular walkers in their neighbourhood. The author did not define the term ‘regular walker’ but allowed participants to decide if they would consider themselves to be regular walkers. The study employed purposive sampling and continued to include participants in the study until saturation of emerging themes was obtained (see Section 5.4.4). Participants were not reimbursed for their participation.

Participants were interviewed by the author in their homes throughout suburban Canberra, Australia. Canberra is a planned city with suburbs comprised of mainly low density detached houses with a smattering of medium density housing located near central suburban shopping areas. Paved footpaths are common, but not universal, and some suburbs have bicycle paths which are used by both walkers and cyclists. Access to open space, such as playing fields and nature reserves, is also common.

5.4.3 The interviews

The interviews, conducted during May and June 2016, were audio recorded (if the participant consented) and transcribed verbatim using a professional transcribing service. Two participants were interviewed simultaneously, and another participant did not consent to her interview being recorded. In this instance, notes were taken during the interview, and these were reviewed and annotated soon after. Before and after each interview, the author noted aspects of the suburban environment in which each participant lived, which enabled comparison between the participant’s description of their walking environment and the interviewer’s perception of that environment.

Before the start of each interview, a small amount of demographic information was collected: age, education, living arrangement, housing type, whether still drives or uses a mobility aid and self-perceived health status (see Table 5.1). The purpose of collecting this information was to provide both the author as well as the readers with an overview of the study participants and to aid in the interpretation of participants’ experiences.
Table 5.1 Participant characteristics in the qualitative study

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age (years)</th>
<th>Education¹</th>
<th>Lives alone</th>
<th>Housing type²</th>
<th>Still drives</th>
<th>Uses a mobility aid</th>
<th>Self-perceived health status</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>85</td>
<td>Post school</td>
<td>Yes</td>
<td>Freestanding house</td>
<td>Yes</td>
<td>No</td>
<td>Excellent/very good</td>
</tr>
<tr>
<td>B</td>
<td>78</td>
<td>School only</td>
<td>Yes</td>
<td>Townhouse</td>
<td>Yes</td>
<td>No</td>
<td>Excellent/very good</td>
</tr>
<tr>
<td>C</td>
<td>77</td>
<td>Post school</td>
<td>Yes</td>
<td>Townhouse</td>
<td>Yes</td>
<td>No</td>
<td>Excellent/very good</td>
</tr>
<tr>
<td>D</td>
<td>75</td>
<td>School only</td>
<td>No</td>
<td>Freestanding house</td>
<td>Yes</td>
<td>No</td>
<td>Excellent/very good</td>
</tr>
<tr>
<td>E</td>
<td>78</td>
<td>Post school</td>
<td>No</td>
<td>Freestanding house</td>
<td>Yes</td>
<td>No</td>
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<td>F</td>
<td>77</td>
<td>School only</td>
<td>No</td>
<td>Freestanding house</td>
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<td>G</td>
<td>80</td>
<td>School only</td>
<td>Yes</td>
<td>Townhouse</td>
<td>Yes</td>
<td>No</td>
<td>Good</td>
</tr>
<tr>
<td>H</td>
<td>83</td>
<td>School only</td>
<td>Yes</td>
<td>Townhouse</td>
<td>Yes</td>
<td>No</td>
<td>Excellent/very good</td>
</tr>
</tbody>
</table>

¹ 'Post school' education includes vocational or university education.
² 'Freestanding house' is regarded as low-density housing and a 'townhouse' as medium density housing.

Each interview started with the participant being asked to recall and describe a recent walk in her neighbourhood and what they had experienced, enjoyed, or disliked about this walk. Thereafter, a range of topics was included in the interview (see Table 5.2); although many of the topics were raised spontaneously by the participant. Everyday language was used in the wording of interview questions, and the author proceeded in a conversational style. The author has lived in Canberra for many years and has walked for exercise and transport throughout her adult life.
Table 5.2 Interview guide used in the qualitative study

1. Can you tell me about a recent walk in your neighbourhood? Was it enjoyable or unpleasant for any reason?
2. Have you always walked or is this a more recent activity in your life?
3. Can you describe how important walking is in your life?
4. How often do you walk? How far? Do you usually walk at a certain time of day?
5. Do you usually walk alone or with others? Which do you prefer?
6. How has walking changed for you since you were younger? Do you experience any pain when you walk?
7. Do you own a dog or did you previously own a dog?
8. Has there been a time when you could not walk and, if so, how did you start walking again?
9. Are there shops or a bus stop nearby? Do you walk to these or other destinations?
10. Do you think you will continue to walk well into your old age?

5.4.4 Data analysis

This study used a hybrid approach to the analysis of data. The approach was guided by the two a priori theoretical perspectives (inductive) and involved analysis of raw data (deductive). The inductive analysis used the two theoretical perspectives (Atchley’s Continuity Theory of Normal Ageing and the socio-ecological model of health behaviour) as signposts to identify themes and sub-themes. The deductive analysis began by the author noting initial thoughts immediately after each interview and listening to each recorded interview several times. Once the professionally transcribed interview data were available, each was examined in detail and annotated. As the author became more familiar with the data, emergent themes were identified. This process was applied to each transcript looking for new themes and confirming existing themes. The process was iterative and involved repeated viewings of the raw data. Finally, relationships between the emerging themes were identified to enable the grouping of themes with conceptual similarities. Each cluster was then given a descriptive label which allowed the data to be grouped together into themes and sub-themes. Throughout this process the author was examining concordance with the
theoretical perspectives while also remaining open to the emergence of unexpected themes and sub-themes.

Several strategies were used to ensure the quality of this study. Descriptive data about the participants have been included, and the background of the author is acknowledged. Methods and procedures are described in-depth to enable reproducibility, and verbatim examples of the data are given to illustrate each theme.

5.4.5 Reflexivity

The small number of participants allowed the interviewer time between each interview to reflect upon the content of each interview and to incorporate any possible changes in approach in the next interview. The interviewer’s interpretive framework was influenced by her experience of regularly walking in her neighbourhood and the nature reserves scattered throughout Canberra. The interviewer also analysed all the data. While this risks introducing systematic bias into the analysis, the author discussed the findings with her colleagues to minimise this risk.

5.5. Results

The women in the study were between 75 to 85 years of age. All the women reported walking regularly based on their descriptions of how often (usually several times per week) and how far they walked. All participants still drove a car, although not at night. None of the women needed assistance to walk or reported using a mobility aid, such as a walking stick, although several women reported using walking poles when they walked on rough terrain. Most women reported their health to be ‘very good/excellent’ and based on the interviewers’ observations this perception matched their demeanour and was reflected in their enthusiasm for walking as well as participation in other physical activities. Some women attributed their good health and freedom from pain to good luck rather than any particular behaviour.

The neighbourhoods of all study participants were quiet with negligible traffic volumes and few people visible during the day. Some women lived in medium density housing (townhouses) and some in detached houses but all were close to paved footpaths, or grassed nature strips separate from road surfaces. Some women lived a short walk
from nature reserves which are typical of those in Canberra; lightly wooded and often with wide, formed gravel walking paths. Most women lived within 5-10 minutes' walk of a shopping precinct or a bus stop. To walk to these amenities, some women needed to cross busy roads but could do this at traffic lights or, in one case, using a pedestrian underpass. Buses are the only form of public transport in Canberra and are accessible in most suburbs.

Three major themes emerged from the data. The first, and most notable theme, was that ‘walking was a significant part of the lives’ of the study participants. The second theme was ‘the pleasure of walking’, and the third theme was ‘connection to the neighbourhood through walking’. Each of these major themes and associated sub-themes is discussed below. Table 5.3 provides a summary of the findings from this study.

5.5.1 Significance of walking throughout their lives

The significance of walking to the study participants as an important and worthwhile personal activity, both now, in the past, and into the future, emerged as the most prominent theme.

Habit of walking
Most of the women had been walkers throughout their adult lives, and all had walked since middle age. For some women walking was an integral part of their lives. These women self-identified as ‘walkers’ as indicated by the following accounts.

[E] I’m very much a walker and need that to give me that little bit oomph ... I can’t imagine not walking ... it’s just a natural part of my day, and if I don’t walk I can get very ... not down, but I just haven’t gotten that lift in myself.

[C] As children we always went out – we did a lot of camping and went out into the natural world. Walking is part of what you do if you’re sitting out in the middle of it all. I’ve always walked.

Walking was also a family activity for one woman, particularly when her children were younger.

[F] We always took our kids out on a Sunday. I thought it was sort of better than church being all together and then we continued it with my sister and brother-in-
law and so we've walked on Sundays in the winter at or around Canberra for years. Not in a bushwalking club though. Just a little walking.

For another woman, walking was a family activity when she was a child herself.

[H] Even as a child on a Sunday, because there was no entertainment or that sort of thing, the family would go for a walk. If you walked ... not far was the city of Caulfield, they had a brass band, so we would walk to the bandstand, and listen to the band playing, then walk home again, which was quite a step.

And walking carried over into her married life. Married over 60 years ago, she recalled the role walking played on her honeymoon.

[H] My husband and I always walked. When we went on our honeymoon, we walked. It wasn't going to fancy places or anything. We went to a place that's not there anymore, Marysville ... we stayed, and we walked all the trails.

The women who had started walking in middle age were less likely to identify themselves as walkers, but walking was still an activity in which they regularly participated; most walked daily and at regular times, most commonly in the early morning. For all the women interviewed, walking, in addition to other activities, gave structure to their days and weeks. For most of the women, the habit of walking over a long period of time, and in different environments, was expressed by the desire to continue walking as they got older. Some women expressed this desire through the observation of family members.

[E] Judging by my sister who's well into her late 80's and still walks every morning, I gather I will too.

[F] And my mother ... was still walking up to 90. She got to one month off 99, but she would walk down to the shops ... along the paths.

The oldest woman among those interviewed considered walking as part of a moral obligation to look after her health as she aged.

[A] If I'm going to get old, I want to be as healthy as I can be ... because the less I do the sooner ... I'm going to be a liability. And I just think that it's a duty ...

Only one woman owned a dog which she walked every morning although she was uncertain if she would continue to do this walk if she no longer owned a dog. She did regularly walk for transport in her neighbourhood.
All the women expressed considerable concern when asked about how they would feel if they couldn't walk in the future or for a period due to illness or injury.

[F] If I was confined and couldn't walk and was in a wheelchair, I would have to be taken out. I'd have to go outdoors and just feel it.

[E] ...I can’t imagine not walking.

Overall, the women were thankful for what their ageing bodies were currently allowing them to do rather than focusing on potential future limitations. Most indicated that they would pursue other outdoor activities if they were no longer able to walk outdoors.

Just walking

The distinction between walking for different purposes (e.g., for exercise or for transport) was stated explicitly by some, but not by all the women. Those women who walked mainly for enjoyment were less likely to walk for transport. Nonetheless, all the women did walk to get to and from places, such as to the local shops, to a bus stop, and to an exercise class, or in one case to walk her grandchildren to and from the bus stop. One woman often walked to various destinations, and if she hadn’t fitted this into her day, she would walk in her neighbourhood later in the day.

[B] Yes, I walk to get somewhere usually but, as I say, if I haven’t walked in the day, like Wednesdays, I sometimes go out and do a walk around the neighbourhood.

One woman was trialling being without a car and was investigating her public transport options. When asked by the interviewer, she acknowledged that this was increasing her amount of walking. Some women said that they did not use public transport in Canberra – mainly those who lived with their spouses or who were comfortable driving around Canberra. While all the women still drove, due to lack of familiarity some preferred to catch the bus when going out of their immediate neighbourhood.

[C] I prefer to go by bus to the centre of town. I don’t like to drive in. It’s not familiar to me. I don’t know that I would bother making it familiar. I’m on the edge of it being a sensible thing for me to be doing. I prefer to go by bus.

Walking was a part of the women’s mobility within and beyond their neighbourhood. Some women also acknowledged the importance of this in the future, particularly those that were living alone.
**Active women**

All the women walked several times per week and in some cases every day. Duration of walking varied but all would exceed the recommended amount of 150 minutes per week of physical activity (Sims et al., 2010) from walking, irrespective of other physical activity.

[B] *I walk Mondays, if I can, to table tennis. Tuesdays, I play bridge … I walk there if it’s a nice day and back again. Wednesdays, I don’t walk……Thursdays, I drive to [place withheld] and play table tennis, so I don’t usually walk on Thursdays because I’m exhausted after that. Friday, I might do the Friday walk from here …*

Some women indicated that if they didn’t walk in the morning, their days were so busy they might not fit their walking in later in the day. One woman stated that she walked a lot more than usual when she was on holidays with her husband.

[D] *We walk on average between five and ten kilometres a day when we’re away, because we like going to see things. If you get tired, you can always get the local bus back to the unit.*

Some women participated in walking groups, although one woman no longer participated in a walking group because she felt she walked too slowly. All the women participated in other physical activities. The health benefits of these additional activities were valued.

[H] *They actually run a course for older people over 70, I think it was. We went on Thursday morning and did an hour of getting out and off chairs, because it was amazing how that was another thing that I was struggling with. I can actually get up off a chair now, and balancing, and standing on one foot, and all sorts of things.*

Participation in these activities also provided social contact and was valued for this reason as well as for the health benefits. Some women indicated that they had done other more vigorous forms of exercise when they were younger but had given these up over time.

**Adaptation**

The women adapted their walking to their current capabilities. In particular, they walked at their own pace, they walked with others, and some took a mobile phone with them in case they fell or needed assistance when they were away from home. Interestingly though, because this age group of women had spent most of their adult
lives without a mobile phone, taking a phone with them when they walked wasn’t raised by many as something they usually did, nor felt the need to do. One woman, who didn’t own a mobile phone, wore a bracelet (given to her by her daughter) engraved with her daughter’s contact details in case of an emergency. Most notably, the women were aware of their changing capabilities.

[F] I noticed that we aren’t as spry as we were, but we still enjoy it [walking]. You do slow down.

[C] I suppose the underpinning is just accepting that I have the physical well-being to do it [walk] easily up until now. Now that’s diminishing. I no longer enjoy going up hills where before I would have chosen to walk all day from choice, I now wouldn’t do that. Two hours is enough. There’s a big change.

The rate of change in capability with increasing age was also expressed.

[A] Well, it’s the rate of deterioration. Probably every 5 years as you go. So, trying to think back on 75 and the amount of things that I wouldn’t have thought twice about doing …

[Interviewer] So, it is different at 65, 75, 85?


Use of walking (Nordic) poles was another means of adaptation although they were infrequently used by those who owned them. Some women had used walking poles when they were younger and were walking in more challenging terrain. One woman had recently obtained a walking pole and was keen to try it out. She mentioned that her balance was not good and neither was her eyesight, particularly in identifying changes in surface. This experience was not uncommon. One woman [A] lamented the fact that her failing eyesight ‘stops you from being adventurous’. Another woman stated that she had bought walking poles (she had two) to enable her to continue walking as she aged.

The fear of falling was the main concern expressed by all the women. Some had previously fallen, although none seriously, but among those who hadn’t they were aware of how easily a fall could happen. Some women had observed others who had had severe falls and were unable to walk again and this was a motivating factor to take care not to fall themselves. Other women, aware of their loss of balance and stability as they have aged, had adjusted their walking accordingly.
Several women had arthritis but none indicated that this condition was affecting their walking. None of the women said they currently experienced pain when they walked, although some had had pain previously, including foot pain. [B] *I have had periods when I couldn’t walk. For instance, I got plantar fasciitis in one heel, and when that got better, couple of years later I got it in the other heel, so that took me out for quite a while. Then ... my knees suddenly got very sore, so I had an arthroscopy, but I've continued to do the exercises that they recommended and it's fine and I haven't had any trouble with the other knee.*

In summary, walking for these women was primarily motivated by habit. Habit driven behaviour, particularly when it is shared by others and associated with pleasant memories, meant that rather than give up walking, the women adapted their walking behaviour in response to their changing physical capabilities. Their habit of walking also appears to be closely linked to the regularity in which they walked and their participation in other physical activities – further reinforcing awareness of their bodies’ capabilities. They were active women in ageing bodies.

### 5.5.2 Pleasure of walking

The pleasure of walking, more so than other reasons to walk, emerged as a significant feature of the experience of walking in the study participants’ lives.

**Pleasure versus health benefit**

The women were aware of the health benefits of walking but for several women this was a lower priority compared with walking for other reasons. This sentiment was expressed very succinctly by one woman.

[C] *I'd rather have it enjoyable. I'm only doing the things that I find enjoyable ... I'm not really motivated to be fit. No, I don't care too much. At 77, who cares?*

For others, walking for health and for pleasure was equally important.
For pleasure and to keep fit. If you don’t use it, you lose it. We’ve seen too many people in our parents’ day where they’ve literally sat in the chair and vegetated. We were never going to do that.

When health was mentioned, the emphasis was on bodily maintenance rather than improvement, such as ‘to maintain weight’, ‘because it’s good for me’, or ‘for my bones’. Greater emphasis was also placed on the mental health benefits of walking than on physical health.

I think walking does contribute to a positive attitude. I really do. I think it sets a tone for the day and I think people who don’t walk quite often haven’t got that extra vitality or energy early in the morning.

I think I’d probably say that exercise contributes to my wellbeing definitely … and particularly mental wellbeing … I think that it is important for people.

Pleasure derived from walking alone or with others

The majority of women who lived alone also walked alone and they were quite happy doing this.

I’m absolutely happy to be by myself. I don’t have to have anybody with me. I always carry a mobile phone with me now because I fear I don’t want to be falling over. I’m not adventurous. I don’t go hiking in the bush or anything like I used to. I don’t do the sort of walking that I need to take my hiking stick with me.

I probably prefer to walk on my own, but I do that [walk with others] because I think the social activity’s good. I think that particularly in older age, I do join in activities just to be connected to the world – walking is one of those.

Women who didn’t live alone, walked with their partners/husbands and only occasionally did they walk alone. Two of the women interviewed were friends – they had been walking together for 34 years. Walking facilitated both opportunities to be with others as well as connectedness with their neighbourhood. Commenting on a fellow walker who had moved away from their neighbourhood one woman said:

One of the ladies that walked on the hill is devastated not to. She’s 85 and she’s had to move … and her legs aren’t good but she has a friend who comes around and the other day took her up [the hill]. Amazing. It took them an hour to do it. She would have done it in half an hour once but her husband’s scattered up there and she goes up and talks to him.
**Enjoyment of surroundings**

Several women expressed particular joy in walking in the natural environment. They mentioned the native flowers and how these changed throughout the seasons, kangaroos, time of day – sunrise and sunset in particular, and views to the mountains. In built up areas, enjoyment was derived from looking at new houses being built and renovations to existing houses, as well as looking at other people's gardens.

[D] *When we walk around the streets, we check up on people's gardens, too. We know a lot of people around the streets here. If they're out in the garden we'll stop and talk, sometimes take a cutting off their plants. It's a neighbourhood.*

In summary, the pleasure of walking for these women was expressed simply as the enjoyment of walking, as walking alone or with others, through connection with others (including those who have died) and enjoyment of their immediate neighbourhood or accessible natural environments. The women did not describe their enjoyment of walking in terms of any bodily sensation – for example, it is possible that they regularly experience some pain – but the pleasure they derive from walking appears to override any complaints they might express about their bodies while walking. Their pleasure of walking, in turn, reinforces their habit of walking.

**5.5.3 Connection to the neighbourhood through walking**

Walking regularly in their neighbourhood facilitated and, over time, strengthened the connection to their neighbourhood.

**Sense of belonging**

The sense of belonging to their neighbourhood was expressed in various ways. Some women said how much they enjoyed living in their neighbourhood and walking enhanced this enjoyment and connection to their neighbourhood. One woman talked of the people, and dogs, she met regularly on her walks in the nearby nature reserve.

[D] *You meet the same people and the same dogs. You get to know them. Makes up a bit for not having a dog yourself anymore. It's just lovely out there.*

Some of the women talked of being on extended holidays and the pleasure of returning home.

[E] *Always ready to come home......This is belonging.*
Several women had lived at their current address for many years (decades in some instances) and were comfortable and familiar with their environment. Some women indicated that they did not want to move from where they currently lived even though they acknowledged that for various reasons it was a decision they might face in the future.

**Somewhere to walk**

All the women were able to walk in the immediate vicinity of their homes and various places (shops, library, bus stops) were mostly within 10-15 minutes walking distance. Several women chose to live in neighbourhoods close to local nature reserves.

[C] *I like to be in a beautiful place. I wouldn’t even walk from choice just around the streets. I would prefer to hop in the car and go to some open space. Normally there’s plenty of open space not far. Living here, I don’t even have to get in the car.*

Noticing changes in the neighbourhood was also part of the walking experience for some women, particularly those who had lived in their neighbourhood for a long time.

[D] *You walk around, but you see what people have done to their gardens and whether they’ve changed anything. A lot of the people that we’ve known over the years have moved, and the younger people work. You haven’t always got the same people to talk to anymore that you used to.*

**Few neighbourhood challenges**

The women did not express many concerns about the environment in which they walked. For example, none of the women were concerned about their personal safety, such as crime or crossing busy roads. The need to cross roads as part of their walking route was mentioned by several women, usually to go somewhere during the middle of the day when the traffic was reduced, but none indicated that this was a safety concern.

Negotiating the hilly terrain, where most women lived, was rarely mentioned as a challenge (a possible reflection of their considerable fitness) but walking downhill in nature reserves posed more problems because of uneven surfaces. One concern mentioned by two of the women was the issue of walking on cycle paths.

[A] *I’m very nervous, very nervous on these joint paths. There are cyclists on them. They have not yet learnt to ring the bell 200 yards away from where you are. If they’re kind enough to ring at all, they ring it when they’re almost on you, and you nearly fall over backwards. So, I won’t walk down on the [bike] path down the lake*
... I certainly won't go in the mornings when I know there's going to be people going to work and in the afternoon ... Generally speaking, because I've had some pretty narrow scrapes, I've started to avoid the walk down there altogether – plenty of nice areas around here where you don't have to go down to the lake.

None of the women walked at night, mainly because of impaired vision and the associated risk of falling.

[A] I won't walk at night; not because I'm physically afraid ... I think we're relatively safe around here. I'm not that worried. I don't see as well, so therefore I am not seeing the footpath to a certain extent. That's dangerous. As falling is my chief priority I won't walk after dusk.

In summary, the neighbourhoods in which these women lived did not restrict their walking. Although their neighbourhoods would not be defined as highly walkable, they had several features that facilitated walking – formed paths enabling the women to walk safely, access to nature reserves and destinations within walking distance. Regularly walking in their neighbourhoods strengthened their connection and sense of belonging to the place where they lived, which in turn contributed to their pleasure, and negated potential barriers to walking that other, less experienced, elderly walkers might see as obstacles.
<table>
<thead>
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<th>Themes</th>
<th>Sub-themes</th>
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| **Significance of walking throughout their lives** | **Habit of walking** – The women had walked throughout their lives (or at least since middle-age). For some, walking had often been a family activity – when they were young themselves or with their own children. The women wanted to continue walking, despite awareness of their ageing bodies, and most were concerned about the possibility of not being able to continue their habit of walking in the future.  
**Just walking** – The distinction between walking for different purposes (e.g., for exercise or for transport) was sometimes stated explicitly, but not always. The women did walk for different purposes but seldom did they comment on there being a difference. The importance of walking as a form of mobility both now and in the future was mentioned by some women.  
**Active women** – All the women regularly walked (several times per week) and participated in other physical activities – gardening was common but other activities included: lawn bowls, going to the gym, table tennis, aquatic exercise, tai chi and core fitness for over 55s.  
**Adaptation** – The women were adapting their walking to the challenges of ageing, in particular, fear of falling, failing eyesight and maintaining balance. The women’s experience with walking meant that they were aware of their capabilities as well as their limitations and they adjusted their walking accordingly. |
| **Pleasure of walking**                      | **Pleasure versus health benefit** – The women walked for pleasure more than for health. When health was mentioned, bodily maintenance was more important than improvement and mental health was generally more important than physical health.  
**Pleasure derived from walking alone or with others** – Walking alone was common and enabled connectedness with the neighbourhood while walking with others facilitated connectedness to each other as well as to their neighbourhood.  
**Enjoyment of surroundings** – Numerous features of their neighbourhood environment were mentioned as enjoyable: nature, native flowers, kangaroos, birds, changing seasons, views to the mountains, sunrises and sunsets, hot air balloons in the early morning, gardens, changes in their neighbourhood, to name a few. |
| **Connection to their neighbourhood through walking** | **Sense of belonging** – Several women, particularly those who had lived in the same place for many years, expressed a sense of belonging to their immediate surroundings as a result of regular walking. They knew people, knew their dogs and looked forward to returning to their neighbourhood after being away.  
**Somewhere to walk** – The neighbourhood facilitated walking for different purposes – access to nature reserves, to footpaths, to destinations, and to public transport. Familiarity with and a sense of belonging to the neighbourhood facilitated walking for many women.  
**Few neighbourhood challenges** – The women mentioned few obstacles to walking in their neighbourhood. The main neighbourhood concern was the speed of cyclists on shared paths. Concern about personal safety, quality of footpaths, crossing busy roads or hilly terrain were mentioned by some women but were not considered barriers to walking. |
5.6. Discussion

This study offers unique insights into the experience and meaning of walking to women aged 75 years and over who report walking regularly in their neighbourhood. With few exceptions, the experience and meaning of walking to these women is very positive. Walking presents an opportunity to experience pleasure in the outdoors, to observe the natural environment, to observe changes in their neighbourhood, or to go somewhere. These findings are in contrast to the list of barriers to walking outdoors mentioned by older adults in other studies (Franco et al., 2015; Moran et al., 2014; Shepard & Aoyagi, 2013) and highlight the significance of, and pleasure derived from, outdoor walking among these elderly women and that their habit of walking established over many years contributes to their connection with their neighbourhood.

The significance of walking among the study participants was not unexpected because of the women’s self-identification as regular walkers in their neighbourhood. The significance of walking was expressed in numerous ways – as an integral part of family life, as a feature of significant past events, as the enjoyment of walking alone or in sharing the experience with like-minded and similar aged persons. Thus, consistent with Atchley’s Continuity Theory of Aging, the women’s ongoing participation in walking was expressed both visibly through their behaviour as well as internalised through their self-identification as a regular walker. Some of the women might describe themselves as ‘walkers’, particularly those that had walked throughout their lives. Nonetheless, walking outdoors was a habit for all the women – they walked often (sometimes daily in their neighbourhood) and all had been doing so for many years. In order to continue walking outdoors as they aged, the women had adapted their walking in response to their changing capabilities. These changing capabilities were physical in nature as none of the women had mentioned any mental health issues or concerns about their cognitive ability – the latter also being reflected in the fact that all the women still drove. These adaptations were also made in response to their fear of falling – a concern raised by all the women and one that is prevalent in healthy older adults with or without a history of falling (Liu, 2015). However, for these women, the adjustments they made were relatively minor, for example, walking more slowly and not walking at night. These small changes in walking are consistent with Atchley’s
Continuity Theory whereby older adults adapt deeply internalised behaviours in response to changes in capability associated with ageing. Most notably, prior behaviour facilitates the necessary changes that contribute to the maintenance of current behaviour – as without the prior experience the behaviour may not be continued.

The pleasure of walking, as a stronger theme than the potential health benefits associated with walking, was unexpected. The pleasure of walking was experienced by the women in a variety of ways – both during and after walking, through connection with like-minded others, through immersion in the natural environment as well observing change in their immediate built environment. Phoenix and Orr (2014), investigated the pleasure of exercise among physically active older adults (60 to 92 years) and identified four dimensions of pleasure. Three of these: sensual pleasure; the pleasure of habitual action; and the pleasure of immersion were similar to descriptions expressed by most of the women in this study, particularly those who regularly walked in natural environments. The fourth dimension was documented pleasure (Phoenix & Orr, 2014) or writing about one’s physical activity; the women gave no indication that they were writing about their walking experience. Devereux-Fitzgerald et al. (2016), acknowledged the need for greater emphasis on the pleasurable and sociable aspects of physical activity for older adults. Their conclusion resonated with the descriptions observed in this study which emphasised the immediate pleasurable experience of walking rather than longer term health-related goals potentially associated with walking outdoors. Walking for pleasure is not new, as evidenced by historical descriptions of walking in *Wanderlust: A History of Walking* (Solnit, 2001) and *On Foot: A History of Walking* (Amato, 2004) (see Section 2.2), but enjoyment of physical activity in older age appears to have been superseded by an emphasis on the health benefits as the main motivation to participate.

The analysis of data in this study was guided by the socio-ecological model of health behaviour (Sallis et al., 2008); although the influence of the neighbourhood’s social and physical environment was not as strong as expected. Increased housing density, open space and mixed land use have been associated with increased levels of physical activity, primarily walking, among older adults (Durand et al., 2011; Haselwandter et al., 2015). By contrast, the elderly women in this study lived in low density, relatively
homogenous suburban environments. Zeitler et al. (2012), reported that low density suburban environments in Brisbane, Australia, were not conducive to walking or using public transport but encouraged reliance on the car among people aged 56 to 87 years. However, among the elderly women in this study, destinations to walk to and access to open space encouraged walking whereas the low-density suburban environment did not discourage walking. These findings provide an indication of the relative importance of certain elements of the physical environment among elderly women for whom walking is a significant part of their lives.

Franke et al. (2013), observed opportunities to socialise, in addition to a favourable neighbourhood environment, encouraged physical activity among older adults aged 66-88 years. Their study included men and women, and all physical activity. By contrast, the focus on walking, in isolation from other physical activity, indicated that walking outdoors to socialise was not a strong influencing factor, particularly among women who lived alone. Opportunities to socialise were an important aspect of all the women’s participation in other physical activities, and for women who did not live alone, they generally walked with another. For women who lived alone, walking was often a solitary, although enjoyable, experience irrespective of their reason for walking. Walking for transport among women who lived alone offered a means of mobility and was the preferred option, in some instances, to driving in their immediate neighbourhood; in contrast to reliance on the car observed in the study by Zeitler et al. (2012). The choice to walk for transport was often planned, for example, as part of their daily/weekly routine. Thus, opportunities to socialise were not an important factor in walking among women who lived alone; instead their habit of walking alone appeared to be a reflection of their self-reliance and independence.

5.6.1 Strengths and limitations

The main strength of this study was its participants – elderly women describing their experience of walking and the meaning they ascribe to it. The validity of findings was enhanced by one interviewer conducting all the interviews, audio recording of the interviews and their professional transcription. Data were analysed both inductively (looking for emergent themes) and deductively (based on two theoretical perspectives). This hybrid approach enabled comparisons between the raw data and the two
theoretical perspectives, while also remaining open to unforeseen emerging themes, as occurred in the study. Canberra’s middle to outer suburbs are relatively unique, but the low density suburban environment, car-oriented streets, and often hilly terrain, presented an opportunity to explore the experience of walking among elderly women in an environment not especially conducive to walking. By contrast, the similarity of Canberra’s suburban environments was also a limitation of the study as the experience of elderly women walking in different neighbourhood types was unable to be explored.

5.6.2 Implications of the findings

The findings from this study highlight the importance of integrating walking into everyday life – starting in middle age for women or preferably earlier. Establishment of a habit of walking well before older age appears to strengthen the resolve and facilitates the adaptations required to continue walking as one ages. The pleasure of walking should also be reinforced alongside, or even ahead of, the health benefits of walking, and emphasis given to just walking, irrespective of distance, speed or duration. Ready access to natural environments and relevant destinations encouraged walking behaviour, while the women’s long-term habit of walking, and the associated pleasure and connectedness to their neighbourhood, appeared to mitigate many potential barriers, including the fear of falling.
Appendix 5.1: Information advertising the study

Older Women who Walk – Study Volunteers Needed

Are you a woman aged 75 or over?
Do you live in your own home in the Canberra region?
Do you walk regularly in your neighbourhood?

The University of Canberra is researching older women’s experience of walking in their neighbourhood. If you are interested in participating in this study, please contact Bonnie Field on 02 6201 5706 or at bonnie.field@canberra.edu.au
Appendix 5.2: Participant Information Form

Participant information form

Older women who walk

What is this study about?
The study aims to explore the experience and meaning of walking among women aged 75 years and over, who regularly walk in their neighbourhood.

What are the benefits of the study?
By increasing our understanding of the experience of walking among older women, we gain insight into factors that might motivate other women in this age group to participate in this healthy activity.

Who is doing the study?
The study is being undertaken by the Centre for Research and Action in Public Health, University of Canberra. The researchers are Bonnie Field (PhD student) and Dr Yohannes Kinfu (Bonnie’s primary supervisor).

What will my involvement be?
You will be interviewed about your experience of walking in your neighbourhood. The interview will begin with a short questionnaire asking you about your age, whether you live alone or with others, your highest level of education, whether you use a mobility aid and how healthy you are. The researcher will then ask you a series of questions aimed at exploring your experience of walking. There are no right or wrong answers to any of the questions and you don’t have to answer a question if you don’t want to. You can also end the interview at any time – no explanation is needed.

The interview is expected to take about 30 minutes and will occur at a place convenient to you – most likely in your own home. If you agree, your interview will be audio-
recorded. The researcher may also take notes throughout the interview. A written transcript of the recording will be prepared by a professional transcriber.

Participation in the study is voluntary. If you decide to participate, you can still withdraw from the study at any time, including withdrawal of consent to use any (or some) of the data you have provided. You will be interviewed only once.

**Why is the interview being recorded?**

The purpose of recording the interview is to assist the researcher's memory and to aid in analysis of the information.

**What happens to my information?**

The information you provide will be analysed based on the written transcript of the recording and the researcher’s notes. The findings from the study will be included in the researcher’s PhD thesis, due for completion in 2017. The findings are also likely to be published in an academic journal and may be presented at a conference.

**Will my participation be kept confidential?**

All the information collected at interview (verbal and written) will be kept confidential. The written transcript will be securely stored in a locked filing cabinet and electronic data on a password protected computer at the University of Canberra.

**Ethical concerns**

The study has been approved by the University of Canberra’s Human Research Ethics Committee Protocol HREC: 16-06. If you have any concerns about the study, please contact the researchers first, but you can also contact the Ethics Officer (Phone: 02 6201 5220, email: humanethicscommittee@canberra.edu.au )

**If you would like to participate in the study, please contact Bonnie Field, details below.**

Bonnie Field (Primary researcher)  
T: 02 6201 5706  
E: bonnie.field@canberra.edu.au

Dr Yohannes Kinfu  
T: 02 6206 8652  
E: yohannes.kinfu@canberra.edu.au
Appendix 5.3: Informed consent

Consent form

Older women who walk

Consent Statement

I have read and understood the information about the research. I am not aware of any condition that would prevent my participation, and I agree to participate in this project. I have had the opportunity to ask questions about my participation in the research. All questions I have asked have been answered to my satisfaction.

Please indicate whether you agree to participate in each of the following parts of the research (please indicate which parts you agree to by putting a cross in the relevant box):

☐ Participate in an interview with the researcher
☐ Agree to de-identified information about yourself to be included in any published material
☐ Agree to your interview being recorded (please note that the purpose of the recording is to assist in data analysis)

Name.................................................................. Signature......................................................
Date ..........................................................

A summary of the research can be forwarded to you when published. If you would like to receive a summary, please include your mailing address below.

PLEASE RETURN THIS FORM TO:

Name.............................................................. Bonnie Field
Address........................................................ Centre for Research and Action in Public
.................................................................................... Health
Email.............................................................. Locked Bag 1, University of Canberra,
.................................................................................... ACT 2601 AUSTRALIA
Chapter 6: Walking among elderly women: integration of quantitative and qualitative findings

Qualitative and quantitative research used together produce more complete knowledge necessary to inform theory and practice.
(Johnson & Onwuegbuzie, 2004, p. 21)

This chapter integrates the findings from the quantitative and qualitative studies in the preceding three chapters. The quantitative studies provided an overarching view of the current status of walking, including walking for different purposes among elderly women compared with elderly men and of the role of walking in maintaining mobility among elderly women as they age. The qualitative study provided a personal perspective on the experience and meaning of walking to elderly women who regularly walk in their neighbourhood. Papers 1, 2 and 3 represent the published or submitted works of the quantitative phase and Chapter 5 the findings from the qualitative phase. Findings from the quantitative studies are generalisable to the Australian population of elderly women; hence they support comparable findings in the qualitative study. The qualitative findings are not generalisable to Australian women aged 75 years and over but the descriptions of walking by women in this age group add considerable contextual detail to the empirical findings. Integrated findings are discussed in three sections: 1) new findings or findings discordant with the literature; 2) findings consistent with the literature, but offering additional insight; and 3) findings consistent with the literature, although predominantly in studies involving younger age groups (usually older adults 65 years and over).

The summary findings (italicised) relate to women aged 75 years and over, except where gender differences are discussed. A full list of the findings is given in Table 6.1.
6.1 New findings or findings discordant with the literature

*Living alone was a predictor of walking*

More elderly women live alone than elderly men. Data from the 2011 Australian census indicated that 39% of women aged 75-84 years and 41% of women aged 85 years and over lived alone compared with 19% and 25% of men of the same age, respectively (Australian Bureau of Statistics, 2013c). In a U.K study involving 238 community-dwelling ambulatory older adults aged 65 years and over, women were less likely to walk than men but living arrangement (alone or with others) was not associated with walking (Harris et al., 2009). By contrast, in a large cross-sectional study of post-menopausal women (50-79 years), dog owners were more likely to meet the recommended amount of walking per week than non-dog owners, but the association was more pronounced among women who lived alone (Garcia et al., 2015).

In the 2014-15 NHS, 22% of elderly men and 48% of elderly women lived alone (Paper 2). These proportions are similar to those from the 2011 census, although the proportion of women living alone who participated in the 2014-15 NHS is somewhat higher. Living alone was not associated with either WtE or WtT (Paper 2), but was a predictor of walking among elderly women in the longitudinal study (Paper 3). The majority of women interviewed in the qualitative study also lived alone (Chapter 5). Those who lived alone were content to walk alone and were more likely to mention walking for transport as an important means of mobility (Chapter 5).

Thus, living alone was one predictor of walking as elderly women aged, but the effect of living alone on different domains of walking was less clear.

*Some chronic diseases were not a barrier to walking*

Previous studies have shown that diabetes and heart disease in older women significantly decreased the likelihood of participating in physical activity, including walking for pleasure (Smith et al., 2012) and diabetes was associated with less walking among older adults (Harris et al., 2009). In a study involving mainly older women, four or more chronic diseases predicted reduced physical activity (Chad et al., 2005).
However, McKee et al. (2015) noted that only when long-term illness was severe enough to interfere with functional ability did the presence of chronic disease adversely influence older adults’ participation in physical activity.

Among elderly men and women, the presence of cardiovascular disease and diabetes was not associated with walking (Paper 1) nor were cardiovascular disease, diabetes or arthritis associated with WfE or WfT (Paper 2). In the longitudinal study (Paper 3), the number of chronic diseases (including cardiovascular disease, diabetes, osteoporosis or depression) was not a predictor of walking, but the presence of arthritis did negatively predict walking as the older women aged. The elderly women interviewed regarded their health as very good or excellent, but they were not asked directly about any diseases they had and rarely was the information volunteered in the interview (Chapter 5).

Thus, these findings diverged from the literature and did not support an inverse association between chronic disease (cardiovascular disease and diabetes, in particular) and the likelihood of walking among elderly women. The exception to this finding was arthritis, which may negatively influence walking over time, despite the reduced risk of arthritis attributed to walking among older women (Heesch & Brown, 2008).

**Women WfE less than men, but gender not associated with WfT**

Studies considering gender differences in WfE and WfT have not exclusively examined elderly people as distinct from older adults (Ghani et al., 2016; Owen et al., 2007; Tudor-Locke et al., 2005).

Gender differences were apparent in participation in WfE; with some evidence that, over time, women participated in WfE less than men (Paper 2). Gender differences were not associated with WfT (Paper 2). Participation in WfE or WfT among elderly men and women has not changed in recent years (Paper 2).

Thus, elderly women walked for exercise less than elderly men, but gender was not associated with WfT.
Walking one hour per week maintained mobility, irrespective of walking intensity

Studies considering the effect of walking on the maintenance of mobility have not established its effect on multiple measures of mobility as elderly women age.

Based on the findings from the longitudinal study (involving a 12 year period of follow-up), walking one hour per week compared with no walking, independent of other physical activity, significantly improved mobility. This conclusion was based on the dose-response relationship between walking duration and mobility score (see Figure 1 of Paper 3) and reduced risk of using a mobility aid. These findings were independent of the intensity of walking. Moreover, although the question about walking in the Australian Longitudinal Study on Women’s Health referred to ‘brisk’ walking, how this descriptor was interpreted by elderly women remains unknown. Intuitively, it suggests that women who can recall the amount of walking they participated in in the previous week may disregard the notion of intensity – hence the descriptor ‘brisk’ may not have any relevance to an elderly female population.

Thus, walking up to one hour per week was considered protective of mobility status. The intensity of walking on mobility status among elderly women would require further investigation.

Experienced walkers did not always equate walking with socialising

Opportunities to socialise are associated with participation in walking among older adults (Bird et al., 2010; Hanson et al., 2013; Nathan et al., 2012). Furthermore, Ory et al. (2016) reported that multiple sources of social engagement (human and animal), rather than just one source of support, was indicative of meeting the recommended amount of walking among older adults (60 years and over). McAuley et al. (2003), noted the important role of perceived social support in participation in physical activity (18 months follow-up) among older adults (mean age 66 years) and that social support contributed to self-efficacy for physical activity.

In the qualitative study, there was not a strong link between walking and socialising. The women’s participation in other physical activities and mention of their holidays and
trips away during their interviews were an indication that they were not socially isolated – whether they lived alone or with another (Chapter 5). Of the women who lived alone, they were happy to walk alone and in some instances stated that walking with others was difficult because they felt peer pressure to walk at a pace they could not maintain. Hence, walking alone allowed them to walk at their own pace as well as enabling them to concentrate on their walking to avoid falling.

Thus, in contrast to the literature generally involving younger adults, the experience, confidence and independence of the women who regularly walked alone in their neighbourhood potentially superseded the need, or desire, to walk with others.

Experienced walkers did not ‘see’ neighbourhood barriers to walking

Neighbourhood attributes and walking, particularly in urban environments, have been studied extensively, although less so in older adults. The influence of the urban environment on walking appears to be greater on WfT than WfE among older adults (mean age 75 years) and numerous favourable and unfavourable elements of the pedestrian environment have been identified (Cain et al., 2014). Gallagher et al. (2014), reported that while self-efficacy for walking was important to both older men and women (60-99 years) in walking in their neighbourhood, barriers, such as time and weather, were more important to older women’s walking participation; whereas in older men neighbourhood characteristics, such as crime and the quality of footpaths, were more important.

Neighbourhood attributes and walking were only able to be explored in the qualitative study (Chapter 5). When a study participant raised a concern about their walking environment, such as sharing paths with cyclists, it was not a deterrent to walking; despite the separation of walkers from cyclists having been identified as a priority among elderly walkers in previous research (Krogstad et al., 2015). Concerns, such as these, were vehemently expressed by a few, but not all the women. The women were experienced walkers and did not ‘see’ the barriers in their neighbourhood that other less experienced walkers may see, or if they did they were not deterred by them. To the contrary, walking at a comfortable pace, alone or with others, allowed the women to
immerse themselves in their surroundings – either the natural environment or the built environment, such as noticing the changes in their neighbourhood.

Thus, experience as an elderly walker appeared to mitigate awareness of potential neighbourhood barriers to walking.

6.2 Findings consistent with the literature, but offering additional insight

**Experienced walkers overcome fear of falling**

The role of walking in falls is problematic as walking has been identified as both a cause of falls, particularly in frail elderly people, as well as a means of reducing the risk of falling (Okubo et al., 2015). Fear of falling is also an established perceived barrier to physical activity among older adults (Baert et al., 2011) although older women may take more precautions to avoid falling than older men (Johnson et al., 2016). However, in a 12 month follow-up study, frequent falling reduced participation in walking among both men and women (50 years and over), whereas intermittent falling had no effect (Stahl & Albert, 2015). Frequent fallers were those who reported having fallen to the ground at each of the three assessment periods spaced six months apart; intermittent fallers reported falling less frequently.

In the longitudinal study, about one in four women in their mid-70s had had a fall in the previous 12 months; but by the time they were between 85 and 90 years of age, about 50% had fallen in the last 12 months (Paper 3). Not having a fall or fracture in the previous 12 months was a determinant of walking (Paper 3). In the qualitative study, two of the women indicated that they had fallen recently but had not injured themselves seriously (Chapter 5). In neither case were they deterred from their walking. However, awareness of and the fear of falling was universal among the women interviewed, although they had adapted (and were continuing to adapt) their walking in response to their changing capabilities, such as walking more slowly and walking only during daylight hours.
Thus, consistent with the literature, recent falls predicted discontinuation of walking, but among experienced walkers, falls tended to increase awareness of falling, rather than preventing the women from walking, and precautions were taken to minimise the risk of falling.

**Association of walking with education was mixed**

Elderly women have a significantly lower level of educational attainment compared with elderly men. In the 2014-15 NHS, nearly 3 in 4 elderly women had a school-only education compared with less than 1 in 2 elderly men (Paper 2). No association was found between walking and education among adults aged 60 years and over (Ory et al., 2016) and in a study involving mainly women, education was not associated with physical activity among adults aged 80 years and over (Chad et al., 2005). Cerin and Leslie (2008), reported that self-efficacy for participation in moderate or vigorous physical activity can mitigate the negative influence of lower levels of education.

Higher education was associated with WfE among both elderly men and women but not WfT in the cross-sectional study (Paper 2) and predicted walking in the longitudinal study (Paper 3). In the qualitative study, five of the eight women who regularly walked in their neighbourhood had a school-only education (Chapter 5). While the qualitative study was not a representative sample, the education levels of study participants were consistent with the known education levels in the current cohort of elderly women in Australia.

Thus, higher education predicted walking and was associated with WfE but not WfT. By contrast, previous findings were mixed and did not distinguish between the domains of walking; suggesting that the relationship between walking and education may be domain dependent. In addition, based on the findings from the qualitative study, other factors, such as a habit of walking developed over many years, may have a greater effect on walking participation among elderly women than education, as suggested in the findings from Cerin and Leslie (2008).
Walking for pleasure was more important than walking for health

Health is frequently cited as a motivating factor in exercise participation among older adults (Baert et al., 2011; Franco et al., 2015). However, in a systematic review of the acceptance of physical interventions by older adults (Devereux-Fitzgerald et al., 2016), enjoyment of physical activity emerged as a significant motivating factor.

Chapter 5 identified pleasure as more important than physical or mental health as a reason for walking among older women. Pleasure is a more immediate experience (felt both during and after walking); whereas awareness of a positive effect on health, particularly physical health, is inevitably delayed and may even go unnoticed. The pleasure and enjoyment of walking could also be more easily expressed than the articulation of health as a reason for walking.

Thus, consistent with the literature, pleasure and health both influenced walking participation, but among the elderly women interviewed, pleasure superseded health as a motivator to walk.

Walking to maintain health rather than to improve health

In a systematic review of qualitative studies involving participants 60 years and over (or studies with a mean age of participants of at least 60 years), improved health and mental wellbeing was observed among 78% of included studies as a reason for participating in physical activity (Franco et al., 2015).

When mentioned, health as a motivation to walk was in the context of maintaining one’s health rather than improving health, and the effect of walking on mental health was considered more important than its effect on physical health (Chapter 5). For some, their desire to maintain their physical health was augmented by other physical activity, such as weights training at a gym or organised exercise classes.

Thus, maintenance of health, rather than improvement, featured more prominently as a reason to walk. As women transitioned from being elderly to very elderly (85 years and over), walking to maintain health may assume a greater importance than walking for...
pleasure. The oldest woman interviewed (85 years) emphasised health and transport as her main reasons for walking whereas earlier in her life, she walked with her husband (now deceased) largely for leisure.

**Walking was not associated with driving**

In Australian research, older adults aged 60 years and over were more likely to drive themselves rather than being driven or walking (King & Scott-Parker, 2016). Paper 3 showed that the proportion of women who continued to drive themselves fell as the women aged while reliance on others to drive them or to use other modes of transport increased with age. By contrast, King and Scott-Parker (2016) reported that increasing age led to lower overall mobility.

Walking was not a predictor of continuing to drive oneself in the longitudinal study (Paper 3). All the women interviewed still drove although one woman (the eldest of those interviewed) was trialling being without a car (Chapter 5).

Thus, while walkers and non-walkers rely on the car as their primary mode of transport, walkers, as they age, potentially have more transport options than do non-walkers.

**Living in a major city was a predictor of walking**

Data from the 2011 Australian census indicated that elderly men and women were more likely to live in major cities and other urban areas (such as smaller cities and towns) than those aged 65-74 years – possibly due to greater access to health and aged care services (Australian Bureau of Statistics, 2013c). Recent Australian research has highlighted the need to consider regional differences in the correlates of walking behaviour among middle-aged and older adults (Dollman et al., 2016), particularly as the proportion of adult men and women achieving sufficient physical activity is higher in major cities than in regional and remote areas of Australia (Australian Bureau of Statistics, 2013a).

Living in a major city was a predictor of walking among elderly women in the longitudinal study (Paper 3). All the women interviewed lived in Canberra, a major city in Australia (Chapter 5). Among elderly men and women combined, living in a major
city was a correlate of WfE in the 2007-08 NHS and the 2014-15 NHS and was a correlate of WfT in 2007-08, but not in 2014-15 (Paper 2).

Thus, while living in a major city was a predictor of walking among elderly women, regional differences in WfE and WfT among elderly women requires further investigation.

6.3 Findings consistent with the literature, although predominantly in studies including younger age groups

Walking was associated with other physical activity

In a randomised controlled trial using objective measurement of walking (Valenti et al., 2016), older adults (51-84 years) who engaged in more walking activities also participated in non-walking activities, such as swimming and cycling.

Participation in other physical activity was a correlate of WfE, but not WfT, although the odds ratio between other physical activity and WfT favoured an association but was not significant (Paper 2). Participation in other physical activity and vigorous household chores or gardening was a predictor of walking in the longitudinal study (Paper 3). The qualitative study also showed that all the women interviewed participated in other physical activities, including tai chi, table tennis and organised fitness classes for older adults (Chapter 5).

Thus, consistent with Valenti et al. (2016), walkers were active in a variety of ways.

Walking maintained mobility

Staying mobile is an important aspect of ageing well (Chou et al., 2012; Pahor et al., 2014) but among older adults, walking is not highly valued as a form of transport (Musselwhite et al., 2015). In a 12 month longitudinal study, walking maintained mobility in functionally limited older women (65 years and over) (Simonsick et al., 2005).
The longitudinal analysis confirmed that some walking (up to one hour per week) was better than no walking to maintain mobility as older women aged over a 12 year period (Paper 3). Mobility was defined as the women’s ability to walk certain distances and to walk up stairs, as well as using a mobility aid, such as a walking stick or walking frame. The women interviewed in the qualitative study were not asked specifically about the duration of walking but as they described their experience of walking in terms of location and frequency, it was apparent that they often walked for several hours per week (Chapter 5). None of the women said they used a mobility aid although one woman indicated that she had a collection of walking sticks inherited from her parents. Two of the women had used walking poles previously or were intending to use them in the future, to assist with maintaining stability while they walked, including minimising their risk of falling.

Thus, consistent with Simonsick et al. (2005), walking contributed to the maintenance of mobility among elderly women as they aged.

*Age, but not gender, predicted walking participation*

Walking declines with age in older adults, particularly from the mid-70s onwards (Heesch et al., 2012; Sims et al., 2014). Compared with older men (60 years and over), older women were less likely to walk (Mobily, 2014) and to walk for a shorter duration (older study participants were 65 years and over) (Harris et al., 2009). By contrast, frequency of walking was not associated with older age or being female in a study of adults aged 60 years and over (Ory et al., 2016).

In Paper 1, age was associated with participation in walking but not the duration of walking, but among elderly adults who walk, gender was associated with walking duration, but not age. Participation in walking among elderly women also declined with age (Paper 3).

Thus, generally consistent with the literature, age influenced participation in walking more so than gender, although among walkers, women walked for a shorter duration than men.
**Past walking influenced current walking**

Previous participation in walking as a predictor of current walking has been examined in the literature through studies examining exercise self-efficacy. Self-efficacy is having confidence in one’s ability to participate in a behaviour (Bandura, 1997), such as exercise. In randomised controlled trials, self-efficacy predicted long term maintenance of physical activity in older adults (mean age 66 years) (McAuley et al., 2003) and one year maintenance of a walking and exercise program among older women aged 70 years and over (Findorff et al., 2007). Gallagher et al. (2014), concluded that improving self-efficacy for walking was important in encouraging both older men and women to walk in their neighbourhood (study participants were 60-99 years).

Lifetime walking or walking for many years prior was explored in Chapter 5. Paper 3 provided a glimpse of walking over time in older age but not walking in childhood or earlier adulthood.

Thus, from the limited evidence obtained in this research and consistent with the literature, past walking habits were consistent with current walking.

### 6.4 Chapter summary

This chapter integrates the findings from the quantitative and qualitative studies into three categories: 1) new findings or findings that were discordant with the literature; 2) findings that were consistent with the literature, but which added additional insight (e.g., the role of a specific domain of walking rather than walking for any purpose); and 3) findings that supported the literature (albeit from studies focused on younger age groups). In total, 16 findings were reported. Most notable among the findings relevant to elderly women were the influence of living alone and the increased likelihood of walking; the benign effect on walking participation of diseases prevalent in older women (such as cardiovascular disease and diabetes); and that walking one hour per week maintained mobility, irrespective of walking intensity. Findings from the qualitative research suggest that the experience of elderly women who regularly walk in their neighbourhood (in contrast to women aged 60-74 years) negated, to some extent,
their need to walk with others as well as their awareness of commonly reported neighbourhood barriers.

Table 6.1: Summary of integrated findings – relevant to women aged 75 years and over

<table>
<thead>
<tr>
<th>New findings, or findings discordant with the literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Living alone was a predictor of walking (L, Q)</td>
</tr>
<tr>
<td>Some chronic diseases were not a barrier to walking (C, L)</td>
</tr>
<tr>
<td>Women WfE less than men, but gender not associated with WfT (C)</td>
</tr>
<tr>
<td>Walking one hour per week maintained mobility, irrespective of walking intensity (L)</td>
</tr>
<tr>
<td>Experienced walkers did not always equate walking with socialising (Q)</td>
</tr>
<tr>
<td>Experienced walkers did not ‘see’ neighbourhood barriers to walking (Q)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Findings consistent with the literature, but offering additional insight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experienced walkers overcome fear of falling (L, Q)</td>
</tr>
<tr>
<td>Association of walking with education was mixed (C, L, Q)</td>
</tr>
<tr>
<td>Walking for pleasure was more important than walking for health (Q)</td>
</tr>
<tr>
<td>Walking to maintain health, rather than improve health (Q)</td>
</tr>
<tr>
<td>Walking was not associated with driving (L, Q)</td>
</tr>
<tr>
<td>Living in a major city was a predictor of walking (C, L)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Findings consistent with the literature, although predominantly in studies including younger age groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking was associated with other physical activity (C, L, Q)</td>
</tr>
<tr>
<td>Walking maintained mobility (L, Q)</td>
</tr>
<tr>
<td>Age, but not gender, predicted walking participation (C, L)</td>
</tr>
<tr>
<td>Past walking influenced current walking (L, Q)</td>
</tr>
</tbody>
</table>

Findings derived from: C – cross-sectional data, L – longitudinal data, or Q – qualitative data
Chapter 7: Walking in the context of elderly women ageing well

The WHI [Women’s Health Initiative] cohort of women octogenarians and beyond illustrates how much vital life remains after age 80 but also the challenges faced by many women and the resilience that is possible in the face of these challenges. (Rapp et al., 2016, p. S102)

7.1 A positive ageing experience

Ageing well has been used to describe a positive experience of ageing, although the experience can be inherently subjective and is amplified by the heterogeneity of older age in general. Several other terms, such as ‘successful ageing’, ‘active ageing’ and ‘healthy ageing’, have also used in the ageing literature to describe a positive ageing experience (Fries, 2012). Rowe and Kahn (1997), are accredited with the widely cited model of successful ageing which includes low levels of disease and disability, high physical and cognitive function, and ongoing engagement with life. The model focuses on ability rather than inability and the interaction of the three components to maximise capability. In the study by Li et al. (2014), ‘successful agers’ were not frail, had social support, and had no pain, sleep impairment, or fall history. Anton et al. (2015), focused on physical independence as a marker of successful ageing and investigated various “health conditions, behavioral factors, and biological mechanisms that mark declining mobility and physical function” (p. 2) as well as interventions that might delay these adverse effects. Liffiton et al. (2012), reviewed the literature on the role of physical activity and engagement with life, in the context of the successful ageing model. They concluded that the association was yet to be established, but noted that factors encouraging engagement with life required further examination than has been done to date. The World Health Organization (2002) in their policy document on ageing, adopted the term ‘active ageing’ to encompass continued participation in the wider world, not just being physically active. In the 2016 WHO World Report on ageing and health, ‘healthy ageing’ was aligned with functional ability or “the combination of the intrinsic capacity of the individual, relevant environmental characteristics, and the
interactions between the individual and these characteristics” (Beard et al., 2016, p. 2145).

In qualitative research, models or elements of ageing well reflect the personal and social experience of ageing. ‘Healthy ageing’ has been reflected in the wisdom that comes with age, the importance of remaining independent as one ages, the ability to adapt, and the importance of family and friends (Craciun et al., 2015). Shaw and Langman (2017), in their qualitative exploration of the experience of ageing among adults aged 50 to 92 years identified “three manifest themes: freedom/liberation, independence/autonomy and personal responsibility/self-care, and one overarching, latent theme, continuity and change” (p. 115). Interviews of the very elderly (90 years and over) have identified living in one’s home for as long as possible, independence across various elements of one’s life, and a ‘good death’ as important aspects of successful ageing (Nosraty et al., 2015). In addition to the alignment of ageing well with relatively good health and physical function, common psycho-social themes in these accounts include independence, continuity and the ability to adapt to change.

Theories of Ageing also contribute to the discourse about ageing well (see Section 2.8.1). Atchley’s Continuity Theory of Normal Aging (Atchley, 1989) acknowledges the integral role of the continuity of self, coupled with the need to adapt as required, in order to age well. In turn, without continuity and adaption the implication is that one will not age well. The life course perspective of ageing takes account of the historical context into which one is born and the lifetime accumulation of resources and experiences (positive, negative or neutral) that contribute to the individual’s experience of older age. The Activity Theory of Aging encourages ongoing engagement, where possible, with activities similar to those of one’s younger years; the premise being that engagement is more conducive to ageing well than disengagement with prior activities. Lawton’s Theory of Environmental Press argues that a positive experience of ageing is reflected in an individual’s ability to adapt favourably to their environment (Lawton, 1982). Two theories of health behaviour also provide insight into an individual’s ability to effect behavioural change. The socio-ecological model of health behaviour acknowledges that an individual’s behaviour is influenced by the interaction of the individual with their social and environmental circumstances. Self-efficacy theory
posits that the motivating factor to change a behaviour requires an individual to believe in their ability to achieve the change - thus, self-efficacy is underpinned by a sense of control over one's choices and therefore, to some extent, over one's life (Bandura, 2004).

7.2 Towards a conceptual model

In response to the recurrent themes raised in the models and theories described above, a conceptual model of the 'Psycho-social contribution of walking to elderly women ageing well' is proposed. The contribution of walking to the physical health, and to a lesser extent the mental health, of elderly women is implicit in the model. Rather, the proposed model focuses on the psycho-social aspects of ageing well. The conceptual model includes: 1) connectedness – social and environmental; 2) independence and a sense of control; and 3) continuity, change and adaptation. The model is not intended to capture every element of what it means for elderly women to age well but positions the simple and accessible experience of walking within the context of a positive ageing experience.

The following sections describe how walking enabled and encouraged connectedness, independence and continuity among elderly women who walk. Evidence for the contribution of walking to a psycho-social model of elderly women ageing well is summarised in Figure 7.1. The model draws primarily on the evidence from Paper 3 and Chapter 5 as these studies focused exclusively on elderly women.

7.2.1 Connectedness – social and environmental

In a recent invited discussion paper Preparing for better health and health care for an aging population, Rowe et al. (2016) identified social connectedness among older adults as a critical component of ageing well. In Australian research involving women aged 73-95 years who lived alone, interactions with neighbours “underpinned older women’s sense of satisfaction with, and feeling of security within, the neighbourhood”, although the level of interaction varied depending on the individual (Walker & Hiller, 2007, p. 1154). Maintaining connectedness as one ages should not be interpreted as the need to fill one’s days with commitments and social engagements but simply to maintain some contact outside the home, as an individual’s capabilities and interests permit. Similarly,
connectedness and engagement extends to an ability to contribute to society more broadly.

Neighbourhood connectedness is akin to a sense of belonging to a community and is associated with features, such as knowing and caring about one’s neighbours, as well as being aware of and responding to the quality of the environment (e.g., litter, graffiti, noise and aesthetics). Neighbourhood connectedness may also extend to activism (e.g., defending one’s neighbourhood when it is under threat from unwanted change). In the qualitative study by Walker and Hiller (2007), the older women expressed an attachment to their local neighbourhood that was facilitated by “close proximity to services and living in a pleasant, stable environment” (p. 1162). Considering the interaction of social and environmental connectedness, Ory et al. (2016) noted that ‘neighbourhood cohesion’, derived from five questions (such as responses to meeting people while walking and the cleanliness of neighbourhood) was significantly associated with walking among older adults (60 years and over).

**Walking facilitated social and physical connection to one’s neighbourhood**

Walking to socialise was not a significant feature of the elderly women who walk, but walking facilitated connection to their neighbourhood and this, in turn, offered opportunities to socialise and interact with their neighbours (Chapter 5). The women described in detail the routes they walked, what they saw, and the people (and the dogs) that they met along the way. Several women were still living in their family homes, but for those who had moved to new neighbourhoods, they were equally able to describe the neighbourhood in which they lived based on where they walked. The women knew where and what time of day it was best to walk for pleasure or to go somewhere. These simple activities may seem trite to the non-elderly, but for the women who lived alone, regular walking in areas close to their homes allowed them to connect socially and physically to their neighbourhood. Elderly women who walk are also able to pass on the tradition of walking in their neighbourhood and walking for enjoyment to younger family members in their role as grandparents.
Walkers were aware of their immediate neighbourhood and saw opportunities to walk rather than barriers

The qualitative study provided evidence of awareness of the neighbourhood environment due to regular walking (Chapter 5). Several women interviewed were able to walk in nature reserves close to their homes and their descriptions indicated their familiarity and enjoyment of these places. Although several women often walked alone, due in part to living alone, they felt at ease in the neighbourhoods in which they walked. The women were aware of their neighbours and lamented that the health of some of their neighbours was not as good as their own. The women were also not deterred by potential environmental barriers, such as uneven paths in nature reserves or hilly terrain. They walked at a pace suitable to their surroundings, and their familiarity with environment and confidence in walking enabled them to overcome the fear of falling that was expressed by all the women.

Walkers were active in a variety of ways

Beyond their immediate neighbourhoods, walkers were also more likely to engage in other physical activity and other activities, such as volunteering (Paper 3 and Chapter 5). Thus, they were actively contributing to the community and were not merely passive participants. The role of walking in promoting or enabling these additional activities is unclear but its association with walking is apparent. Paper 1 also acknowledged the presence of a “cohort of active older Australian men and women who continue to walk well into very old age, irrespective of the presence of cardiovascular disease or diabetes” (Field et al., 2017a, p. 1).

7.2.2 Independence and a sense of control over one’s life

Older people strive to maintain their identities and independence as they grow older (Australian National University, 2016) despite considerable change in health and functional status as older adults transition from 70 to 85 years (Jacobs et al., 2012). Loss of cognitive capability or the ability to walk are extreme examples of the loss of one’s independence as an older adult and are sometimes unavoidable, but striving to maintain independence even in the absence of these challenges remains a focus of ageing well. By contrast, dependence can lead to loss of a sense of control over one’s life
as one becomes dependent on another (or others) to live their day-to-day lives. Consistent with the notion of reliance on others, is the prevalent belief that the elderly ‘should not overdo it’. While this is a kind and well intentioned gesture on the part of family and friends, it can unwittingly induce excessive sedentariness and dependency. By contrast, elderly women who regularly walk illustrate their independence and sense of control over their lives to their families and friends.

**Walking maintained mobility and mobility supports independence**

Walking contributes to the maintenance of mobility (Paper 3). Maintaining one’s mobility is closely linked to maintaining independence, such as continuing to live in one’s home with minimal assistance (Chou et al., 2012; Pahor et al., 2014). In a review of qualitative studies that addressed perceptions of mobility among older adults (Goins et al., 2014), three overarching themes emerged: (a) mobility is part of sense of self and feeling whole, (b) assisted mobility is fundamental to living, and (c) adaptability is key to moving forward.

Evident among the women interviewed (Chapter 5) was that walking was just walking – they frequently did not distinguish between walking for different purposes. For example, one participant stated that she only wanted to walk in beautiful places, but when queried further about her walking, she mentioned that she occasionally walked to the bus stop to catch a bus into the city rather than drive (a journey by car of about 20 minutes). Thus, she, and several other women interviewed, did not readily distinguish between walking for transport and other forms of walking. To these women, walking afforded them a level of mobility and independence, that was almost taken for granted.

**Walkers achieved a sense of control through maintaining their health**

Changes in physical and mental health are more pervasive in older age than in younger adulthood, hence maintaining a sense of control in the midst of change becomes ever more important. Nonetheless, for most ageing bodies, the changes are gradual thus allowing time to adapt. The women interviewed spoke of maintaining the functional capabilities of their ageing bodies through walking and other physical activity, rather than improving their capabilities (Chapter 5); suggesting that bodily maintenance was more within their control.
Walkers also drove, thus enhancing their mobility options

Both walkers and non-walkers drove (Paper 3) and driving, if one can, is an attractive transport option for older adults. For example, in a study involving individuals aged 45 to 94 years (Menec et al., 2016), those who thought it was crucial to be able to walk to various places tended to drive to these destinations. In Australia, the importance individuals place on driving themselves or being driven is pervasive and is unlikely to change in the near future. Moreover, having driven throughout one’s life and experienced the associated freedom and independence, giving up driving, either by choice or otherwise, is a significant milestone in one’s life. Thus, as elderly walkers walk and drive, they enhance their mobility options, which in turn contribute to maintaining their independence.

7.2.3 Continuity, change and adaptation

Older people seek continuity as they grow older (Australian National University, 2016) and continuing past activities supports and upholds a sense of control over one’s life. As the body accumulates the overt and covert signs of ageing, the sense of self is closely linked to who one was. If that younger self was active or aspired to be more active, then the older version of oneself can more easily accommodate the reality of, or the aspirations of, the younger version. Thus, consistent with Atchley’s Continuity Theory of Normal Aging (Atchley, 1989), continuity of the self is preserved and consistent with Activity Theory of Ageing, participation in current activities reflects prior participation.

Elderly women who walk self-identified as walkers

Participants in the qualitative study responded to an advertisement calling for elderly women aged 75 years and over who regularly walked in their neighbourhood. Hence, the women themselves had self-identified as regular walkers, as a definition of ‘regular walking’ was deliberately not specified in the advertisement. For these women, walking was an integral part of their lives (Chapter 5).
Walkers adapted their walking to their capabilities

All the elderly women interviewed had been walking for a considerable period of time (some all their lives and some for several decades) and were aware of their physical capabilities (Chapter 5). This awareness allowed them to adjust and adapt their walking, such as walking at a comfortable pace to minimise their risk of falling. Awareness of one's physical capabilities and limitations is also likely to extend into other aspects of the women's lives, such as other physical and social activities they engage in (Paper 3 and Chapter 5). Walkers may also cope better when they stop driving because of their familiarity with their neighbourhood, such as distance to a bus stop, and confidence in their ability to walk within it.

Walking maintained capability to continue walking

The more resources one has, the better one can adapt. The women interviewed were aware of their age, and several described themselves as lucky to have their current physical (and cognitive) health (Chapter 5). Regarding walking, they were experienced walkers, and their confidence enabled them to continue walking and, in turn, regular walking allowed them to keep walking. As an indication of maintaining functional capability well into old age, 34% of women aged 85-90 years in the longitudinal study reported doing some walking, 33% reported doing some vigorous household chores/gardening, and 27% reported volunteering in the week prior to interview (Paper 3).

7.3 Chapter summary

This chapter described a conceptual model of the contribution of walking to elderly women ageing well. The model drew on the positive experiences of ageing described in the literature, selected theories of ageing and theories of health behaviour, and was populated, where relevant, by the integrated findings from this thesis described in Chapter 6. The conceptual model has three themes: 1) connectedness – social and environmental; 2) independence and a sense of control over one's life; and 3) continuity, change and adaptation. The purpose of deriving the model was to highlight the breadth and scope of beneficial psycho-social effects afforded to elderly women through the simple act of regularly walking in one’s neighbourhood.
Figure 7.1: A conceptual model of the psycho-social contribution of walking to elderly women ageing well

**Regular neighbourhood walking**

- Walking facilitated social and physical connection to one’s neighbourhood
- Walkers were aware of their immediate neighbourhood and saw opportunities to walk rather than barriers
- Walkers were active in a variety of ways

**Psycho-social elements of the model**

- **Connectedness – social and environmental**
  - Walking maintained mobility and mobility supports independence
  - Walkers achieved a sense of control through maintaining their health
  - Walkers also drove, thus enhancing their mobility options

- **Independence and a sense of control over one’s life**
  - Elderly women who walk self-identified as walkers
  - Walkers adapted their walking to their capabilities
  - Walking maintained capability to continue walking

- **Continuity, change and adaptation**

**Elderly women ageing well**
Chapter 8: Conclusion

_A society which promotes a physically active lifestyle for older adults is more likely to reap the benefits of the wealth of experience and wisdom possessed by the older individuals in the community._

_(World Health Organization, 1997, p. 5)_

This chapter collates and discusses the contribution of the integrated findings and the conceptual model of the psycho-social elements of walking and elderly women ageing well described in Chapters 6 and 7 to new knowledge, methodology, policy development and public health practice. The strengths and limitations of the mixed methods approach used in this thesis are summarised and suggestions for further research provided.

8.1 Original contribution to knowledge

The research and findings described in this thesis add to the knowledge and literature on walking among elderly women in several ways. Empirical findings have identified differences in walking behaviour among elderly men and women, predictors of walking as elderly women age, and the weekly duration of walking estimated to maintain mobility among elderly women. The qualitative findings, while not generalisable to the in-scope population, have enhanced the empirical findings and provided insight through personal accounts of the meaning and experience of walking among elderly women who regularly walk in their neighbourhood. These findings together contribute new knowledge about the walking patterns and behaviours of women in the age group 75 to 85 years, in particular.

The current behaviour of a cohort, such as the elderly population included in the quantitative and qualitative studies, is indicative, but does not predict the behaviour of a similar-aged cohort in the future. The reason for this, as proposed in life course theories, is that individuals are born into periods in time and the prevailing social, economic and political circumstances influence their behaviour and life experience. Study participants in the older cohort of the ALSWH were born between 1921 and 1926,
and participants aged 75 years and over in the 2007-08 NHS were born in 1932 or earlier, and those in the 2014-15 NHS were born in 1939 or earlier. Numerous social differences between the ‘baby boomers’ and those born pre-1945 have been reported, such as access to education and contraception, and increased participation of women in the labour force. As a result, the health of ageing ‘baby boomers’ is likely to differ from that of their parents (Humpel et al., 2010). However, the experience of an ageing body is universal, albeit occurring at different rates. While modern medicine can delay the physical decline, this thesis has provided strong evidence that women who continue to walk throughout their 70s and into their 80s are more likely to maintain their mobility as they age than women who do not walk. The findings also support the contribution of walking to elderly women ageing well – from a psycho-social, as well as the traditional health perspective.

8.2 Methodological contribution

This thesis highlights the added value that can be achieved by integrating relevant findings from publicly-funded national health survey datasets with the findings from a qualitative study. Mixed methods research often involves collection of quantitative and qualitative data from the same individuals so as to strengthen the comparison between the two datasets (Creswell, 2014, p. 222). However, this approach can limit the sample size of the empirical data, thus restricting the generalisability of findings. By contrast, the findings from the studies in this thesis using national health survey datasets strengthened the robustness of qualitative findings where concordance occurred, while the qualitative research provided additional insight into the experience of walking among elderly women that would be difficult to obtain using just the quantitative findings.

The cross-sectional and longitudinal nationally representative surveys used in this thesis included a plethora of good quality data on elderly women. Each of the data sets used (NNPAS 2011-12, NHS 2007-08, NHS 2014-15 and the older cohort of the ALSWH) was publicly available at no cost to the user. Use of these large datasets also enabled stratification of the analyses by multiple variables, in particular, age and gender and other socio-demographic variables. Hence, this thesis highlights the value of the National Health Survey series in research (analysed either as individual cross-sectional
surveys or as a comparable series of surveys). While the ALSWH data have been widely used in the published literature, the NHS data have rarely been used for this purpose, nor have the findings from analysis of NHS data been previously considered alongside comparable qualitative data.

### 8.3 Contribution to public health policy and practice

This thesis contributes to policy development by providing additional evidence in support of the psycho-social benefits of walking to elderly women. As discussed in Chapter 7, walking among elderly women contributes to ageing well through increased connectedness to life outside the home, maintenance of independent living and enabling continued mobility, through a flexible and resilient approach to walking. The psycho-social benefits may be equally applicable to elderly men but this would need to be examined in further research.

Earlier chapters provided justification for the focus of this thesis on elderly women and walking. However the most notable reason was that participation in and experience of exercise for elderly women was likely to differ from that of men and women who are older (65-74 years), but not elderly (75 years and over). Thus, physical activity recommendations for older adults which currently provide advice for those aged 65 years and over (Sims et al., 2010) should consider distinguishing between older adults and the elderly and between elderly men and women. Associated visual material should include the elderly or very elderly walking – either with or without the assistance of a walking aid. Instead, participation in physical activity is frequently portrayed using healthy individuals who are older, but not elderly, and are participating in activities at a high level (e.g., masters athletes). Thus, physical activity participation at an elderly age is portrayed as something that others do, that they train for and compete in, rather than physical activity being the simple act of walking and moving more throughout the day. Images of ageing bodies performing remarkable feats of physical ability at 80 and 90 years of age may make interesting news items, but they are unlikely to encourage those who are sedentary to be more physically active. Instead, such images and news stories could inadvertently discourage participation because of a perceived disconnect between their ageing bodies and the apparent capabilities of others.
Physical activity recommendations are described in terms of duration, frequency and intensity of physical activity, whereas the findings from this thesis, and others (Segar & Richardson, 2014), support a broader understanding of the meaning of physical activity, including walking, to elderly women. The women interviewed self-identified as walkers indicating the value they placed on walking. Devereux-Fitzgerald et al. (2016), also acknowledged the need for improving our understanding of the value older adults place on physical activity as a means of understanding physical activity participation in this older age group. Segar et al. (2011), reported that, among younger women (40-60 years), the internalised value of physical activity was a greater motivating factor to exercise than externally-driven norms about health and weight. This led the authors to suggest that a rethink of messages to encourage physical activity, such as walking, that focuses on what matters to people and what they value rather than recommendations related to duration and intensity (Segar et al., 2011). Promoting and encouraging older women to walk should consider a similar values-based approach.

The thesis findings also emphasise the enjoyment of walking, particularly as elderly women need to walk at a pace that they are comfortable with and as far as they are able, rather than ‘briskly’ as is recommended. Thus, while this thesis used and compared the domains of WfE and WfT, a third category might be WfP (i.e., walking for pleasure). WfP is a domain of walking that is likely to be done with no particular purpose in mind, other than enjoyment, and can be done at a leisurely pace that potentially involves frequent stopping. Indeed, walking at a faster pace may be unnecessary because older adults require a greater amount of exertion than younger adults to walk at a similar pace (Barnett, A et al., 2016). WfP also reflects a return to an earlier time as indicated by historical accounts of walking (Solnit, 2001) when walking was not only integral to everyday life but also provided opportunities to reflect and calm the mind.

Older and elderly walkers also have a role in maintaining a family tradition of walking for pleasure. If they walk regularly, then in their role as grandparents, older adults and elderly people can involve their families in walking. If these activities are instilled in childhood, they can engender a lifelong habit of walking that is based on enjoyment and shared memories and one that is, in turn, passed on to their children. Grandparents can also encourage walking as a means of transport or of engaging with public transport,
particularly as an activity that does not stop when a younger individual obtains their driver’s licence. For elderly people themselves, walking should be encouraged as a means of preparing for the eventual likelihood of reduced or cessation of driving, particularly if they intend to remain in their own home and they live alone. Walking and other physically active pursuits should also be integrated into a broader framework of ageing well that continues into old age rather than being confined to early older age.

Elderly men and women regularly come into contact with health and aged care workers, including those that attend to the elderly in their own homes. These workers are well placed to encourage their elderly patients and clients to be more physically active. Burton et al. (2015), found in their small Australian study that structured exercise was not the “activity of choice for older home care clients” (p. 170) and recommended focusing on activities that elderly men and women enjoy, such as walking and gardening. Consistent with the findings in this thesis, Burton et al. (2015) also suggested that the benefits of physical activity to wellbeing and independence be promoted to the client and their family members, in addition to its health benefits. However, most notable from the findings in this thesis is that the confidence of the elderly women who walk (to walk alone, to walk on hilly and uneven terrain, and to walk for pleasure or for transport) was derived from their prior experience with walking. Thus, encouraging older women to walk, with others if need be, before they become elderly women is an imperative.

8.4 Strengths and limitations

The strengths and limitations of the individual quantitative and qualitative studies were discussed in Chapters 3 to 5. While the use of national data sets in the quantitative studies enabled the findings to be generalisable to the in-scope population, the available variables and associated coding of each variable constrained, to an extent, the analysis that was possible. Nonetheless, a sufficient range of variables was included in the analysis to enable the research questions to be addressed validly.

The mixed methods approach used in this thesis enabled the merging of the quantitative component which encompassed the objective and measurable with the qualitative component which accounted for the subjective and descriptive. Both are valuable
research methods, but together they enhanced the understanding of walking among elderly women. The quantitative studies reflected an outsider’s perspective, and the qualitative study attempted to capture an insider’s perspective because we cannot have an intimate knowledge of the experience of being old unless we are old ourselves. Phenomenology was used in the qualitative study to capture the insider’s experience (Smith et al., 2009, p. 21). When interviewing study participants about their walking experience, the women provided a descriptive account of an activity that they enjoyed and participated in frequently. However, as walking is an everyday experience and is not necessarily imbued with great feeling and emotion, the interviewer encouraged (but was aware of not leading) the participants to express their thoughts about the meaning of walking in their lives. Thus, phenomenology proved to be a useful technique in eliciting accounts of the perceived value of an everyday activity, such as walking to the women as they aged.

8.5 Recommendations for future research

Possibilities for future research are considerable due to the scarcity of studies that focus specifically on walking and physical activity as part of the everyday movement and mobility of elderly women. While the national datasets can be explored further based on the available data, several possibilities for future qualitative research are discussed.

Firstly, the in-home interviews could be extended to include walk-along interviews including both elderly women who regularly walk as well those who do not. If walkers and non-walkers were interviewed in similar walking environments, then each becomes a control for the other. This method was used by Korotchenko (2017) to obtain greater insight into the participant’s experience of walking. This approach would also give an indication of the intensity of walking by elderly women, the ways in which environmental obstacles or challenges are negotiated by walkers and non-walkers, and the social or environmental interactions that spontaneously occur. In addition, while a small amount of quantitative data was obtained from the women in the qualitative study, a larger and more diverse sample of elderly women walking in different neighbourhood environments coupled with an enhanced empirical data collection could be included and compared with similar variables in a nationally representative dataset similar to that used in this thesis. While this type of mixed methods research could
include elderly men, there is merit in conducting further research in walking among elderly women, independent of elderly men, for the reasons identified in this thesis.

Secondly, the quantitative and qualitative findings both supported the dual occurrence of walking and other physical activity among elderly women. Thus, further research into the relative emphasis placed on walking compared with other physical activity within the context of ageing well is warranted. A specific area of interest would be whether walking for pleasure encourages further physical activity – if this is so then walking for pleasure could serve as an intermediary to a more active life among the elderly or, alternatively, walking could be continued into very old age when other more strenuous activities can no longer be maintained.

Thirdly, the role of walking in transitioning to cessation of driving should also be investigated given the importance of the car in maintaining mobility as older adults age (Lord et al., 2011; Musselwhite et al., 2015) and the considerable impact of driving cessation on the lives of older adults (Mullen et al., 2017). Musselwhite and Shergold (2013), noted that considering alternative mobility options before giving up driving was associated with better quality of life among older people after they stopped driving. Hence, familiarity with one’s neighbourhood as a result of regular walking might assist elderly women in their planning. Such research is of relevance to elderly men and women, but particularly women, given that they are more likely to live alone in very old age.

8.6 Concluding remarks

Research in the elderly often focuses on the negative – barriers, limitations and dysfunction, rather than facilitators, capabilities and functional ability. This thesis has framed the experience and patterns of walking among elderly women as a positive experience; one that has wider implications for ageing well. Considering a holistic approach to walking is not new, but has been overlooked in current physical activity guidelines which focus on frequency, duration and intensity of specific activities to reduce health risks rather than the less obvious psycho-social benefits derived from walking as a component of overall daily movement, including walking.
Public health emphasises health for all and in terms of physical activity and the elderly, walking offers the best potential return on investment because of the enormous gains in health and mobility that can be achieved by the vast majority of elderly women doing a little walking, particularly among those who currently do none. Public health policy development needs to ensure that health inequalities are not inadvertently increased (Beard & Bloom, 2015). Walking as a physical activity accommodates the heterogeneity and varied experience of the elderly by accommodating differing physical capabilities, cultural backgrounds, and environmental and economic circumstances. However, to fully understand the varied experience of ageing, such as walking outside the home as an elderly woman, the elderly and the very elderly must be included in conversations about their physical and mental health, their functional capabilities and their motivations.

The predominance of the car in modern society has replaced, to a large extent, walking as a means of getting to and from places. This thesis has highlighted the role of walking as a means of maintaining functional mobility among elderly women as well as mobility within one’s neighbourhood. Thus, walking has a potential role in easing the transition to cessation of driving, although as mentioned previously, the role of walking as an alternative to driving when driving oneself is no longer an option requires further research.

And finally, participants in the qualitative research study were aged 75-85 years and the oldest participants in the longitudinal study were 90 years of age. A proportion of elderly men and women in the cross-sectional studies were aged 85 years and over, and some of these will have been over 90 years of age. Thus, the findings in this thesis relate to elderly women, aged between about 75 and 90 years. Thereafter, different criteria are likely to permeate the interplay of elderly women, walking and ageing well; most notably physiological and emotional resilience to cope with the daily demands of extreme old age, in addition to the psycho-social support needed to cope with these demands (Poon et al., 2016).
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