

IMPACT OF ASSISTANCE ON THE QUALITY OF LIFE OF OLDER ADULTS WITH ACTIVITIES OF DAILY LIVING & INSTRUMENTAL ACTIVITIES OF DAILY LIVING DISABILITIES

by
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DECLARATION

I, the undersigned, declare that this work has not previously been submitted to this or any other University, and that unless otherwise stated, it is entirely my own work

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SUMMARY

As populations age, incidence of functional limitation including disability in Activities of Daily Living and Instrumental Activities of Daily Living increases. This creates a higher level of demand for technological and personal assistance in the form of technological and personal assistance. Functional limitations and disability can impact negatively on older adults' quality of life. This thesis, using data from a nationally representative sample examined, whether type of ADL/IADL assistance affected the quality of life of older adults.

The study was based on data collected from the first wave of The Irish Longitudinal Study on Ageing (TILDA), a nationally representative study of older adults in the Republic of Ireland, and included 4,904 community dwelling adults aged 60 years and older. Measurements included activities of daily living (ADLs), Instrumental activities of daily living (IADLs), and quality of life measured using the previously validated CASP-19. Information was collected on the types of assistance used with limitations in ADL/IADL. The statistical analysis included descriptive analysis and ordinary least-squares regression models were used to examine the influence of different types of assistance, individually and in combination with others, on the quality of life of older adults.

The overall weighted prevalence of disability in ADL was 11.8%, compared to 10.4% in IADL. More individuals reported difficulty with one ADL task (7.4%) than ≥ 2 ADL (4.4%), whereas a higher proportion of respondent reported difficulty in ≥ 2 IADL (5.6%) than one ADL task (4.8%). The ADL disabilities were most commonly reported for dressing and least commonly reported for

eating, while, the IADL disabilities most commonly reported were household chores and least for using a telephone.

Among those with ADL disability, a higher percentage reported using technological assistance (19%) than personal assistance (9%). Those who had both ADL and IADL disability were more likely to use both types of assistance together (43%). Similarly, the combination of both types of assistance (43%) adopted was clearly related to the severity of disability (≥ 2 IADL). The ordinary least-squares regression models showed that after adjustment to health and socio-demographic factors, both technological and personal assistance together (β : 0.44; 95% CI: 0.15, 0.72) were associated with a higher quality of life ($p < 0.01$) among older adults with ADL disability.

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LIST OF ABBREVIATIONS

ADL	Activities of Daily Living
AT	Assistive Technology
CARDI	Centre for Ageing Research and Development in Ireland
CI	Confidence Interval
IADL	Instrumental Activities of Daily Living
QOL	Quality of Life
TILDA	The Irish Longitudinal Study on Ageing
WHO	World Health Organisation

CHAPTER—1 INTRODUCTION

1.1 Introduction

This thesis explores the interface between disability, assistance and quality of life in Ireland. The dramatic increase in life expectancy in the developed world has resulted in rapidly ageing populations. The island of Ireland is no exception (Central Statistics Office, 2012). In Ireland in 2010, one person in nine was over the age of 65 years, and by 2050, that number will have risen to one in four. Ageing and its challenges associated with maintaining health and well-being are of ever-increasing importance (CARDI 2010). Increasing age is associated with an increase in multiple chronic health problems, marked by a decline in functional ability, activity restriction, and institutionalisation. Particularly, decline in functional ability can progress to functional limitations and lead to disability in *activities of daily living* (ADL) and *instrumental activities of daily living* (IADL) in older adults. With this ageing population, it is predicted that functional limitation that comes with ageing will also increase, increasing the need for care and support for alleviating disability in ADL and IADL.

Older adults generally cope with these disabilities by making use of personal assistance, technological assistance or both. Personal assistance refers to help that disabled persons receive from others, such as a spouse, child, friend, or paid caregiver. Technological assistance refers to the use of equipment or devices (wheelchairs, canes, raised toilet seats, etc.) to allow performance of daily activities. The goal of such coping is to increase function and improve quality of life.

The purpose of this study was to describe and explore the prevalence of disability in ADL and IADL and to evaluate the impact of assistances on the quality of life of older adults with disabilities in ADL. There are additional questions the study has sought to answer. These include studying various limitations experienced by older adults in their activities of daily living as well as in the assistance (technological assistance/personal assistance) utilised by elderly when they encounter functional limitations in their ADL.

1.1.1 Aims

The aim of this study was to describe and explore the prevalence of ADL and IADL disability in a sample of the Irish population aged 60 years and older, and to further examine the socio-demographic factors that are associated with disability. Importantly, the study investigated the relative effectiveness of technological and personal assistance in the context of quality of life outcome of older adults.

1.1.2 Statement of Problems

Technological assistances for disability are used both independently and in conjunction with personal assistance. However, the relative advantages of technological assistance and personal assistance are not well understood, in part because most studies evaluate one or the other, but rarely the two together. Therefore, it is important to examine the impact of different types of assistance provided for the elderly who are dependent in their daily living activities.

The purpose of this thesis was to investigate the types of limitation in ADLs and IADLs experienced by older adults, the types of assistance provided with ADLs, and the impact of such assistance on quality of life. This study focused on adults aged 60 years or older who reside in the Republic of Ireland.

1.1.3 Research Questions

The following questions were addressed in this study:

1. What are the demographic characteristics of older adults with ADL and IADL disability in Ireland?
2. What type and proportion of assistance, technological and personal, are currently being used by older adults with ADL and IADL disabilities?

3. Is there a correlation between an older adult's area of greater ADL disability and the types of assistance currently being used?
4. Which combination of assistance with ADL and IADL disability reduce task demands or resolve difficulty resulting in better outcomes in their quality of life?

1.2 Thesis Overview

This thesis begins with a Literature Review, followed by Methodology, Results, Discussion and Conclusion.

1.2.1 Chapter 2--Literature review

This chapter provides an overview of the existing literature in the area of impact of assistance on the quality of life of disabled older adults. It contains the relevant background information and previous research performed in an effort to establish the requirement for this research and provide a basis for the proposed hypothesis.

1.2.2 Chapter 3—Methodology

This chapter provides a clear account of all methods and design used in this research. It provides a comprehensive explanation of all the procedures used and the relevant detail required for researchers to use this work as a basis for further research.

1.2.3 Chapter 4—Results

This chapter presents the empirical results generated by this research. In addition, main findings are highlighted within this section.

1.2.4 Chapter 5—Discussion

This chapter discusses and interprets the results as presented in the previous chapter. In addition, the potential impact of the results is highlighted and future recommendations are presented.

1.2.5 Chapter 6—Conclusion

Finally, a short conclusion is offered to summarise the entire body of work and also to wrap up the thesis, with the main outcome highlighted.

CHAPTER -2 LITERATURE REVIEW

2.1 Introduction

This chapter reviews the existing literature and establishes the research context of functional limitation and impairment in activity of daily living in the older population. It concludes with a discussion of the possible available assistance in ADL and IADL in the context of the dependent and disabled elderly and in the impact on quality of their lives.

The growing number of elderly in Europe is giving rise to a growing burden of old age disability, leading to reduced independence, an increased use of various services and assistance, and decreased quality of life.

2.1.1 Aim

A thorough literature review to document the existing knowledge and determine what remains unknown in the field is necessary. Therefore, the aim of this chapter is to review the existing knowledge in the area and highlight areas where further work can be developed.

2.1.2 Search Strategy

Two streams of literature are particularly relevant for this work: literature on ageing disability and literature on assistance services and their impact on quality of life. A systematic search strategy was conducted through English and to search computerised bibliographic databases. The academic databases used were PubMed, Google Scholar, and Embase.

2.1.3 Quality of Life for Older Adults

Population ageing has emerged as a global phenomenon, brought about by great advances in life expectancy (WHO, 2015). With increased life expectancy, delayed onset of morbidity, and higher expectations for old age growing interest has been devoted to services, programs, and treatments that improve individual quality of life (QoL). Therefore, in the present century 'quality of life' has become an increasingly popular term used in ageing research (Netuveli & Blane, , 2008; Bowling et al., 2003; Grewal et al., 2006; Murphy et al. 2007).

Increased longevity is associated with an increase in multiple chronic health problems. Almost all chronic conditions are strongly related to ageing (Ory & Cox,. 1994). These multiple chronic conditions can be marked by declining health, activity restriction, isolation and loneliness (Rolls & Drewnowski, 1996). A major series on health and ageing in "The Lancet" warns that unless health systems find effective strategies to address the problems faced by an ageing world population, the growing burden of chronic disease will greatly affect the quality of life of older people (www.thelancet.com/series/ageing). Therefore in 2012, WHO emphasised that it is not only important to add further years to life, but more importantly to add life to those years, and to ensure that elderly can live full, enriching and productive lives (WHO, 2012).

During the last few decades, new perspectives have emerged, focusing more on quality of life (QoL) outcomes and their determinants in old age. The concept of quality of life for elderly people has different meanings and it addresses the broad diversity of ways of ageing such as 'active', 'positive', 'successful' or 'healthy' used with ageing. "Successful ageing" is, however, the term most frequently used

in research (Hung et al., 2010) and it is also the one considered to have had the greatest impact on academic gerontology. Definitions within this perspective have been border and more subjective, including actively participating in society without discrimination and achieving independence within a 'good' quality of life (Jopp & Smith, 2006; Vaillant & Mukamal, 2001). Although there is substantial conceptual overlap between the terms, and reciprocity in the sense that quality of life can be viewed as a cause or a consequence of successful ageing, there are also some important differences. For example, a widely accepted definition of successful ageing by Rowe and Kahn (1998) has three components: absence of disease and disability; high mental and physical functioning; and active engagement in life, whereas most quality of life research tends to be less prescriptive in this regard. A recent meta-analysis of 29 studies found that estimates regarding the proportion of successful ageing ranged from 0.4% to 95% because of widely varying operational definitions of what constitutes success (Depp & Jeste, 2009). Averaged across studies, approximately one third of older people were characterised as ageing successfully. However, these findings conflict strongly with the results emerging from studies in the UK (Jivraj et al., 2013; Netuveli et al., 2006), and Ireland (Layte, Sexton & Savva, 2013), which show that older people continue to enjoy a high quality of life well into their later years despite increasing levels of morbidity.

Quality of life is important to older people, caregivers, and health professionals regardless of whether older people live, either independently or in a community facility (Gabriel & Bowling, 2004; Huber & Hennessy 2005; Murphy, Shea, & Cooney, 2007). Older people themselves value quality of life more than their health, and this is especially important, where cure or complete relief is not

always possible (Borglin et al., 2006). Promoting and improving people's quality of life is seen as one of health and social care's most important goals (Godfrey, 2001; Holmes, 2005).

The risk of disability in the elderly population increases with the development of chronic diseases, which often increase the demands of special care and support (Liao et al., 2015). The elderly feel honored and respected when they will be cared for at homes and especially by their family members (Connidis, 2010; Bangerter et al., 2016). Whereas, caregivers, especially family caregivers, gain self-satisfaction, reciprocity, and a sense of duty having been fulfilled (Fuhrmann et al., 2015; Chen et al., 2015; Liao et al., 2015). The quality of life of older adults influences the quality of care given and the resultant potential gains for the caregivers (Schoonhoven et al., 2007; Schulz, & Sherwood, 2008). Just as quality of life is regarded to be great importance amongst older people and their caregivers, it is also regarded as of great importance by researchers and health professionals.

Researchers have debated whether quality of life should be measured using objective or subjective measures and these disputes largely reflect different disciplinary interpretations of what quality of life comprises and how it should be assessed (Costanza et al., 2007; Diener & Suh, 1997). Objective assessments of quality of life typically involve economic (e.g. standard of living), social (e.g. social networks) or health-related (e.g. healthy life years) indicators, whereas, subjective measures tend to involve self-appraisal of social, emotional and psychological well-being, such as life satisfaction and happiness. This latter approach takes the view that a good life is one that is experienced as such and has

tended to predominate in social-science research in recent years (Netuveli, & Blane, 2008). The Irish Longitudinal Study on Ageing (TILDA) uses such a measure to index quality of life among the older population.

2.1.4 Factors Influencing Quality of Life of Older Adults

A person's quality of life is affected by social and environmental factors, as well as physical and psychological factors (Power, Bullinger & Harper, 1999). Characteristics such as age, education level, social class, income, marital status, employment, religion, leisure, life events, social skills, and health are all associated with quality of life, although many effects are small (Kahneman, Diener, & Schwarz, 2003). The strongest effects on quality of life are seen from participation in social relationships (Rodriguez-Laso, Zunzunegui, & Otero, 2007), engagement in meaningful and leisure activities (Bowling et al., 2003), reduced activity, functional capacity (Wahrendorf, & Siegrist, 2010), and increased chronic ill health (Wikman, Wardle, & Steptoe, 2011). Opportunities to connect socially, and involvement in any activities, require older people to remain mobile and independent. Increasing age is associated with functional disability and dependence in activities of daily living, this in turn leads to the poorer quality of life (Freedman, Martin, & Schoeni, 2002; Lin, Beck, Finch, Hummer, & Master, 2012). In older populations disability is often complex, multifactorial and a consequence of interaction between physical, social and attitudinal environment (Dubá, Rajkumar, Prince, & Jacob, 2012; Verbrugge, & Jette, 1994). It is of great importance for quality of life to maintain independence in ADL and IADL. For example, a study from English Longitudinal Study of Ageing (ELSA) team found that the effect of having a longstanding illness on quality of life was compounded if it co-existed with a functional limitation (Netuveli et al., 2005).

2.1.5 Ageing and Functional Ability

At present the important current trend in global population health is the transition from the predominance of infectious diseases to chronic non-communicable diseases (NCDs) such as heart disease, cancer, diabetes and lung cancer. This is due in large part to global population ageing. Among the 60-and-over population, NCDs account for more than 87% of the disease burden in low, middle, and high income countries (WHO, 2011). These chronic conditions become more common with increasing age and are a major cause of activity limitation, disability, and institutionalisation (den Ouden et al., 2013; Berthelot, Martel, & Belanger, 2002). Particularly, decline in functional ability is one of the greatest threats to independence in older adults. Functional ability status is commonly measured by asking older adults whether they were able to engage in various basic activities of daily living (ADLs) (Katz, 1963; Katz, Downs, Cash, & Grotz, 1970; Branch et al., 1984), and instrumental activities of daily living (IADLs) (Lawton, & Brody, 1970; Fillenbaum, 1985). Decline in these functional abilities can progress into functional limitations and eventually lead to disability in ADL and IADL (Wang, Van Belle, Kukull, & Larson, 2002). Difficulty or inability to perform these activities is the most frequently used indicators of ADL and IADL disability (Phelan et al., 2004). Functional abilities (ADLs & IADLs) have long been seen as essential measures of disability in both ageing studies and in clinical practice to assess care needs on an annual basis in older adults (Desforges, Applegate, Blass, & Williams, 1990; Reuben et al., 2013).

Activities of Daily Living:

ADLs are defined as basic self-maintenance tasks, which include eating, dressing, bathing, toileting, transferring into or out of a bed or chair, and moving around the house (Maddox, 2013). Each ADL is closely related to each other. When a person is not able to perform one activity this will impact the others.

ADL provides a basic framework to evaluate an older person's ability to live independently, require assistance, or dependency. Dependency or independency in activity of living depends on age, sex, health, and illness status (Holland, 2008). Basic ADL requires muscle strength, coordination, balance, cognitive and sensory skills and adequate joint range of motion. However, increasing age has an adverse effect on these capabilities, resulting in an increased risk of falls. These all lead to increasing dependency upon others in order to perform ADL (Mollaoğlu, Tuncay & Fertelli, 2010).

Instrumental Activities of Daily Living:

The phrase IADL was originally introduced in 1969 by Lawton and Brody in their seminal work entitled "Assessment of Older People." IADL describes activities necessary for adaptation to the environment and emphasise community activities such as preparing meals, shopping, managing money, doing housework, using the telephone, and taking medications (Lawton & Brody, 1969). The activities of IADLs more heterogeneous than ADLs and are more cognitively influenced. IADLs are activities related to independent living and involve interaction with the physical and social environment, and are generally more complex than personal ADL (Spector & Fleishman, 1998). IADLs require a higher level of physical and mental ability than do ADL. IADLs are less related to the ability to manage basic

personal needs. They involve more complex activities that we all must do regularly to remain safely independent. A decline in the ability to manage IADLs is a sign that an older person is beginning to lose the ability to remain independent (Judge, Schechtman, Cress & Group, 1996).

Measuring functional ability poses a variety of challenges. One important issue is that environmental factors strongly influence responses to ADL and IADL measures. For example, someone who uses a wheelchair may be perfectly able to drive or use local transportation, but may be unable to leave the house due to an inability to negotiate stairs. Whether an individual has difficulty getting to and using the toilet may depend on whether there is a toilet easily accessible, and on whether there are physical aids such as grab rails. Asking about a respondent's latent ability to perform a task ("Can you. .?") has the advantage of addressing barriers in the environment or other contextual factors that may inhibit performance, but such an approach sometimes gives a misleading impression of the respondent's actual performance of ADL tasks. People may not do what they are physically capable of doing because of individual or cultural preferences. Asking what ADL tasks someone actually does ("Do you . . .?") can provide a better picture of what supports are needed to promote functional ability (Glass, 1998). Finally, difficulty in performing an activity has been introduced as an alternative to inability to perform the task because difficulty may more appropriately indicate disability, being more a characteristic of the person and less affected by the presence of social support (Stahl, 1990).

One of the most important dimensions of function ability is dependence. Dependence indicates whether an individual needs or uses the assistance of another person or special equipment to accomplish a task. Need of assistance and

long-term care support increased in the case of dependency (Lipszyc, Sail & Xavier, 2012). Each activity can be rated on a three-point scale of independence: (1) no assistance required, (2) partial assistance required, and (3) total assistance required (or does not do the activity). Another approach is used to assess how difficult or "hard" it is to perform a task or activity. For example, in the Longitudinal Study of Ageing (LSOA), a large probability study of the non-institutionalised elderly, respondents were asked the following question for each activity: "Because of a health or physical problem, do you have any difficulty performing [the activity]." Respondents who reported having some difficulty were asked: "By yourself, and without using special equipment, how much difficulty do you have [performing the activity]: some, a lot, or are you unable to do it?" Functional limitation is associated with loss of independence and with increased needs for assistance and support in performing daily living tasks (Fried & Guralnik, 1997).

2.1.6 ADL and IADL Disability

Disability refers to the negative aspects of the interaction between the individual and the environment, i.e., deficits, limitations in the activity and restrictions in his/her social participation (WHO, 2001). We consider it as dependence when the adaptation of the environment or the use of technical aids cannot compensate for disability and the help of a third person is needed to carry out activities of daily living (de l'Europe, 2008). Disability is the main factor to impact on health and quality of life, not only for the elderly but also for the caregiver and relatives (Millán-Calenti et al., 2000).

Generally, disability in older people is assessed based on their difficulty to carry out the activities of daily living, or those activities everybody does every day in order to live independently and be integrated within the environment (WHO, 2001). The International Classification of Functioning, Disability and Health (ICF) (WHO, 2001) tries to establish a consensus in its understanding by establishing a difference between the basic ADL and the IADL. The first (ADL), are defined as those activities essential for an independent life, while carrying out the IADL is more complex, requiring a higher level of personal autonomy. These IADL-scores refer to tasks implying enough capacity as to make decisions as well as interaction with the environment. Based on these differences, deficits in the IADL normally precede deficits in the ADL (Judge et al., 1996).

ADL and IADL disability is easily understood as difficulty or dependency in carrying out activities essentials to independent living, including essential roles, task needed for self-care, and living independently in a home, and desired activities important one's quality of life (Pope & Tarlov, 1991; Adams, Hendershot & Marano, 1999). According to the World Health Organisation (Heikkinen E, 2003), old age disability is usually defined in terms of difficulties in one or more basic self-care tasks, often called activities of daily living, or ADLs, (bathing, dressing, toileting, continence, feeding, transferring from chair to bed) or in one or more instrumental activities of daily living or IADLs (using the phone, shopping, preparing meals, housekeeping, laundry, public transportation, taking medication, handling finances). The interface between ageing and disability is not yet recognised in Ireland, either in terms of service provision or policy. The two main advisory agencies on ageing and disability, the National Council on Ageing and Older People (NCAOP) and the National Disability

Authority (NDA), have also tended to focus specifically on one or the other; the NCAOP on ageing and the NDA on disability. This is now changing, with the two agencies engaged in exploring the interface between ageing and disability in Ireland. European Community Household Panel survey (ECHP) (www.ec.europa.eu) reporting the data referring to people over 65 in the European Community, observed that 21% of the population is are unable to carry out activities of daily living, and this figure rises up to 29% for people over 75 years old. France would be the European country with most dependence in the ADL (28% of people over 65); in contrast to Ireland, with only 8% dependent (Grammenos, 2003).

2.1.7 Assistance in ADL and IADL Disabilities

The number of older adults with disabilities continues to grow, despite reductions in disability rates over the past two decades (Schoeni et al., 2001). The proportion of older adults experiencing limitation in either ADLs or IADLs increases with age. At present, approximately 18% of the older adults in Irish population are reporting combined ADL/IADL difficulties (Connolly et al., 2016). Older adults with disabilities compensate for their functional limitations by receiving assistance from both human (personal assistance) and assistive technology (technological assistance). The description of the provision and utilisation of these assistances can provide insight into older adults' need for assistance in different living environments. Many older adults use technological assistance (e.g; cane, walker, grab bar, shower seat etc.) or personal help to overcome functional limitation or facilitating their ability to live independently (Freedman et al., 2006). Both kind of assistance reduce task demands so that older adults can complete activities of daily living more easily. Surprisingly, although these two kinds of

assistance often ameliorate limitations (Agree, 1999; Mann et al., 1995; Verbrugge, Rennert & Madans, 1997), they do not always improve older adults' well-being (Agree & Freedman, 2011; Gignac, Cott & Badley, 2000; Silverstein, Chen, & Heller, 1996), suggesting a complex relationship among disabilities, and the use of technological and personal assistance. Some factors may contribute to the complexity of the associations. The use of personal assistance requires older adults to yield decision power to the people assisting, whereas use of technology advocates autonomy and self-sufficiency (Horowitz et al., 2006; Freedman et al., 2014; Veehof et al., 2006). The need for assistance also changes over time and depends on trends in disability rates. More recent studies have shown that the disability rate has been relatively constant over the last decade (Freedman et al., 2013). A small decrease in disability rates was coupled with a decline in the need for personal assistance services. One potential driver in the decline in the need for personal assistance is the greater use of assistive technologies over the last few decades (Kaye, Kang & LaPlante, 2000; Manton, Corder & Stallard, 1993).

Personal assistance services:

Personal assistance services is the support given to older adults from informal caregivers (e.g., partners, adult children, other relatives, friends and neighbours) and formal caregivers (i.e., subsidised or paid professionals) to enable participation in everyday activities. Assistants might help with bathing, dressing, moving around during the day, shopping, etc. Personal assistance is designed for ADL/IADL dependent individuals and differs from rehabilitation services by professional healthcare providers (e.g., nurses, therapist etc.). Some form of personal assistance is now available (often by statutory right) in all Nordic countries, however Ireland is still without legislation (Mot et al., 2012). The

naming of personal assistance and rules about who may be a personal assistant for older adults may vary from country to country. For example, some countries allow family members (e.g., spouses) while others do not (Mot et al., 2012). Compared to other assistance, personal assistance may have unique benefits and potential drawbacks. Older adults may more on trust in assistance provided by their family members however they may create unnecessary dependencies for some older adults (Agree, & Freedman, 2003).

Technological assistance services:

Technological assistance refers to the use of equipment or devices (walking sticks, canes, bathroom rails, raised toilet seats, hearing aid, etc.) to allow performance of daily activities in an around the home. This equipment has the potential to promote independence and improve the quality of life for older adults with ADL/IADL disabilities (Edwards, & Jones, 1998). This technology can benefit as an assistive and supportive tool for both caretakers and the elderly. Technological assistance is sometimes referred to in various literatures as assistive devices or assistive technology (Hoenig, Taylor & Sloan, 2003; Tinker & Lansley, 2005). Assistive Technologies (AT) includes “any item, piece of equipment, or product system, whether acquired commercially, modified or customised, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities” (Bryant & Seay, 1998). The use of devices increases with age, almost doubling each decade after the age of 65 years (Cornman, Freedman & Agree, 2005). These assistive technologies range from common devices such as canes and ramps to more high-tech devices such as electric wheelchairs and devices to monitor and prompt people with disabilities to take medicine and perform other tasks like eating. These technologies are used to compensate for physical or

cognitive impairments to enable activities of daily living and to reduce isolation (Kylberg et al., 2013). When it is possible to do so, many people prefer to use assistive devices to complete activities of daily living rather than receive help in performing those tasks (Verbrugge, Rennert & Madans, 1997). Research suggests that the use of assistive technology devices by older adults can result in a higher perceived quality of life, greater independence, improved functional capacities of daily living and a heightened level of social activity (Lubinski & Higginbotham, 1997; Scherer, 2002).

Gitlin (2002) identified three main areas of an older adult's life where assistive technology may be effective. These include (1) before the onset of a disability, playing more of a preventive role, (2) after first experiencing the onset of a disability, and (3) during long term care. Unfortunately, most older adults are not aware of the assistive technology devices available that can dramatically improve their quality of daily living (Lubinski & Higginbotham, 1997). However, when awareness is gained, many older adults have a tendency to discard the idea of using assistive technology to improve their lives. Whether the reason is a lack of knowledge or a fear of the unknown, some older adults find the use of assistive technology difficult and intimidating. Even after purchases of assistive technology have been made, many older adults may feel a sense of discomfort, frustration or embarrassment. This may be due to unfamiliarity, inadequate training in the use of the product, and feelings of embarrassment due to assistive devices being used in public. In addition, older adults may also not have received information on where to purchase replacement parts or other assistive devices when the need arises (Lubinski & Higginbotham, 1997; Gitlin, 2002). Referral to the Multi-disciplinary team (MDT) for timely assessment and efficient functioning of the used device.

2.1.8 Importance of Technological and Personal Assistance:

During the 20th century there was a dramatic growth of older adults with disabilities using assistive technologies globally (Manton, Corder, & Stallard, 1993; Norburn et al., 1995). During the 1980s, those using any equipment rose from 3.3 to 4.1 million and the number relying *only* on equipment more than doubled (Monton et al., 1993). By the mid- 1990s, the majority of those with activity of daily living (ADL) limitations used some form of technology, and almost a third(31%) used only AT to accommodate their needs (Agree & Freedman, 2000). Clinical literature mainly focused on the efficacy of specific devices and their efficacy depends on design, provision of appropriate training, and effective home based assessment (Gitlin & Levine, 1992; Kohn, LeBlanc & Mortola, 1994; Sanford & Megrew, 1995; Steinfeld & Shea, 1995).

Assistive technology can help individuals with disabilities compensate for lost functions, increase their independence, alleviate pressures on the exiting long-term care system, and thus ensure a quality of life. A national studies suggest that technology may confer unique benefits in reducing difficulty with daily tasks and unmet need (Agree, 1999; Agree & Freedman, 2003; Taylor, & Hoenig, 2004; Verbrugge, Rennert, & Madans, 1997; Verbrugge & Sevak, 2002) and reduces the amount of personal care needed (Mann et al., 1999). However, it remains unclear whether AT replaces or supplements personal care.

There is limited research on the substitutability of devices or technological assistance for personal care. Moreover, devices can substitute personal care (formal or informal care) in a number of ways. For example, a walking stick might alleviate the need for personal assistance and allowing an individual to

move more independently. Adding grab-bars to the shower may enable older persons to shower independently and safely, which makes them more autonomous and also reduces the need of human assistance. A descriptive research study in the United States, Agree & Freedman (2000) found that simple assistive technology, such as canes, had the potential to substitute for informal care, while more complex devices, such as wheelchairs, appeared to supplement formal care. These relationships held after controlling for the underlying degree of disability severity.

In community-based long-term care studies there is a substitution between technological and personal assistance (Agree & Freedman, 2000; Hoenig, Taylor, & Sloan, 2003; Allen, Foster & Berg, 2001; de Klerk & Huijsman, 1996). Most research on long-term care in the community has evaluated the options in terms of formal and informal caregivers. The increased use of devices in home-based, long-term care arrangements has the potential to foster the independence and autonomy of older adults with ADL disability, alleviate the excess burden on caregiver, and reduce expenditure on long term care.

Older adults with ADL disabilities living at home or in the community compensate for their functional limitation through personal assistance and technological assistance. With the increasing demands for long-term care services for older adults in the community, policymakers and researchers are interested in whether technological assistance can be a substitute for personal assistance or whether it is a complementary support (Anderson & Wiener, 2013). If this technological assistance is a substitute for personal assistance, such as when a cane is used rather than dependence on a human caregiver, then cost savings may be possible by promoting its use. Alternatively, if assistive technology is a complement, meaning both are used together, such as when a mechanical lifting

device issued by a personal assistant for transferring a person to and from bed, then providing such technology will increase costs to the extent that it is provided, although it may reduce unmet need (Agree & Freedman, 2003). Limited research literature is available on this point, with some studies showing they are complementary (Agree et al., 2005), some substitutes (Agree & Freedman, 2000; Hoenig, Taylor & Sloan, 2003; Mortenson et al., 2012), and some both (Allen, Foster & Berg, 2001; Allen, Resnik & Roy, 2006). The differences across studies seem to depend on contextual factors, data, and analysis methodologies. Another important issue for understanding the relationship between technological assistance and personal assistance is controlling for differences in disability levels of recipients using these services. If the underlying need is relatively light, some assistive technologies may accommodate most or all of one's need for help. On the other hand, if underlying need is great, then substantial amounts of assistive technologies and human personal assistance may be needed. Controlling for differences in analyses will be important to accurately assess whether there is a substitution effect between technological assistance and personal assistance (Kaye et al., 2000).

2.1.9 Summary of the Literature Review

Based on the literature review, it is hypothesised that increasing chronic conditions increase ADL and IADL disabilities, and might lead to inability to perform activity of daily living. Moreover, it was hypothesised that these subpopulations need assistance in daily living activities in the form of technological and personal assistance.

CHAPTER-3 METHODOLOGY

3.1 Introduction

The purpose of this study was to evaluate the impact of assistances on the quality of life of older adults with ADL disabilities. There are additional questions the study has sought to answer. These include studying the various limitations experienced by older adults in their activities of daily living as well as the assistance (technological assistance/personal assistance) utilised by elderly when they encounter functional limitation in their ADL. Most studies have focused on the prevalence of disability in an older population. However, this study attempts to find out the impact of assistance utilised by the disabled older person on their quality of life.

This chapter discusses the overall research methodology used for the study. It consists of a description of study design, data collection and data analysis.

3.2 Research Questions

1. What are the demographic characteristics of older adults with ADL and IADL disability in Ireland?
2. What types of assistance are currently being used by older adults with ADL and IADL disabilities?
3. Is there an association between an older adult's area of greater ADL disability and the types of assistance currently being used?
4. Which combination of assistance reduces task demands or resolves difficulty resulting in better outcomes in their quality of life?

3.3 Study Design, Sample and Recruitment

3.3.1 Design of The Irish Longitudinal Study on Ageing (TILDA)

Data analysed in this thesis is from the Irish longitudinal Study on Ageing (TILDA). TILDA is a nationally representative prospective cohort study of 8175 participants aged 50 years and older, assessing the social, economic, and health circumstances of community-dwelling older adults in Ireland that commenced in October 2009 (Kenny, 2013). TILDA is one of a family of longitudinal studies that have used the Health Retirement Survey (Juster & Suzman, 1995) in the United States as a template, but has a unique emphasis on objective health measures, some collected using health technologies. The original study sample was chosen using the regularly updated RANSAM sampling techniques, which is a computer-based random sampling design developed by the Economic and Social Research Institute of Ireland (Whelan, 1979). The sampling frame was the Irish Geo-directory which is a comprehensive listing of all Irish residential address. Geographic clusters are identified at the level of District Electoral Divisions. Each cluster contains 500-1180 addresses, which were further stratified by geographical location, age and socioeconomic status. It was decided to select 640 of these clusters. Based on probability of being selected, proportionate to the number of addresses with an individual aged ≥ 50 years. From each of the 640 clusters, 50 addresses were selected randomly, which constituted the initial sample from which study participants were recruited for the TILDA study. A detailed description of the TILDA cohort, and of the study design and methodology is reported by Kearney et al. (2011) and Whelan and Savva (2013). Further information is available at the TILDA website (<http://tilda.tcd.ie/>) and the Irish

Social Science Data Archive (ISSDA) website (www.issda.ie) where the data are available on application.

3.3.2 Procedures

All selected addresses were posted a letter inviting participation in the study; in instances where there was no unique address the letters were delivered by hand by TILDA researchers. A week thereafter, interviewers travelled to the invited households, to determine if there was an eligible individual resident there, namely anyone aged ≥ 50 years and their spouses/partners (of any age). If, in the interviewer's judgement, a participant could not give consent to part take in the study, due to dementia or cognitive impairment, they were excluded. This thesis is based on the first wave of TILDA data, which was collected between October 2009 and July 2011 through a computer assisted personal interview and self-completed questionnaire. All findings detailed within this thesis are thus cross-sectional in nature.

3.3.3 Materials

There are three components to data collection in TILDA, wave 1. First each eligible participant completed an interview in their own home using computer-assisted personal interviewing (CAPI). The CAPI included detailed questions on socio-demographic characteristics, health, wealth, lifestyle, social support and participation, health and social care utilisation, and attitudes towards ageing. Participants in their own time completed a self-completion questionnaire, which asked more sensitive and personal questions and was returned by post. Finally all participants were invited to have a comprehensive health assessment either in a dedicated health centre or in their own home. All health assessments were carried

out by trained research nurses. Only the centre-based assessments included detailed measurement of vision and novel technologies such as beat-to-beat finger arterial blood pressure and monitors. The overall response rate was 62% (n=8175). Of those, 85% returned the self-completion questionnaire (n=6912) and 62% participated in a health centre assessment (n=5041).

3.3.4 Indicators

In this thesis; Respondents answered questions included in the social module of CAPI about their ability to perform a range of activities to assess their functionality. These activities fall into two groups. “Activities of Daily Living” (ADLs) are the basic tasks of everyday life, such as eating, bathing, dressing, toileting, and moving about. Instrumental Activities of Daily Living (IADLs) are the activities performed by a person in order to live independently in a community setting, such as managing money, shopping, using the telephone, housekeeping, preparing meals, and taking medications correctly (see Table 3.1). In the present study, a respondent was deemed to have ADL or IADL limitations if they responded ‘yes’ to have difficulties carrying out any of the selected items.

Table 3.1: Questions concerning limitations in ADL and IADL in TILDA (Items in bold used to establish ADL & IADL limitation)

ADL	IADL
Please look at card FL2. Because of a health or memory problem, do you have difficulty doing any of the activities on this card? Again exclude any difficulties you expect to last less than three months.	Please look at card FL3. Because of a health or memory problem, do you have difficulty doing any of the activities on this card? Again exclude any difficulties you expect to last less than three months
Dressing, including putting on shoes and socks	Preparing a hot meal
Walking across a room	Doing household chores (laundry, cleaning)

Bathing or showering	Shopping for groceries
Eating, such as cutting up your food	Making telephone calls
Getting in or out of bed	Taking medications
Using the toilet, including getting up or down	Managing money, such as paying bills and keeping track of expenses

This section asks respondents about any difficulties they have in the performance of all typical activities of daily living and instrumental daily living, as listed above. They are also asked about the kind of assistance and help utilised for dealing with any difficulties. For ADL, participants asked the following questions: “Do you ever use equipment or devices to help you in dressing/getting across a room/bathing/eating/getting in out of bed/using toilet?” In order to understand personal assistance received for dealing with ADL difficulties, participants asked the following question: “Does anyone ever help you with dressing/getting across a room/bathing/eating/getting in out of bed/using toilet?”. For IADL difficulties participants asked the following question: “Does anyone help you with preparing a hot meal/with doing household chores/ shopping for groceries/ making phone calls/ taking your medication/ managing your own money?” In this section, a participant was deemed to have specific type of assistance if they responded ‘yes’ to having assistance in carrying out specific difficulties.

3.4 Ethics

Ethical approval was obtained from the Faculty of Health Sciences Research Ethics Committee of Trinity College, Dublin, and all participants provided signed informed consent prior to participation. All experimental procedures adhered to the Declaration of Helsinki (Whelan & Savva, 2013).

3.4.1 Confidentiality of Patient Identifiable Information

All data capture, storage, handling and retrieval procedures have been audited by the internal audit office of Trinity College Dublin (TCD) and complied with TCD policy for handling patient-identifiable information. TILDA is registered as a data controller with the Office of the Data Protection commissioners and complies with all national data protection legislation.

3.5 Funding

TILDA is funded by The Atlantic Philanthropies, the Irish Government, Irish life, the Health Research Board (HRB), the National Institutes of Health (NIH), the National Institute on Ageing (NIA) and the European Union horizon 2020. The financial sponsors played no role in the design, execution, analysis and interpretation of data or in the writing this thesis.

Researcher was funded by the Government of Ireland, under Government of Ireland International Educational Scholarship Programme 2015/2016, for a research based MSc Medical Gerontology programme from the Department of Medical Gerontology, School of Medicine, Trinity College Dublin, University of Dublin.

3.6 Data Collection

The data were collected through completion of quality of life and disability questionnaires. The majority of the questions were asked using single closed questions. In addition, the questionnaires had embedded within them several well-validated scales. This includes CASP-19 questionnaire (QoL) and ADL and IADL scales. The main study variables include quality of life (CASP-19 questionnaire),

disability (ADL and IADL) questionnaire, and questionnaire for type of assistance. The socio-demographic characteristics (gender, age category, education level, marital status, living status, employment status, and area of living) and some health needs variables (chronic pain, falls in last year, polypharmacy, vision and hearing) were self-reported and collected through an interview in the participants' home in an extensive face-to-face computer-assisted questionnaire completed by a trained interviewer.

Quality of life: Quality of life in TILDA is indexed using CASP-19 measure, which is brief (19-item) self-report inventory that is designed to measure quality of life independent of the factors that might influence it, such as health, social support and material circumstances (Hyde et al., 2003) (Full list of CASP-19 questions in an Appendix-A). This scale is composed of 4 sub-scales, the initial of which make up the acronym: **C**ontrol, **A**utonomy, **S**elf-Realization and **P**leasure. Participants who complete the CAPI questionnaire were invited to fill in a paper Self Completion Questionnaire (SCQ). Participants indicated the extent to which they agreed with each statement on a four-point frequency scale ranging from 'Often' through 'Never' and responses are scored so that the most positive responses are given a score of 3 and the most negative responses are given a score of 0. Some of the items were reverse-coded so that all item responses were in the same direction. The CASP-19 score used in the analysis was the arithmetic sum of the scores for all the 19 items, ranging from 0, representing a complete absence of quality of life, to 57, representing total satisfaction. The instrument produces scores for each of four subscales. These subscales are considered important indication of quality of life among older people. Table 3.2 describes the dimensions of quality of life that are measured by each subscale of the measure

and sample items for each subscale. It has been used in some major observational studies in Europe and USA (Börsch-Supan, Hank & Jürges, 2005; Marmot et al., 2002; Karp, 2007; Netuveli et al., 2006).

Table 3.2: Scale composition and sample items on the CASP-19 quality of life measure

Scale	Description	Sample item	No. of items	Score Range
Control	The ability to actively participate in one's environment	'I feel what happens to me is out of my control '	4	0-12
Autonomy	The right of the individual to be free from the unwanted interference of others	'I can do the things that I want to do'	5	0-15
Self-realisation	The fulfilment of one's potential	'I feel that my life has meaning	5	0-15
Pleasure	The sense of happiness or enjoyment derived from engaging with life.	'I feel satisfied with the way my life has turned out'	5	0-15
CASP-19 total score	Sum of the four CASP-19 subscales		19	0-57

ADL and IADL Disability: “Disability” in older populations most often is measured as self-reported limitations in Activities of daily Living (ADL) and Instrumental Activities of daily Living (IADL). The TILDA survey asked whether, “Because of a health or memory problem”, the participant had “any difficulty” (yes/no) with ADL/IADL as above explained in Table 3.1. These questions were adapted from standardised ADL and IADL scales (Katz, 1963; Lawton & Brody, 1970). Disability was defined as having limitation in one or more activities, including ADL and IADL.

Assistance Services in Disability: In order to understand the assistance required for completing ADL and IADL tasks, participants were asked a question regarding assistance. For each ADL two methods of assistance were asked of everyone (“do you ever use any equipment or device to do the tasks” and “does anyone ever help you to do the task”). For each IADL, a question about personal assistance was asked of everyone (“does anyone ever help you to do the task”). The use of equipment or device is not queried here.

3.7 Data analysis

3.7.1 Construction of Disability and Assistance variables

3.7.1.1 Disability Type

As we asked the difficulty in ADL and IADL tasks from respondents in TILDA, we constructed a set of variables based on type of disability, as did previous studies of disability trends (Crimmins, Saito & Reynolds, 1997). A respondent was defined as ADL-disabled if there was any difficulty in performing (or inability to perform) one or more of the above six ADL tasks. IADL-disabled was coded in the same way i.e. if there was any difficulty in performing (or inability to perform) one or more of the above six IADL tasks. Four exclusive types of ADL/IADL disability were constructed in this cohort that included those with ‘no disability’; an ‘ADL disability only’; an ‘IADL disability only’; and finally those with ‘both an ADL and IADL disability’ (Barrett et al., 2011). For this thesis, we choose to focus on the latter three types of disability and included them only in the analysis.

3.7.1.2 Severity of Disability

Severity of disability was defined as the number of tasks that a person is unable to perform (Johnson & Wiener, 2006). There were constructed for ADL and IADL group in the following way: respondents who reported difficulty with one task (1 ADL limitation), (1 IADL limitation) and who reported difficulty in two or more tasks (≥ 2 ADL limitation), (≥ 2 IADL limitation).

3.7.1.3 Self-care and Mobility

In addition, we constructed a further variable that categorised ADL disabilities into binary variable that summarised the two key activities of daily living tasks--self-care and mobility--of the World Health Organisation's International Classification of Functioning, Disability and Health (ICF) (ICF, 2001) to identify ADL content. Self-care activities include difficulty in performing these four tasks of ADLs; dressing; bathing or showering; eating; and toileting. Challenges in the domain of mobility included walking across a room and getting in or out of bed.

3.7.1.4 Assistance Categorisation

Four categories for assistance services were defined. The first was the use of *only technological assistance* (shoe horn, pick up stick, walking stick or frame, shower seat, grab rails, special utensils or special dishes, bed rail, wheelchair, raised toilet seat etc.) to help carry out ADLs. The second was the use of *only personal assistance* from another person to help a person cope with one or more ADLs or IADLs limitation. The third *both assistance* help was defined as utilising both technological assistance and personal assistance. Finally the fourth category *no assistance* was defined as those who didn't use any kind of assistance to help with their disabilities.

3.7.2 Statistical Analysis

3.7.2.1 Descriptive Statistics

Statistical analyses for this work were conducted using STATA version 12.1 (Stata Statistical Software: StataCorp, College Station, TX). All of the results were estimated by taking the sample clustering and household structure into account with respect to age, sex, educational attainment, marital status and urban versus rural residence (weight reflected the reciprocal of the selection probability). In addition to using sampling weights, standard errors were corrected for intra-class correlations within geographic clusters and within households (using the “svy” command in Stata). Descriptive statistics were used to explore the differences in the key variables (socio-demographic characteristics, type and severity of disability and types of assistance service). The prevalence of disability and assistance are reported as percentage and 95% confidence interval (CI) allow comparison with prevalence reported in other studies.

3.7.2.2 Statistical Model

Dependent Variable: The quality of life measure used in TILDA is CASP-19 measure, comprises of 19 Likert scale items, capturing four dimensions of QoL ability: control, autonomy, self-realization, and pleasure. Respondent's rate how often they feel a particular way about their life, ranging from often to never. Statements are a mixture of positive and negative, with positive items reverse coded so that a higher score equates with higher QoL. Each item is scored from 0 to 3, with the summed scale ranging from 0 to 57.

Independent Variables: We included two sets of variables, used in previous research, in the models: health needs and socio-demographic characteristics.

Health needs: In this study five health need variables (chronic pain, fall in last year, polypharmacy, vision and hearing) were included in the model to examine the association between these factors and quality of life.

Socio-demographic characteristics: We also included seven demographic characteristics related to disability care: age, gender, education (primary or none, secondary, tertiary), marital (married, unmarried), living status (with spouse, with partner, alone), employment status (employed, retired, others), and area of living (Rural, urban) that may affect an individual's quality of life.

The interpretation of differences of scores on the CASP-19 scale has been addressed by cross-sectional approach. We first examined the distribution of CASP-19 scores. Participants completed this questionnaire in their own time, to allow them to respond in private to sensitive questions. We first examined the distribution of CASP-19 scores visually using histograms in Stata. The distribution of the CASP-19 scores was not normally distributed as there was a negative skew. To address this, the square roots of CASP-19 score were calculated to better approximate a normal distribution and it is these values that were used in subsequent regression analysis. The Regression techniques were used to test the relationship between types of assistance and quality of life outcome after controlling for other factors. The significance level was set as <0.05 . First, multiple linear regression model addressed quality of life differences between the types of assistance in older adults with ADL disability. Predictors entered into the model were: age (in years), gender (male/female), educational status (primary or none/secondary/tertiary), living status (with spouse/with partner/alone), marital status (married/unmarried), employment status (employed/retired/others), area of living (urban/rural), fall in last year (yes/no),

vision (yes/no), hearing (yes/no), chronic pain (yes/no), and polypharmacy (yes/no). Subjects were grouped in relation to a socio-demographic profile and other health variables. The second multiple linear regression model was conducted for type of assistance in individuals ADLs with the same methodology. Domains of explanatory variables were entered separately and the effect of each on the explained variance was examined using the coefficient of determination (R^2). Having established the variance explained and the effect of variables with each domain entered separately, a full ordinary least squares regression model was estimated by adding the domains to the final model in forward stepwise fashion in the order: chronic pain; fall in last year; polypharmacy; vision; hearing; and socio-demographic factors. The final model included all domains simultaneously, allowing the full extent of variance explained to be established. The independent contribution of each domain was then established comparing the R^2 of the full model with the R^2 of the model excluding that domain.

CHAPTER-4 RESULTS

4.1 Introduction

The previous chapter described the methodology and approaches used throughout this analysis. This chapter documents the results generated using these methods that were conducted to address the research questions. Initially, the socio-demographic profiles of the respondents are presented with relevant features and statistics provided. Following this, the results of the descriptive and regression statistical analysis of the parameters are reported.

4.2 Research questions

4.2.1 Research Question One: What are the demographic characteristics of older adults with ADL and IADL disability in Ireland?

The TILDA study interviewed 8504 participants aged 50 years and over, with giving a response rate of 62%. The sample for this current study was, however, confined to those aged 60 or over (n=4904). Results indicate a broadly similar distribution of respondents by age group (≥ 60 , < 75 and ≥ 75) in this TILDA survey; however, there were a slightly higher proportion of female respondents aged 75 and over. (Figure 4.1)

Figure 4.1 Percentage (weighted) of men and women in each age group in TILDA

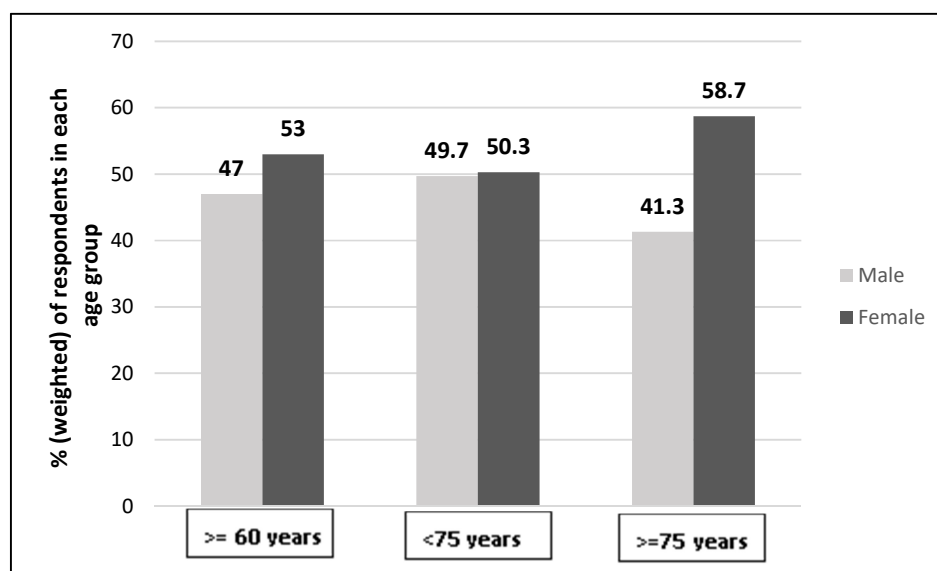


Table 4.1 Demographic Characteristics at Wave 1 of 60 plus from TILDA.

	Sample n & (% of TILDA Population)	Weighted population% (95% confidence interval)
Gender(n=4,904)		
Male	2,282 (46.5)	46.9 (45.7-48.2)
Female	2,622 (53.5)	53.0 (51.8-54.3)
Age category(n=4,904)		
<75	3,552 (72.4)	66.6 (64.7-68.5)
≥75	1,352 (27.6)	33.4 (31.5-35.3)
Level of Education(n=4,900)		
Primary	1,962 (40)	42.6 (40.7-44.5)
Secondary	1,710 (35)	40.4 (38.7-42.1)
Tertiary	1,228 (25)	16.9 (15.6-18.2)
Marital Status(n=4,904)		
Married	3,601 (73.4)	72.7 (71.1-74.3)
Unmarried	1,303 (26.6)	27.3 (25.7-28.9)
Living status(n=4,895)		
With spouse	3,021 (61.7)	57.7 (55.8-59.5)
With partner	85 (1.7)	1.5 (1.0-2.0)
Alone	1,789 (36.6)	40.8 (39.0-42.6)
Employment status(n=4,904)		
Employed	902 (18.4)	17.8 (16.5-19.1)
Retired	2,831 (57.7)	57.5 (55.7-59.3)
Others	1,171 (23.9)	24.6 (23.2-26.1)
Area of living(n=4,895)		
Urban	2,578 (52.7)	56.5 (52.7-60.3)
Rural	2,317 (47.3)	43.5 (39.7-47.3)

In Table 4.1 proportions of the over 60 population in Ireland (TILDA) by demographic characteristics at Wave 1 and their calculated 95% confidence intervals (95% CIs), as well as their total number. In this population just over half of the participants were female (53.5%). The majority of participants were in the under 75 age category (72.4%), primary educated (40%), married (73.4%), living with their spouse (61.7%), retired 57.7 % and living in an urban area (52.7%).

Prevalence of ADL and IADL Disability Among Older Adults

Table 4.2 shows the prevalence of the population within each disability categories; ADL disability only; IADL disability only; and those with at least one of both ADL and IADL disabilities. Overall, 11.8% (n=540) older people aged 60 and over have disability in ADL, and 10.4% (n=454) have disability in IADL (see Table 4.3). We can say 22.2% (11.8+10.4) of population have difficulty either in ADL, IADL or both. The prevalence of older people having disability only in ADL are 6.2%, only in IADLs 4.7%, and in both ADL & IADL 5.7%.

In this population a higher proportion of men than women (7.4% vs.5%) had reported difficulty in an ADL only, while women were more likely than men to report an IADL only (6% vs. 3.3%). Similarly, women were more likely to report difficulty in both ADL and IADL combined than men (6.7% vs. 4.5%). In term of age, participants aged ≥ 75 were more likely to report any kind of disability than participants aged < 75 years. When the relationship between disability and education was examined, the proportion of all disability reduced with a higher level of education. In terms of marital status, a higher proportion of married person reported difficulty in an ADL only (6.3% vs. 5.9%) than unmarried, while those unmarried were more likely to report difficulty in an IADL only than married (8.4% vs. 3.4%). Similarly unmarried persons were more likely to report

difficulty in both ADL and IADL task combined (9.6% vs. 4.2). Participants living alone were more likely to report disability in IADL only and both ADL and IADL combined. In terms of area of living, a higher proportion of persons living in urban rather than rural areas had reported difficulty in an ADL only and IADL only, while person living in rural area were more likely to report both ADL and IADL combined.

Table 4.2: Prevalence of Type of Disability by Socio-demographic Characteristics

Types of Disability% (95% CI)				
(n=4904)	ADL disabled Only ^a (n=293) 6.2 (5.4-6.9)	IADL disabled Only ^b (n=207) 4.7 (4.0-5.4)	ADL & IADL disabled ^c (n=247) 5.6 (4.8-6.4)	Neither ADL or IADL disabled (n=4,157) 83.5 (82.2-84.7)
Gender				
Male	7.4 (6.3-8.6)	3.3 (2.4-4.2)	4.5 (3.6-5.4)	84.7 (83.0-86.5)
Female	5.0 (4.1-5.9)	6.0 (4.9-7.0)	6.7 (5.4-7.9)	82.3 (80.6-84.1)
Age category				
<75	5.5 (4.6-6.3)	2.6 (2.0-3.1)	3.1 (2.4-3.7)	88.9 (87.6-90.2)
≥75	7.3 (5.9-8.8)	9.0 (7.3-10.7)	10.8 (8.9-12.7)	72.8 (70.3-75.3)
Level of Education				
Primary	6.9 (5.7-8.1)	6.9 (5.7-8.2)	7.3 (6-8.5)	78.9 (76.9-80.8)
Secondary	5.5 (4.3-6.7)	3.4 (2.5-4.3)	4.8 (3.6-6)	86.3 (84.4-88.1)
Tertiary	5.7 (4.2-7.3)	2.4 (1.5-3.4)	3.4 (2.2-4.6)	88.4 (86.3-90.5)
Marital Status				
Married	6.3 (5.3-7.2)	3.4 (2.7-4)	4.2 (3.4-5)	86.2 (84.9-87.5)
Unmarried	5.9 (4.5-7.2)	8.4 (6.7-10)	9.6 (7.8-11.4)	76.2 (73.5-78.8)
Living status				
With spouse	6.3 (5.4-7.3)	3.2 (2.5-3.9)	3.6 (2.8-4.3)	86.8 (85.4-88.3)
With partner	5.3 (-0.1-10.7)	5.2 (5.3-9.9)	2.4 (-0.9-5.7)	87.1 (80.0-94.1)
Alone	5.9 (4.7-7.1)	6.8 (5.5-8.2)	8.7 (7.1-10.2)	78.5 (76.3-80.7)
Employment status				
Employed	4.3 (2.8, 5.8)	0.5 (-, 0.9)	0.9 (0.2-1.6)	94.3 (92.6-96.0)
Retired	6.3 (5.4, 7.3)	5.4 (4.4-6.3)	6.1 (5-7.2)	82.1 (80.5-83.8)
Others	7 (5.4, 8.7)	6.3 (4.7-7.8)	8 (6.3-9.8)	78.6 (75.9-81.4)
Area of living				
Urban	6.7 (5.6-7.8)	5.4 (4.3-6.4)	5.1 (4-6.1)	82.9 (81.1-84.6)
Rural	5.5 (4.4-6.5)	3.9 (3.1-4.7)	6.4 (5.2-7.6)	84.2 (82.4-86.0)

a: Difficulty in ADLs task; b: Difficulty in IADLs task; c: Difficulty in any ADLs or IADLs

Values in bold establish the highest percentage of difficulty in older adults.

Table 4.3 shows weighted population of severity of disability (difficulty in number of task) by socio-demographic characteristics. First, classifying the subjects according to ADL limitation (see methodology section 3.7.1.2), the entire sample was divided into 2 mutually exclusive groups: limitation with at least 1 ADL (n=345, 7.4%) and limitation with 2 or more ADLs (n=195, 4.4%). The same classification is also followed for IADL limitation and the entire sample was divided into 2 mutually exclusive groups: limitation with at least 1 IADL (n=218, 4.8%) and limitation with 2 or more IADLs (n=236, 5.6%). In this population difficulty in one ADL activity was more commonly reported for men than for women (7.8% vs 6.9%) and difficulty in two or more ADL activity was more reported by women than for men (4.7% vs 4.1%). Similarly people aged 75 years and above, unmarried and living alone had more severe disability in both ADL and IADL. Participants living in urban areas have more difficulty in one ADL limitation as compared to those living in rural areas, who have difficulties with two and more ADLs. A higher level of education, employment (employed) and those living with spouse showed less severe disability in both ADL and IADL.

4.2.2 Research Question Two: What type and proportion of assistance are currently being used by older adults with ADL and/or IADL disabled?

To answer this research question we categorised four types of assistance service that rely on 1) only technological assistance; 2) only personal assistance; 3) both assistance 4) not using any assistance for ADL disability (see methodology section 3.7.1.4). Those with underlying difficulty in ‘ADL alone’ reported more technological assistance (19%) than personal assistance (9%) in performing task (see Table 4.4). Those reported who have underlying difficulty in ‘IADL alone’ are 72.6%, for personal assistance. Overall of those who are both ADL and IADL

disabled, 19.3% received technological assistance, 14.9% personal assistance and 42.9% received both.

4.2.3 Research Question Three: Is there a correlation between an older adult's area of greater ADL disability and the types of assistance currently being used?

Table 4.5 shows, the use of assistance services in context of severity of disability. As ADL severity increased, so did the utilisation of assistance (technological and personal). Participants with disability in one ADL task relied more on technological assistance than personal assistance (16.3% vs. 9.4%). The next column of this table confirms that the combination of both assistance (43%) adopted is clearly related to the severity of disability. In the older population with IADL disability, utilisation of personal assistance was also increased with severity of disability, from 67.1% to 92.9% of those with 2 or more IADL limitations.

Table 4.3: Prevalence of Severity of Disability by Socio-demographic Characteristics

Severity of Disability% (95% CI)						
(n=4904)	1 ADL limitation (n=345) 7.4 (6.5-8.2)	≥2 ADL limitation (n=195) 4.4 (3.7-5.1)	Total ADL disabled (n=540) 11.8 (10.7-12.9)	1 IADL limitation (n=218) 4.8 (4.0-5.5)	≥2 IADL limitation (n=236) 5.6 (4.8-6.4)	Total IADL disabled (n=454) 10.4 (9.3-11.4)
Gender						
Male	7.8 (6.6-9.1)	4.1 (3.2-4.9)	12.0 (10.4-13.5)	3.7 (2.8-4.6)	4.1 (3.2-5.0)	7.8 (6.6-9.1)
Female	6.9 (5.9-8.0)	4.7 (3.7-5.7)	11.7 (10.2-13.1)	5.7 (4.6-6.7)	6.9 (5.8-8.1)	12.6 (11.1-14..2)
Age category						
<75	5.5 (4.6-6.4)	3.0 (2.3-3.7)	8.5 (7.4-9.6)	2.8 (2.2-3.5)	2.8 (2.1-3.4)	5.6 (4.7-6.5)
≥75	10.7 (8.9-12.4)	7.4 (5.9-9.0)	18.1 (15.9-20.3)	8.5 (6.9-10.2)	11.3 (9.4-13.2)	19.8 (17.4-22.2)
Level of Education						
Primary	8.5 (7.1-9.8)	5.7 (4.6-6.8)	14.2 (12.5-15.9)	6.0 (4.9-7.1)	8.2 (6.9-9.6)	14.2 (12.6-15.8)
Secondary	6.6 (5.3-8.0)	3.7 (2.6-4.8)	10.4 (8.7-12)	3.9 (2.8-4.9)	4.3 (3.3-5.4)	8.2(6.7-9.7)
Tertiary	6.4 (4.8-8.0)	2.7 (1.6-3.8)	9.1 (7.3-11)	3.9 (2.6-5.2)	1.9 (1.0-2.9)	5.8 (4.3-7.4)
Marital Status						
Married	6.7 (5.8-7.6)	3.7 (3.0-4.5)	10.4 (9.3-11.6)	3.5 (2.8-4.2)	4.0 (3.3-4.8)	7.5 (6.5-8.6)
Unmarried	9.2 (7.4-10.9)	6.3 (4.7-7.8)	15.4 (13.1-17.7)	8.1 (6.5-9.8)	9.8 (8.0-11.6)	18 (15.6-20.3)
Living status						
with spouse	6.5 (5.6-7.5)	3.4 (2.6-4.1)	10 (8.7-11.1)	3.3 (2.5-4.0)	3.5 (2.8-4.3)	6.8 (5.7-7.8)
With partner	0.7 (-0.7-2.2)	6.9 (0.8-13.0)	7.7 (1.4-13.9)	3.9 (-0.6-8.4)	3.7 (-0.0-7.5)	7.6 (2.3-13)
Alone	8.8 (7.3-10.3)	5.8 (4.5-7.0)	14.6 (12.7-16.5)	6.9 (5.5-8.2)	8.6 (7.1-10.1)	15.5(13.6-17.5)
Employment status						
Employed	4.1 (2.7-5.5)	1.1 (0.3-1.7)	5.2 (3.6-6.8)	0.7 (0.1-1.3)	0.7 (0.06-1.3)	1.4 (0.5-2.2)
Retired	7.9 (6.8-9.0)	4.5 (3.6-5.4)	12.4 (11-13.8)	5.5 (4.5-6.5)	6.0 (4.9-7.0)	11.5 (10.1-12.9)
Others	8.4 (6.6-10.2)	6.7 (5.0-8.4)	15.1 (12.7-17.4)	5.9 (4.4-7.5)	8.4 (6.6-10.2)	14.3 (12-16.7)
Area of living						
Urban	7.6 (6.4-8.8)	4.1 (3.2-5.1)	11.7 (10.3-13.2)	5.1 (4.1-6.2)	5.3 (4.3-6.3)	10.4 (9-11.9)
Rural	7.1 (5.9-8.3)	4.7 (3.7-5.8)	11.9 (10.3-13.4)	4.3 (3.4-5.1)	6.0 (4.8-7.2)	10.3 (8.8-11.8)

Note: Values in bold establish the highest percentage of difficulty in older adults.

Table 4.4: Types of Assistance Used According to the Different Types of ADL and IADL Disabilities.

	Types of assistance % (95% CI)		
	ADL disabled only N= 293	IADL disabled only N= 207	Both ADL & IADL disabled N=247
Rely only on Technological Assistance	19.0 (13.9-24.2)	---	19.4 (13.3-25.2)
Rely only on Personal Assistance	9.1 (5.6-12.3)	72.6 (66.4-78.9)	14.9 (10.5-19.4)
Rely on Both Assistance	7.5 (4.3-10.8)	---	42.9 (35.8-50.0)
No Assistance	64.4 (58.3-70.6)	27.3 (21.1-33.5)	22.8 (17.1-28.6)

Note: Percentage distribution (survey) of assistance; all add to 100%. For ADLs, technological and personal assistance were asked. For IADLs, personal assistance was asked.

Values in bold establish the highest percentage of using assistance in disabled older adults.

Table 4.5: Types of Assistance Used According to the Severity of ADL and IADL Disabilities.

	Types of assistance% (95% CI)			
	1 ADL limitation N=345	≥2 ADL limitation N=195	1 IADL limitation N=218	≥2 IADL limitation N=236
Rely only on Technological Assistance	16.3 (11.8-20.7)	23.9 (17.1-30.7)		
Rely only on Personal Assistance	9.4 (6.2-12.6)	15.8 (10.7-20.8)	67.1 (60.5-73.7)	92.9 (89.3-96.5)
Rely on Both Assistance	13.0 (8.8-17.2)	43.0 (35.1-50.9)		
No Assistance	61.3(55.6-66.9)	17.3(11.6-23.0)	32.9 (26.3-39.5)	7.1 (3.5-10.7)

Note: Percentage distribution (survey) of assistance; all add to 100%. For ADLs, technological and personal assistance were asked. For IADLs, personal assistance was asked.

Values in bold establish the highest percentage of using assistance in disabled older adults.

Any assistance (technological assistance only + Personal assistance only + both) + no assistance=100%. For IADLs, personal assistance is asked. Any assistance (=personal) + No assistance=100%

As we categorised ADL difficulty in self-care and mobility (see methodology section 3.7.1.3), Table 4.6a and 4.6b shows that the prevalence of disabilities related to self-care ranges from 1.2% to 10.6%, and related to mobility ranges from 2.3% to 2.9%, while the prevalence with underlying difficulty in IADLs ranges from 1.4% to 6.8% among community-dwelling older adult. ADL difficulties were most commonly reported for dressing (10.6%) and least commonly reported for eating (1.2%). The IADL difficulties most commonly reported were household chores (6.8%) and least for using telephone (1.4%). Use of any type of assistance ranged from 32.5% to 79.7% for older adults with ADLs.

Among those with an underlying difficulty in self-care (see Table 4.6a), any kind of assistance was reported more frequently for bathing and least often used for eating. In the same population, 34.6% of those with difficulty toileting rely on technological assistance, whereas 24.2% of those with difficulty in dressing and 23% difficulty in eating rely on personal assistance. To perform the activity of bathing 42% of participants received both types of assistance. Those with underlying difficulty in mobility (see Table 4.6b) more likely to receive technological assistance than personal help.

Among participants reporting disability in IADL tasks (see Table 4.6c), the use of personal assistance ranges from 72.1% (using telephone) to 92.5% (shopping). Within this group, personal assistance was used more frequently for help with shopping (92.5%) and least often used for help using telephone (72.1%).

Table 4.6a: Type of Assistance Services Used in Activities Related to Self-care

Age≥ 60 (n=4904)	Disability Prevalence ^a	Any Assistance ^b	Assistance among persons with disability in task % (95% CI) ^c			
			Rely only on Technological Assistance	Rely only on Personal Assistance	Rely on both Assistance	No assistance
Dress (395)	10.6 (9.5-11.7)	40.5 (35.0-46.1)	9.8 (6.5-13.1)	24.2 (19.3-28.9)	6.5 (3.9-9.2)	59.5 (53.9-65.1)
Bathe (234)	6.9 (5.9-7.9)	73.5 (67.4-79.6)	22 (15.8-28.3)	9.3 (5.3-13.2)	42.2 (34.6-49.7)	26.5 (20.4-32.6)
Eat (41)	1.2 (0.8-1.6)	32.5 (17.0-48.2)	6.2 (-2.2-14.7)	23.1 (8.8-37.4)	3.2 (-1.6-8.1)	67.5 (51.8-83.0)
Toilet (65)	1.9 (1.4-2.4)	56.6 (42.7-70.4)	34.6 (20.3-48.9)	7.1 (-1.8-16.0)	14.9 (5.6-24.1)	43.4 (29.5-57.3)
Self-care (515)	14.3 (13.0-15.6)	53.3 (48.2-58.5)	16.7 (12.9-20.5)	12.5 (9.5-15.4)	24.1 (19.5-28.7)	46.7 (41.5-51.8)

a: Difficulty doing a task on one's own because of age and health status.

b: Percentage distribution (survey); all add to 100%. Any assistance (technological assistance only + Personal assistance only + both) + no assistance=100%. Values in bold establish the highest percentage of using assistance in disabled older adults.

Table 4.6b: Type of Assistance Services Used in Activities Related to Mobility

Age≥ 60 (n=4904)	Disability Prevalence ^a	Any Assistance ^b	Assistance among persons with disability in task % (95% CI) ^c			
			Rely only on Technological Assistance	Rely only on Personal Assistance	Rely on both Assistance	No assistance
Walk-in (76)	2.3 (1.7-2.9)	79.7 (69.1-90.4)	48.1 (35.1-61.1)	4.4 (-0.02-8.8)	27.3 (15.7-38.8)	20.3 (9.6-30.9)
Transfer (100)	2.9 (2.3-3.5)	46.4 (35.3-57.4)	17.6 (8.8-26.5)	11.3 (3.7-18.9)	17.4 (9.0-25.7)	53.7 (42.6-64.7)
Mobility (147)	4.3 (3.5-5.1)	64.2 (55.4-72.9)	32.3 (23.0-41.5)	8.8 (3.4-14.2)	23.1 (15.4-30.8)	35.8 (27.1-44.5)

a: Difficulty doing a task on one's own because of age and health status.

b: Percentage distribution (survey); all add to 100%. Any assistance (technological assistance only + Personal assistance only + both) + no assistance=100%.

Values in bold establish the highest percentage of using assistance in disabled older adults.

Table 4.6c: Type of Assistance Services Used in Activities Related to IADLs

			Assistance among persons with disability in task % (95% CI) ^c			
Age ≥ 60 (n=4904)	Disability Prevalence ^a	Any Assistance ^b	Rely only on Technologic al Assistance	Rely only on Personal Assistance	Rely on both Assistance	No assistance
IADL (454)						
Meals (167)	4.0 (3.4-4.7)		84.4 (78.0-9..7)		15.6 (9.3-21.9)	
Household (300)	6.8 (6.0-7.6)		83.1 (78.6-87.5)		16.9 (12.4-21.4)	
Shop (250)	5.9 (5.2-6.7)		92.5 (88.9-96.2)		7.5 (3.8-11.1)	
Phone (53)	1.4 (1.0-1.8)		72.1 (58.2-86.0)		27.9 (13.9-41.8)	
Medication (72)	1.8 (1.3-2.3)		75.2 (63.8-86.5)		24.8 (13.4-36.2)	
Money (96)	2.3 (1.8-2.8)		76.3 (66.4-86.1)		23.7 (13.9-33.6)	

^aDifficulty doing a task on one's own because of age and health status.

^bFor IADLs, personal assistance only ask from respondent

The bottom panel of above Table 4.6a & 4.6b shows, that the distribution of disability and assistance differed by the domain of ADL disability. For instance, difficulty was more commonly reported for self-care activities than for mobility activities (14.3% vs 4.3%) and any type of assistance was more commonly received for mobility activities than for self-care activities (64.2% vs 53.3%). Participants reporting difficulty in self-care activities reported receiving more of both types of assistance (24.1%), whereas individuals with a mobility limitation relied more on technological assistance alone (32.3%).

Table 4.7 shows the prevalence of assistance services used by older adults with ADL disabilities. In Ireland, for adults with any type of ADL disability, the technological assistance tends to be used more by men, persons aged below 75 years, persons with higher education and those who are presently employed. Personal assistance alone was not dominant in any socio-demographic characteristics. Personal assistance with a combination of technological assistance in Ireland is more likely to be received by women, those aged 75 years and above, those retired from employment and other kind of employment status. Receiving both types of assistance was also more frequent for both married and unmarried older adults, those living with spouse or alone, and those who are living in rural or urban area.

Examining the type of ADL activities, Table 4.7 also summarises the socio-demographic characteristics of respondents within the two categories of ADL disability: self-care and mobility. The type of assistance received for self-care activities follow the same trend as above but some interesting patterns emerged in the assistance utilised by those with mobility disabilities. The type of assistance received by those with mobility disabilities did not vary by socio-demographic characteristics, and majority have reported technological assistance to perform their mobility tasks.

Table 4.7: Prevalence of Assistive Services by Socio-demographic Characteristics

	% and 95% CI	Overall Assistance (n=285)	Assistance in Self-care (n=265)	Assistance in Mobility (n=88)
Gender				
Male	Only technological assistance	40.2 (30.9, 49.5)	37.4 (27.8, 46.9)	52.1 (34.4, 70.0)
	Only personal assistance	25.2 (17.6, 32.7)	28.2 (19.8, 36.5)	16.3 (3.7, 28.9)
	Both assistance	34.6 (26.1, 43.1)	34.4 (25.7, 43.8)	31.6 (15.6, 47.6)
Female	Only technological assistance	30.8 (22.2, 39.4)	27.4 (18.7, 36.0)	49.3 (34.2, 64.4)
	Only personal assistance	18.8 (12.8, 24.8)	20.2 (13.5, 26.9)	12.3 (1.9, 22.8)
	Both assistance	50.4 (41.5, 59.3)	52.4 (43.1, 61.6)	38.4 (24.2, 52.5)
Age category				
<75	Only technological assistance	38.7 (29.7, 47.7)	34.9 (25.6, 44.2)	52.9 (33.4, 72.3)
	Only personal assistance	30.1 (21.9, 38.2)	31.9 (22.9, 40.9)	25.4 (7.8, 43.0)
	Both assistance	31.2 (22.8, 39.6)	33.1 (23.7, 42.5)	21.7 (7.9, 35.5)
≥75	Only technological assistance	31.9 (23.3, 40.5)	29.2 (20.6, 37.8)	48.9 (34.7, 63.1)
	Only personal assistance	15.5 (9.7, 21.3)	17.7 (11.4, 24.1)	7.6 (0.7, 14.4)
	Both assistance	52.6 (43.6, 61.5)	53.1 (43.9, 62.3)	43.5 (29.6, 57.4)
Level of education				
Primary	Only technological assistance	31.3 (23.2, 39.5)	27.4 (19.2, 35.6)	51.2 (35.9, 66.6)
	Only personal assistance	20.9 (14.6, 27.1)	24.0 (17.0, 30.9)	13.1 (3.6, 22.7)
	Both assistance	47.8 (39.4, 56.2)	48.6 (39.8, 57.5)	35.6 (21.1, 50.1)
	Only technological assistance	34.0 (23.2, 44.8)	30.5 (19.5, 41.5)	48.2 (28.6, 67.7)
	Only personal	21.2 (12.6, 29.8)	22.9 (13.2, 32.5)	12.6 (-2.1, 27.3)

Secondary	assistance			
	Both assistance	44.8 (33.6, 56.0)	46.6 (34.7, 58.5)	39.2 (20.6, 57.9)
Higher	Only technological assistance	54.7 (38.8, 70.6)	55.8 (40.1, 71.5)	55.5 (16.2, 94.8)
	Only personal assistance	24.6 (11.8, 37.4)	22.3 (9.65, 35.1)	27.3 (-1.5, 56.0)
	Both assistance	20.6 (9.3, 32.0)	21.8 (9.5, 34.1)	17.2 (-1.2, 35.6)
Marital status				
Married	Only technological assistance	34.2 (26.1, 42.3)	30.0 (22.0, 38.0)	51.3 (35.6, 66.9)
	Only personal assistance	23.8 (17.6, 30.0)	26.3 (19.6, 32.9)	18.0 (5.2, 30.8)
	Both assistance	42.0 (33.7, 50.3)	43.7 (35.2, 52.3)	30.7 (17.0, 44.5)
Unmarried	Only technological assistance	35.2 (25.6, 44.8)	33.4 (23.8, 43.1)	49.0 (31.8, 66.3)
	Only personal assistance	17.8 (10.3, 25.3)	19.2 (11.0, 27.3)	8.5 (0.2, 16.8)
	Both assistance	47.0 (36.7, 57.3)	47.3 (36.6, 58.1)	42.5 (25.8, 59.1)
Living status				
With spouse	Only technological assistance	30.1 (21.9, 38.4)	25.3 (17.5, 33.1)	46.0 (30.0, 62.0)
	Only personal assistance	30.2 (22.9, 37.5)	33.7 (25.9, 41.5)	12.6 (2.6, 22.5)
	Both assistance	39.7 (30.9, 48.4)	41.0 (32.0, 50.0)	41.4 (26.0, 57.1)
With partner	Only technological assistance	15.5 (-12.8, 43.8)	15.5 (-12.8, 43.8)	No observation
	Only personal assistance	25.0 (-7.5, 57.6)	25.0 (-7.5, 57.6)	No observation
	Both assistance	59.5 (20.2, 98.7)	59.5 (20.2, 98.7)	No observation
Alone	Only technological assistance	39.4 (29.9, 48.9)	37.4 (27.6, 47.2)	54.8 (38.4, 71.1)
	Only personal assistance	13.7 (7.6, 19.7)	14.0 (7.6, 20.4)	14.9 (2.4, 27.4)
	Both assistance	46.9 (37.1, 56.6)	48.5 (38.3, 58.7)	30.3 (16.1, 44.4)

Employment status				
Employed	Only technological assistance	54.1 (22.8, 85.4)	60.0 (28.4, 91.5)	No observation
	Only personal assistance	41.9 (11.2, 72.6)	35.6 (5.0, 66.2)	No observation
	Both assistance	4.0 (-3.9, 11.8)	4.4 (-4.4, 13.2)	No observation
Retired	Only technological assistance	37.2 (28.9, 45.6)	33.7 (25.2, 42.2)	60.3 (45.4, 75.2)
	Only personal assistance	20.3 (14.3, 26.3)	22.5 (15.8, 29.1)	11.9 (3.0, 20.8)
	Both assistance	42.4 (33.8, 51.0)	43.8 (34.8, 52.8)	27.8 (14.3, 41.3)
Others	Only technological assistance	28.2 (18.4, 38.1)	24.8 (15.2, 34.3)	38.2 (20.7, 55.7)
	Only personal assistance	21.1 (13.5, 28.6)	23.5 (15.1, 32.4)	14.0 (-0.1, 28.1)
	Both assistance	50.7 (40.2, 61.2)	51.5 (40.5, 62.4)	47.8 (30.2, 65.4)
Area of living				
Urban	Only technological assistance	36.4 (27.1, 45.8)	34.1 (24.4, 43.8)	51.6 (34.2, 69.0)
	Only personal assistance	19.1 (12.7, 25.5)	21.3 (14.1, 28.6)	11.1 (2.1, 20.0)
	Both assistance	44.4 (35.3, 53.6)	44.5 (34.7, 54.3)	37.3 (21.1, 53.5)
Rural	Only technological assistance	32.7 (24.2, 41.2)	28.5 (20.3, 36.7)	49.8 (33.4, 66.3)
	Only personal assistance	24.2 (17.1, 31.3)	25.1 (17.6, 32.7)	17.1 (3.1, 31.0)
	Both assistance	43.1 (33.5, 52.6)	46.3 (36.6, 56.0)	33.1 (18.3, 47.8)

4.2.4 Research Question Four: Which combination of assistance received reduced task demands or resolved difficulty resulting in better outcomes in their quality of life?

We explored different types of ADL assistance requirement as predictors of measured quality of life, using the squared root of total CASP-19 score as the

dependent variable. The means score and standard deviation of CASP-19 total score was 44.76 ± 7.43 ; 95% CI: 44.51, 45.1. In separate ordinary least squares regression models, we iteratively added covariates across health and socio-demographic domains (see methodology section 3.7.2.2). Table 4.8 presents the results of the unadjusted model, the intervening model adjusted for all health variables, and the full model adjusted for health and socio-demographic factors.

The top panels of Table 4.8 show, across all three models, that co-reliance on both personal assistance and technological assistance for ADLs was associated with small but significant positive increases in quality of life scores (model 1 – β : 0.67; 95% CI: 0.40, 0.95; model 2 – β : 0.50; 95% CI: 0.22, 0.77; model 3 – β : 0.44; 95% CI: 0.15, 0.72). In contrast, across all models, we found that relying on personal assistance or technological assistance alone was not associated with any significant change in quality of life score. Small but significant positive effects on quality of life scores were obtained for chronic pain in models 2 and 3 (model 2 – β : 0.39; 95% CI: 0.13, 0.64; model 3 – β : 0.41; 95% CI: 0.15, 0.67), with coefficient similar to the effects observed for ADL assistance (‘both’) in those models. In addition, polypharmacy had a small but significant positive effect on quality of life scores in models 2 and 3 (model 2 – β : 0.24; 95% CI: 0.02, 0.46; model 3 – β : 0.22; 95% CI: 0.001, 0.44). Visual impairment was also associated with a negative effect on quality of life scores in models 2 and 3 (model 2 – β : -0.42; 95% CI: -0.69, -0.15; model 3 – β : -0.43; 95% CI: -0.69, -0.17). In all regressions, the coefficient of independent variables showing statistical significance at $p < 0.05$; $p < 0.01$; and $p < 0.001$ had the expected positive or negative sign based on the conceptual framework.

From the initial to full models, the significant effects retained their signs, but the magnitude of the co-efficient for ADL assistance (both) diminished as health and socio-demographic domains were included in latter two models. The R^2 for models 1, 2, and 3 were 0.0718, 0.1594 and 0.1870 respectively, indicating an expected improvement in the variance accounted for with the addition of further covariates that could be anticipated to impact quality of life. This suggests that ADL assistance plays a modest role in the context of reported quality of life, with quality of life impacted by other physical health variables.

Table 4.8: Survey Multiple Linear Regression Model of Type of Assistance in ADL with Quality of Life.

			Model 1			Model 2			Model 3		
			B	Linear SE	95% CI	β	Linear SE	95% CI	B	Linear SE	95% CI
Any help	No Assistance	Ref									
	Only Technological Assistance		0.27	0.16	(-0.05, 0.61)	0.14	0.16	(-0.18, 0.46)	0.10	0.16	(-0.21, 0.42)
	Only Personal Assistance		0.18	0.16	(-0.14, 0.51)	0.06	0.15	(-0.24, 0.36)	0.05	0.15	(-0.24, 0.35)
	Both Assistance		0.67	0.14	(0.40, 0.95)***	0.50	0.14	(0.22, 0.77)***	0.44	0.14	(0.15, 0.72)**
Chronic pain	No	Ref									
	Yes					0.39	0.13	(0.13, 0.64)**	0.41	0.13	(0.15, 0.67)**
Fall in last year	No	Ref									
	Yes					0.04	0.12	(-0.18, 0.26)	0.04	0.13	(-0.17, 0.27)
Polypharmacy	No	Ref									
	Yes					0.24	0.11	(0.02, 0.46)*	0.22	0.11	(0.001, 0.44)*
Vision	No	Ref									
	Yes					-0.42	0.13	(-0.69, -0.15)**	-0.43	0.13	(-0.69, -0.17)**
Hearing	No	Ref									
	Yes					0.02	0.12	(-0.22, 0.26)	0.05	0.13	(-0.20, 0.31)
Sex	Male	Ref									
	Female								-0.01	0.12	(-0.26, 0.22)
Age									0.002	0.007	(-0.01, 0.01)
Education	Primary	Ref									
	Secondary								-0.02	0.12	(-0.28, 0.23)
	Higher								-0.07	0.14	(-0.35, 0.20)
Marital	Married	Ref									
	Unmarried								-0.24	0.19	(-0.63, 0.14)
Employment	Employed	Ref									
	Retired								0.31	0.17	(-0.02, 0.66)
	Other								0.49	0.20	(0.09, 0.89)*
Living status	with spouse	Ref									
	with partner								0.03	0.29	(-0.55, 0.62)
	single								0.23	0.20	(-0.16, 0.64)
Living area	Urban	Ref									
	Rural								0.09	0.11	(-0.13, 0.33)

* P<0.05; ** p<0.01; *** p<0.001

β –Estimated model of coefficient;

[Linearized standard errors of row proportions]

[95% confidence intervals for row proportions]

In the next analysis, we explored different type of assistance requirement as predictors measured quality of life in individual's task of ADLs using the same methodology as above. Table 4.10 presents the results of the unadjusted model, the intervening model adjusted for all health variables, and the full model adjusted for health and socio-demographic factors. Table 4.9 presents the results of the unadjusted model, and the full model adjusted for health and socio-demographic factors. The results show that in the activity of transfer and walking, respondents relied more on technological assistance alone than other assistance, with significant scores in the quality of life. In the activity of walking (unadjusted model- β : -0.71; 95% CI: -1.55, 0.12; adjusted model- β : -1.10; 95% CI: -1.84, -0.37) and in transfer activity (unadjusted model- β : 1.4; 95% CI: 1.10, 1.76; adjusted model- β : 0.86; 95% CI: 0.05, 1.67). The person who used technological assistance for mobility domain had high CASP-19 scores (mean) than those who used other assistance. Respondents seemed to be reliant on technological assistance and personal assistance both during bathing and toileting activities.

Table 4.9: Survey Multiple Regression Model of Type of Assistance in Individuals ADLs with Quality of Life

			Undusted			Adjusted		
			B	Linear SE	95% CI	B	Linear SE	95% CI
Help in Dressing	No Assistance	Ref						
	Only Technological Assistance		0.15	0.24	(-0.32, 0.63)	0.02	0.22	(-0.40, 0.44)
	Only Personal Assistance		0.43	0.18	(0.06, 0.81)*	0.18	0.17	(-0.15, 0.51)
	Both Assistance		0.37	0.19	(-0.009, 0.76)	0.17	0.22	(-0.27, 0.62)
Help in Walking	No Assistance	Ref						
	Only Technological Assistance		-0.71	0.41	(-1.55, 0.12)	-1.10	0.36	(-1.84, -0.37)**
	Only Personal Assistance		0.49	0.36	(-0.23, 1.23)	-0.05	0.64	(-1.36, 1.25)
	Both Assistance		0.03	0.39	(-0.75, 0.83)	-0.30	0.42	(-1.15, 0.55)
Help in Bathing	No Assistance	Ref						
	Only Technological Assistance		0.54	0.28	(-0.009, 1.10)*	0.63	0.27	(0.10, 1.20)*
	Only Personal Assistance		0.55	0.29	(-0.02, 1.13)	0.47	0.30	(-0.12, 1.07)
	Both Assistance		0.80	0.25	(0.31, 1.30)**	0.83	0.24	(0.35, 1.32)**
Help in Eating	No Assistance	Ref						
	Only Technological Assistance		-0.16	0.23	(-0.65, 0.32)	0.28	0.72	(-1.23, 1.80)
	Only Personal Assistance		0.23	0.38	(-0.56, 1.03)	-0.82	0.89	(-2.70, 1.04)
	Both Assistance		-0.35	0.25	(-0.88, 0.17)	1.27	0.68	(-0.15, 2.70)
Help in Transfer	No Assistance	Ref						
	Only Technological Assistance		1.4	0.16	(1.10, 1.76)***	0.86	0.40	(0.05, 1.67)*
	Only Personal Assistance		0.56	0.47	(-0.39, 1.52)	0.20	0.43	(-0.67, 1.09)
	Both Assistance		0.60	0.28	(0.02, 1.19)*	0.33	0.26	(-0.20, 0.87)
Help in Toilet	No Assistance	Ref						
	Only Technological Assistance		-0.55	0.27	(-1.13, 0.01)	-0.92	0.45	(-1.85, 0.009)*
	Only Personal Assistance		1.09	0.25	(0.57, 1.62)***	0.63	0.51	(-0.40, 1.68)
	Both Assistance		0.61	0.43	(-0.27, 1.50)	0.81	0.37	(0.04, 1.59)*

* P<0.05; ** p<0.01; *** p<0.001

B –Estimated model of coefficient;

[Linearized standard errors of row proportions]

[95% confidence intervals for row proportions]

CHAPTER-5 DISCUSSION

5.1 Introduction

The aim of this chapter is to discuss and interpret the results obtained and presented in the previous chapter. At the outset, the main findings are discussed with a focus on the initial hypotheses. Following this, the results, are compared and contrasted with the findings of previous researchers in the area. In addition to this, the methods used are critiqued with potential limitations and sources of error being highlighted. Finally, the potential applications and impact of these results are discussed, followed by limitations and recommendations suggested to build on and to improve the efficacy of these approaches.

5.2 Discussion of Findings

This study has added to our knowledge of disability among community-dwelling older adults by focusing on the type of assistance used by them, which impact on their quality of life. This study also has enhanced the understanding of variation in the types of assistance used by older adults. We propose explanations of quality of life differences in the prevalence of three dimensions of assistance among older adults-technological assistance alone, personal assistance alone and both types of assistance, and examine the relying underlying them.

5.2.1 Prevalence of ADL and IADL Disability

It is difficult to compare prevalence of disability between studies due to different study populations, sampling procedure, and definitions of disability.

The descriptive analysis of ADL and IADL disability demonstrate that the prevalence of disability was higher for ADL than IADL in older adults of aged 60 years and more. This is supported by earlier cross-sectional ageing studies (Feng et al., 2013; Lin et al., 2012). The proportion of the population in this study that reported having an ADL disability (11.8%) is less than the US Health and Retirement Study (HRS) (18%) (Hung et al., 2011), the English Longitudinal Study of Ageing (ELSA) (28%) (Banks et al., 2012) and the Rotterdam study (31.8%) (Taş et al., 2007). Similarly, the proportion with an IADL disability (10.4%) is also less than the HRS study (17%) and ELSA (28%).

With respect to ADLs, the findings show that the reported frequency and prevalence of difficulty in performing ADL tasks were higher for men than women. However, prevalence of disability in IADL and combined ADL and IADL were higher among older women than in men. Prior investigations on gender differences of disability in older adults have shown conflicting results, with some studies indicating greater disability in older women (Fiedler & Peres, 2008; Murtagh & Hubert, 2004; Yount & Agree, 2005) in men (Marengoni et al., 2009). Others found no gender differences; (Giacomin et al., 2008).

Gender differences in disability are often explained by women's greater longevity (Struck et al., 1999), and higher prevalence of disabling morbidities (Murtagh & Hubert, 2004). Our findings need to be interpreted in light of the gender-specific nature of the IADL activities. Some previous studies also suggest that the level of older women's participation in housework was around three times higher than that of older men (Habib et al., 2006). Moreover, they are more likely to report more about health problems and disability than men (Murtagh & Hubert, 2004).

The increasing prevalence of ADL and IADL disability reported elsewhere can be partially explained by increasing frailty associated with ageing, consistent with findings from other studies (Kawamoto, Yoshida & Oka, 2004; Fielder & Peres 2008; WHO 2011(a); Nascimento et al., 2012). This is likely to be associated with decreasing physical, cognitive, intellectual and social functioning that may compromise functional ability (Maciel & Guerra, 2008). These disabilities may be triggered by a reduction in muscle strength with age (Dunlop, Hughes & Manheim, 1997), (Jagger et al., 2001). Using data derived from the U.S., Liang et al. (2008) found that women and the oldest old experienced not only greater disability but also more elevated rates of increase.

This study has also enhanced the understanding of variation in reported disability among socio-demographic variables and the inequalities in these variables affect the disability (Morciano, Hancock & Pudney, 2015; Díaz-Venegas, et al., 2016). This study has found that level of education, marital status, living status, employment status, and area of living were associated with the prevalence of three dimensions of disability--ADL disability only, IADL disability only, and both ADL and IADL disability--and also factored the severity of disability. We found that less education, being unmarried and living alone were linked with disability, likely due to social disadvantage that affects long-term health (Koukouli et al., 2002). Higher educational attainment is associated with better health outcomes in older age for a number of reasons. More highly educated individuals are more likely to work in white collar jobs, less likely to be exposed to job-related health risks (Kanjilal et al., 2006; Fisher-Hoch et al., 2010). In addition, they are more efficient in managing illness (Grossman, 1972), more likely to use assistive technology, and more willing and able to adjust environment to cope with

disability (Hoenig, Taylor & Sloan, 2003; Cutler, Landrum & Stewart, 2006). Interestingly, the advantage of higher education considerably declined with both types and severity of disability in older adults.

5.2.2 Types and/or Proportion of Assistance for ADL and IADL Disability

As described earlier, older adults with ADL disabilities used two types of assistance categorised as technological assistance and personal assistance, but those older adults with IADL disability only received personal assistance. More than half of the older population with an ADL disability didn't receive any kind of assistance, whereas, the proportion of receiving assistance in the form of personal help among those with an IADL disability was much higher.

Severity of disability increased the utilisation of both types of assistance. Technological assistance utilisation increased from 29.3% to 71.6% and personal assistance also increased from 23.3% to 58.8% with increased ADL severity. Similarly the utilisation of personal assistance was also increased from 67.1% to 92.9% with IADL severity.

With respect to severity of disability in ADL, the use of different types of assistance increased, particularly a combination of both types of assistance. Older adults with one ADL limitation relied more on technological assistance alone and the proportionate use of assistance was in the following hierarchy of Technological assistance >Both assistance >Personal assistance. In case of ≥ 2 ADL limitations, older adults relied on both types of assistance rather than one with the following hierarchy of Both assistance > Technological assistance > Personal assistance. At a higher level of disability, either personal assistance alone or technological assistance alone appear insufficient to support older people in the

community (Mitzner et al., 2011). We hypothesise the reason for this shifting of assistance required, is that people with severe disability have more dependence on personal help.

In this section the activities of daily living for which older adults receive or utilise assistance are highlighted. Those who have an ADL disabilities use both types of assistance and those with IADL disability reported receiving only personal assistance. (Absence of technological assistance query for IADL section). In this study, more than half of disabled older adults did not receive any assistance. This may have been because they were not available, as previous research has reported Ireland (Desai, Lentzner & Weeks 2001). In this population, the most common type of assistance in performing ADLs was technological assistance (45.3%) followed by personal assistance (36.6%). As the number of disabilities increased, the receipt of a combination of both types of assistance also increased. This finding is supported in research by Verbrugge et al. (1997) which showed that higher levels of difficulty with an ADL task are associated with greater use of both technological assistance and personal assistance. The study shows that use of assistance and emphasis on technological rather than personal assistance were higher among severely disabled persons. These findings need to be interpreted in light of a person's perception of autonomy and self-sufficiency. With technological assistance older adults can maintain their autonomy and self-sufficiency qualities which can be relinquished when they are relying on personal assistance. This suggests a hierarchy of preference: people try the device first, if possible, and turn to personal assistance when the device fails or is unavailable. This trend in the greater use of technological assistance over the last few decades is supported by earlier national studies (Kaye, Kang & LaPlante, 2000; LaPlante,

Hendershot & Moss, 1992; Manton et al., 1993; Taylor & Hoening, 2004; Verbrugge & Sevak, 2002). However, these devices are used both independently and in conjunction with personal assistance. The relative advantages of technological assistance and personal assistance are not well studied in the earlier research.

Through this study, we also examined the individual activities of ADLs in which older adults utilised different types of assistance. In the mobility-related activities (walking and transfer) older adults relied more on technological rather than personal assistance (four times higher than the use of personal assistance) whereas in self-care related activities (dressing, bathing, eating, and toileting) the use of both types assistance was more frequent. When considering the receipt of assistance for both activities in the mobility domain, the higher proportion of technological assistance used by participants. Research has shown that most participants believe that a device or equipment helped them to improve their walking ability, balance control, and self-confidence, ultimately reducing the weight-bearing load on the leg and promoted their independence. A large number of patients decided to use a mobility device (Faruqui et al., 2010; Bateni et al., 2005). However in this study, when considering the findings from self-care related activities, the proportion of respondents who reported receiving assistance to carry out certain activities varied greatly and depended on the activity type. Bathing and toileting appear to be the self-care activities that are in most need of assistance whereas, in contrast to others types of disability, they relied more on technological assistance in toileting activity and a combination of both technological and personal assistance for help with bathing. Personal assistance appears to be needed more in the self-care activities of dressing and eating.

Receipt of personal assistance was more commonly reported for those with IADL difficulties, ranging from 92.5% for help with shopping to 72.1% for help using phone.

Results for type of assistance differed with socio-demographic characteristics (Table 4.8) but most received a combination of both types assistance together. We also found that for some groups (e.g., men, older aged below 75 years, those with some college education, and those with employed) relied more on technological assistance for performing their ADL tasks. Those with a higher level of educational attainment reported more use of technological assistance. When discussing the reason for using device or equipment for some groups and especially for mobility related activity, research has found that individuals felt more positive about using a device or equipment as they felt more independence, security and confidence, ultimately reducing the falls (Miskelly, 2001).

Limitations in self-care and mobility activity disrupt the equilibrium of older adults' lives by preventing older adults from performing their daily activities. Prior studies have found a positive association between the number of limitations and the use of assistive devices or personal help among older adults (Agree, Freedman & Sengupta, 2004; Freedman et al., 2009; Tomita, Mann, Fraas & Stanton, 2004; Verbrugge & Sevak, 2002)

5.2.3 Impact of Assistance on Quality of Life

This study found a complex relationship between the use of different type of assistance service regarding difficulty in ADL with varying effects on quality of life. In our analyses, we examined the impact of two different types of assistance on quality of life. This approach moves beyond earlier research in this area that

focused on the efficiency and effectiveness of specific types of assistance (e.g., Chen, Mann, Tomita & Burford, 1998; Gitlin & Levine, 1992; Kohn, LeBlanc & Mortola, 1994; Steinfeld & Shea, 1995; Desai, Lentzner & Weeks, 2001; Tennstedt, McKinlay & Kasten, 1994). Overall, our findings support the both types of assistance are important for older persons living in the community and importantly, one kind of assistance does not replace to the other assistance.

In our analysis, we examined quality of life in order to identify the nature of substitution between technological assistance and personal assistance. Overall, these findings show that, regardless of the measure of socio-demographic and health variables, neither technological nor personal assistance replacing each other for most older adults living with ADL disabilities in the community. There is the possibility that better quality of life may be accomplished with a combination of technological assistance and personal assistance, rather than from either alternative alone. Both type of assistance reduce the task demand in the activity of daily living that enhances the quality of life outcome of older adults. Full adjusted models (Table 4.9) identified significant differences in quality of life in older adults who used both types of assistance. Consistent with previous studies (Agree, Freedman, Cornman, Wolf & Marcotte, 2005), these results indicate that most Irish older person preferred both technological and personal assistance in alleviating disability. One earlier national study examined the effectiveness of assistive technology in terms of its impact on hours of personal care for older adults with disabilities, finding that those who use assistive technology also need fewer hours of personal care (Allen, Foster & Berg, 2001).

Previous research has produced inconsistent findings on both type of assistance as substitutes or compliments (Agree & Freedman, 2000; Agree et al., 2005; Allen et

al., 2001, 2006; Hoenig et al., 2003; Mortenson et al., 2012), but the present results suggest that complete substitution of technological assistance for personal assistance is unlikely overall. Instead technological assistance use appears to supplement personal assistance- there is a higher probability of using both types of assistance to perform ADL tasks.

In contrast, there is no evidence of an importance of either one type of assistance in alleviating disability among older adults with difficulty in ADLs. However, further study findings indicate that the importance of technological assistance is quite possible at the level of individuals ADL task especially for 'walk across a room' and 'getting in or out of bed' activity. Use of walking sticks, bed rail, and wheelchair etc. type of technological assistance has a positive impact on person's wellbeing. Framing, mobility devices or equipment as a means to enhance older adults' independence and autonomy especially valuable to enhance safety and comfort (Scherer, 2005). Previous research from Scherer and Glueckauf (2005) argued that mobility devices seem to be more effective when they are molded to meet specific activities of daily living. Therefore, for the two mobility-related ADLs, use of technological assistance was associated with greater reduction of level of difficulty and might be are more likely to substitute personal assistance. It is also understood that assistive devices such as raised toilet seat, shower seat, grab rail etc. can assist older adults in maintaining independence and having the ability to undertake bathing and toileting tasks (Clemson & Martin 1996; Mann et al., 2002), but these devices use would not preclude personal assistance (Roelands et al., 2002).

CHAPTER-6 CONCLUSION

Difficulties in doing everyday tasks become common in older adults as they develop chronic health issues. Presently, the ability to live and work independently in the community is a central goal of successful ageing (Deep & Jeste, 2009) as well as for gerontologists, policymakers, and public health practitioners. Therefore, great effort is made towards reducing these difficulties through a variety of care and support and enable independent living in the community as long as possible. The two common strategies are technological assistance and personal assistance. The purpose of this study was to expose and explore the differences in disability in ADL and IADL and to further investigate the relative effectiveness of technological and personal assistance in alleviating disability among older adults with difficulty in ADLs.

Some of the major key finding that emerged in the study are listed below;

- The overall weighted prevalence of disability in ADL was 11.8%, compared to 10.4% in IADL.
- More individuals reported difficulty with 1 ADL task (7.4%) than ≥ 2 ADL (4.4%), whereas, higher proportion of individuals reported difficulty in ≥ 2 IADL (5.6%) than 1 ADL task (4.8%).
- The ADL disabilities were most commonly reported for dressing and least commonly reported for eating, while, the IADL disabilities most commonly reported were household chores and least for using telephone.
- Among those with ADL disability, a higher percentage reported using technological assistance (19%) than personal assistance (9%). Those who had both ADL and IADL disability were more likely to use both types of assistance together (42.9%). Similarly, the combination of both types of

assistance (43%) adopted was clearly related to the severity of disability (≥ 2 IADL).

- Among those with an underlying difficulty in self-care, any kind of assistance was reported more frequently for bathing and least often used for eating. Within these population those with underlying difficulty in toileting more likely to receive technological assistance, whereas for activity of dressing and eating more likely to receive personal assistance, and for bathing they were reported both type of assistance together.
- Those with underlying difficulty in mobility were more likely to receive technological assistance than personal help.
- Among those with underlying difficulty in IADL tasks, personal assistance was used more frequently for help with shopping and least often used for help using telephone.
- With respect of severity of disability in ADL, both technological and personal assistance together were associated with higher quality of life among older adults with ADL disability.

CHAPTER-7 STRENGTHS, LIMITATIONS AND FUTURE RECOMMENDATIONS

Our study has several strengths. First, we used a large nationally representative database sample. The large sample size is generalisable to the Irish population and a strong questionnaire design and data collection process also makes this study to strong. Findings advance the literature by offering a new explanatory framework for explaining the influences of assistance services on quality of life of older adults with disability. The framework is more nuanced and shows there is more complexity within the processes than previously existed in the literature.

Nevertheless, there are certain limitations in the study that may have affected the final outcome. Firstly, the study is limited by the cross-sectional design which allows the interpretation of association rather than causation. Secondly, the impact of types of assistance on quality of life may be underestimated as this study does not include older people in convalescent care or inpatient hospital care who were excluded during first wave of data collection. Thirdly, this study used self-report computer-assisted questionnaire, asked participants to state whether they had a difficulty or not in their ADL and/or IADL. As disability is not an attribute that can be measured as present or absent, the questionnaire therefore failed to capture the potential range of disability. However, it has also been suggested that self-reports have high validity in relation to objective measures of functional disability (Young et al., 2010).

Future research could focus on analysis of non-community older adults. Additionally, the methodology used in the present study could be applied to other characteristics that are associated with disability and quality of life of older adults.

Analysis of further wave of TILDA data will allow exploration of factors that can predict the persistent or deterioration of disability and their impact on utilisation of different types of assistance.

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Appendix A: CASP-19 Questionnaire (Hyde et al., 2003)

Each participant was told to fill in a questionnaire:

Here is a list of statements that people have used to describe their lives or how they feel. We would like to know how often, if at all, you think this applies to you.

		Tick one box on each line			
		Often	Sometimes*	Not often*	Never
		1	2	3	4
1	My age prevents me from doing the things I would like				
2	I feel that what happens to me is out of my control				
3	I feel free to plan for the future				
4	I feel left out of things				
5	I can do the things that I want to do				
6	Family responsibilities prevent me from doing what I want to do				
7	I feel that I can please myself what I do				
8	My health stops me from doing things I want to do				
9	Shortage of money stops me from doing things I want to do				
10	I look forward to each day				
11	I feel that my life has meaning				
12	I enjoy the things that I do				
13	I enjoy being in the company of others				
14	On balance, I look back on my life with a sense of happiness				
15	I feel full of energy these days				
16	I choose to do things that I have never done before				
17	I feel satisfied with the way my life has turned out				
18	I feel that life is full of opportunities				
19	I feel that the future looks good for me				

*This is the correct order.

. Steps in computing CASP-19 scores:

1. Reverse code items 1, 2, 4, 6, 8, and 9
2. Recode all items 4 =0, 3=1, 2 =2, 1 =3
3. Sum all items. The range for CASP-19 score is 0 to 57.