The Perceptions and Experiences of Mobility Scooters by Older Adults Experiencing a Decline in Mobility

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Declaration of Authorship

I, Roselle Thoreau, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Abstract

For people who have never experienced mobility impairment, being able to walk is crucial to maintaining mobility, independence and participation in activities outside the home. However, as people age, they often experience a decline in their mobility. Mobility scooters offer a method of enabling their users to move around their environment with greater ease. However, despite their prevalence, very little is known about mobility scooters or their effect upon those that use them. This thesis aimed to understand how older people with mobility difficulties viewed mobility scooters. The research also aimed to uncover the prevalence of mobility scooters in the population of older people in the UK. The research employed a mixed-methods approach by utilising a cohort database; creating and analysing a questionnaire of scooter users; and carrying out interviews with scooter users, non-scooter users and stakeholders. The results showed that scooter users were more disabled than non-users perceived them to be, and that scooters gave users a greatly valued means of independent travel. Scooter usage is increasing in the older population and is expected to continue rising, which makes the value of understanding the effect of mobility scooters of even greater importance.

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Table of Contents

Table of Figures

Table of Tables

Glossary of Terms

There are many terms used in transport and physical health literature that can have different meanings when used in different contexts, which can make understanding meaning difficult. In order to avoid this situation within this thesis, this glossary will clarify the meaning of such terms as they are used in the remainder of this thesis. The definitions in this glossary are additionally used in the author's previously published paper, "The impact of mobility scooters on their users. Does their usage help or hinder?: A state of the art review" (Thoreau, 2015).

Capability: The extent of an individual's ability to perform a task. Capabilities often refer to visual ability, hearing and cognitive ability.

Disability: This thesis uses the Equalities Act definition: "*a physical or mental impairment that has a 'substantial' and 'long-term' negative effect on your ability to do normal daily activities.*" (Equality Act, 2010)

Electric wheelchair: This refers to a wheelchair that runs on an electric motor that is controlled by the user. The user does not propel this chair. It is typically run by a single-handed controller but can be run using a mouth controller or an attendant controller.

Independence: The ability to achieve desired activities self-sufficiently and not to be reliant on another person. The ability to be autonomous.

Independent Travel: The ability to move around the environment by oneself, but can include help from either assistive technology or by transport. The emphasis is on being able to manage without dependence on other people. Therefore independent travel includes walking with a walking stick or walking frame, driving oneself, or using public transport without assistance from another person.

Mobility: The ability of an individual to move around the environment unaided, such as by walking or traversing stairs. By unaided, this thesis means without the assistance of any aid, including walking sticks or assistance from a person. This thesis uses the term to refer to the ability to move by oneself.

Mobility Scooter: This refers to a three- to five-wheeled single person electric vehicle with a front tiller. It refers only to Class Two and Class Three Invalid Carriages, as defined by the UK Department for Transport. In this thesis the term "scooter" or "mobility scooter" are used. This term does not refer to a moped-style motorbike or a children's push scooter.

Physical Function: An individual's ability to be able to perform tasks that require physical effort and movement.

Physical Functional Decline: A common term used in gerontology literature, this refers to a decrease of physical functional abilities and is common in older adults. Physical functional decline includes declines in visual and hearing capabilities, balance, cognitive speed, and muscle and bone strength.

Preclinical Disability: A clinical term for people whose ability to carry out day-to-day activities has begun to change but have not yet developed disabilities. The term was coined by Fried and colleagues, who defined it as

"characterized by persons who perceive no difficulty with performance of a task and yet are found to have either (a) general diminution in activities requiring related abilities, or (b) changes in performance of specific tasks". (Fried, Herdman, Kuhn, Rubin, & Turano, 1991).

Quality of Life: Sometime referred to as QoL. It is interpreted differently by individuals to include numerous factors including physical and mental health, economic stability, safety and social networks. This is a highly contentious term in academia and it is understood differently by individuals and is used in different ways by research within and across disciplines. This thesis uses the 1993 World Health Organization definition by WHOQOL Group: *"Quality of life is defined as the individual's perception of their position in life in the context of culture and value systems in which they live and in relation to their goals, expectations, standards and concerns."* (WHOQOL Group, 1993)

Stakeholder: Where stakeholders are mentioned in relation to the interviews the term refers to those occupation or business involves mobility scooters and/or mobility scooter users.

Travel: The ability to move around the environment in any way. Travel can be assisted by other people. For example, being driven to a destination.

Trip: The word has very different meanings in gerontology versus transport literature. The thesis uses the transport research term, meaning a measure of travel.

Wheelchair: This term can be used interchangeably to mean manual wheel-chair, electric wheelchair and mobility scooter. In this thesis, the term wheelchair is used to refer to manual wheelchairs that are either self-propelled or attendant propelled.

1. Introduction

For people who have never experienced mobility impairment, maintaining mobility in later life is crucial to their ability to maintain their lifestyle. For this group, their perception of being able to walk is crucial to maintaining mobility as it enables them to maintain independence and to participate in activities outside the home. However, many older people have difficulty walking and the percentage of people facing difficulty walking rises with age (Katzmarzyk & Craig, 2002; Mindell & Craig, 2005). As people begin to struggle, they have a range of options open to them that can be used alone or in combination. They can walk less often; walk less far; take more frequent rest breaks while walking; use a mobility aid for stability, such as a walker or a cane; or use a mobility device instead of walking, such as a wheelchair or a mobility scooter. A mobility scooter is used to compensate a decline in mobility by replacing walking to enable independent travel. However, very little is known about who uses scooters and how they are used.

The research undertaken here aimed to understand how older people with mobility difficulties viewed using mobility scooters: whether they are beneficial and/or detrimental to their physical function, their independent travel, and their quality of life. The research sought to understand how both users and non-users of mobility scooters perceived scooters, and what barriers exist that hinder older people with mobility difficulties to take up using one. In addition, the research aimed to learn about the prevalence of mobility scooters in the UK population of older people.

1.1 Research Idea Origins

There are numerous approaches to disability and thus far no one model has been able to fully encompass disability (Pfeiffer, 2001). Three models of disability have shaped the research that has been carried out in this area to date; the medical model, the social model and the capability approach. The medical model views disability as a sickness or illness. The medical model

views disability as something that requires fixing, with the emphasis on individual responsibility for this (Barnes, 1997; Oliver, 2013). The social model was developed as a response to their perceived limitations within the medical model. The social model views disability as limitations caused by social and environmental barriers that have been created by society (Altman, 2001; Oliver, 1983; Oliver, 1990: Oliver 2013). This model views disability as a source of inequality similar to gender or ethnicity. In contrast to the medical model the social model places the responsibility of disability on society. The capability approach focuses on what people with disability can achieve, the capability of the individual (Sen 1985). It acknowledges that the capability of an individual to achieve tasks depends on the environment in which the individual is situated.

The idea for this research arose from an interest in older people's transport needs and how barriers and obstacles to travelling around the built environment were overcome or compensated for. If it is accepted that it is beneficial for older people to be able to move freely around the built environment, then it is crucial to ensure that this can be achieved by all older people, no matter what their level of mobility. For older people who use scooters, it is important that an understanding of how these devices are beneficial and where they have weaknesses is gathered. For older people whose mobility is restricted, evidence of the advantages and disadvantages of mobility scooters should be available to them so that they can make an informed choice as to whether this is a mobility device that will be suitable for their needs.

1.2 The Mobility Scooter

Mobility scooters are designed for and used by individuals who are able to walk and manipulate themselves on and off a seated object. Unlike wheelchairs, mobility scooters are generally treated as vehicles in the sense that they are not generally permitted into buildings, including shops. This means that in order to access services and activities, users must be able to walk. The actual operation of a mobility scooter is a mainly passive task, requiring only a minimal amount of grip strength for the accelerator to be engaged. Users are enabled by the scooter to travel distances they previously would

have made by foot (or short distance vehicle trips) with little physical effort. For an older adult with difficulty maintaining their previous levels of walking, the use of a mobility scooter allows them to participate in activities they previously could not access, participate in activities without discomfort or extend the duration of participation (Barham, Fereday & Oxley, 2005; Thoreau, 2015).

Mobility scooters are single occupant electronic transport vehicles (Figure 1.1). A solely battery-operated device; it usually has between three and five wheels. A scooter can be driven forwards and backwards using tillers located on the handle bars. Speed is controlled via a dial on the dashboard (Figure 1.2). Different scooters can be ridden either on the footway or the road, depending on speed capability. They may include a horn, lights and space for storage. They are often referred to as: power-operated vehicle/scooters or electric scooters.

Figure 1.1: A Class Two Mobility Scooter

Scooters are defined by the Department for Transport as Class Two or Class Three invalid carriages. No driving licence is needed to drive them, however, there are restrictions on those who are allowed to drive them. They must be driven by people who are disabled and are at least 14 years old, however it is not clear whether these rules are being enforced (Barton, Holmes & Jacobs, 2014). The difference in the class of scooter is dependent on the capability of the scooter. Class Two scooters are those that cannot exceed 6.44 km per hour (4 mph), can be used on the footway and cannot be used in the road,

except where crossing it. Class Three scooters can travel up to 12.9 km (8 miles) per hour. Class Three vehicles must be registered with the Driver and Vehicle Licensing Agency (DVLA); although they are exempt from road tax. They are allowed by law on the road if they are travelling at greater than 6.44 km/h but must not travel on motorways. Class Three vehicles must have lights, mirrors and a horn.

Figure 1.2: Typical Dashboard of a Class Two Mobility Scooter

Mobility scooters are available from numerous vendors in the United Kingdom. They are sold by many retail outlets, including a major high street store, specialist retail stores and multiple online providers. Additionally, they are available to be bought second-hand through private sellers on websites or by local advertisement. There are also scooter loans schemes available. Whilst not available at the majority of supermarkets, scooters can be loaned to shoppers free of charge while they are on the premises of some larger supermarkets. Although the National Health Service (NHS) does not provide mobility scooters, long-term loan scheme and/or short-term hire schemes are offered by some local councils, for example Camden Council (2014). The largest scheme to loan mobility scooters in the UK is Shopmobility. This is a lending scheme based in shopping centres where mobility scooters, powered

wheelchairs and manual wheelchairs are lent to people whilst they are shopping (Gant, 2002). The cost of hire varies but most schemes are free.

1.3 Research Gap

Much research has been carried out on wheelchair users. There is a focus on the biomechanics of use (e.g. Boninger, Souza, Cooper, Fitzgerald, Koontz, & Fay, 2002; Sanderson & Sommer, 1985) how wheelchairs are used and how their use can be made more efficient. There is a related area of research on pain of use (e.g. Curtis et al., 1999 and Van Drongelen, De Groot, Veeger, Angenot, Allmeijer, Post & Van Der Woude, 2006) which focuses on upper body and shoulder pain of users. There is research around accessibility of the built environment, with particular emphasis on the impact of various governmental policies to improve accessibility (e.g. Bennett, Kirby, MacDonald, B, 2009; McClain, 2000; Pierce, 1998; Welage & Liu, 2011). training, quality of life and accessibility. There is research on the impact of wheelchair skills training (e.g. MacPhee, Kirby, Coolen, Smith, MacLeod & Dupuis, 2004) and on perception of quality of life (e.g. Davies, De Souza & Frank 2003; Frank, Ward, Orwell, McCullagh & Belcher, 2000; Kittel, Marco, & Stewart, 2002; Reid, Angus, McKeever & Miller,2003). Most of this research is based on those who use wheelchairs (electronic or manual) on a full-time basis (generally Spinal Cord Injury patients).

Very little is known about the positive or negative impact of mobility scooters on health and on quality of life of users, or on the impact on others such as pedestrians. In terms of quality of life research, there is some work on users' perspectives; however, it does not differentiate between scooter users and wheelchair users (Thoreau, 2015 and discussed in section 2.4.3). There are two reasons that wheelchair research findings cannot be generalised to scooter users. Firstly, scooter users are able to walk, albeit often for only a limited distance. Secondly, manually propelled wheelchairs require physical effort to propel their chairs forward, whereas scooters do not (Suzuki, Uchiyama, Holloway & Tyler, 2012). Electric wheelchairs are similar to scooters in that no physical effort is needed to move the chair. However, electric

wheelchairs are a medical device prescribed only to people who for some reason cannot propel themselves using a manual wheelchair, making them a medical necessity rather than a choice to buy, which the scooter is. Therefore this current body of research indicates that there is a major gap in knowledge on the effect of mobility scooters. There is no knowledge on whether mobility scooter users find their scooter adequately compensates for their mobility restrictions. There is no knowledge of whether using a scooter changes their perceived quality of life or their physical health. Little is known about the number of users of mobility scooters or their impact on other pedestrians sharing the same space.

1.4 Initial Research Proposal

The research initially proposed was somewhat different in focus from the research that has been completed here. However, the process was important in that it led to the current questions this thesis aims to answer. This section details the initial proposal, why its direction changed and how it led to the current direction of questioning.

1.4.1 Research Questions

Given the compelling evidence supporting the health benefits of physical activity to older adults (Ferrucci et al., 2004; Grossman & Stewart, 2007; Guralnik et al., 1993; Manson et al., 2002; Taylor, et al., 2004), replacing walking with mobility scooters use may hasten levels of physical functional decline, including the ability to walk and be mobile. Whilst two studies had examined the physical effects of mobility scooters, none had focused on a duration of over one year, none examined the effects from a UK perspective and none examined adults who were on the cusp of becoming disabled (Hoenig, Pieper, Branch & Cohen, 2007; Zagol & Krasuski, 2010).

Two schools of thought exist regarding the use of passive assistive technology that can be applied to mobility devices such as mobility scooters (Hoenig Pieper, Branch & Cohen, 2007). The first suggests that mobility device use,

including scooter use, increases participation in social activities outside the home that previously would have been unable to have been accessed by users (Ordonez, 2006; Woods & Watson, 2003). This could be expected to increase aspects of quality of life in users. The second suggests that assistive technology users risk de-conditioning the physical function that allows them to walk, thus reducing their mobility at a greater rate than if they had continued to travel without assistance (Weiss, Hoenig, & Fried, 2007). Whilst both schools of thought are of interest and of importance, the latter philosophy has had little quantification, either in support or refutation, and so there was a case for it to be examined in more detail. Empirical evidence showing the benefits and disadvantages of scooter usage in terms of physical functioning is needed to allow a fully informed choice by those prescribing (as occurs outside the UK), recommending or choosing scooter usage.

The initial aim of this thesis was to provide evidence as to whether the use of a mobility scooter was physically harmful to pre-clinically disabled older adults (see section 2.1.3 and the Glossary of Terms). The research aimed to provide evidence of how numerous aspects of physical health, but specifically mobility, can be affected by using a mobility scooter. It was hypothesised that those who use mobility scooters will walk less and experience a steeper physical functional decline and a greater decline in quality of life measures than non-scooter users.

The research questions were:
1. Does the uptake and use of a mobility scooter correspond to a change in the walking distance covered?
2. If there is a change in walking distance, what is the difference in the change of distance covered over time between scooter users and non-scooter users?
3. If there is a difference in walking distance between scooter users and non-scooter users, does this correspond to a difference in physical health over time?

4. If there is a difference in walking distance of scooter users and non-scooter users, does this correspond to a difference in physical functional ability over time?

5. Is there a difference in Quality of Life scores of scooter users and non-scooter users over time?

Walking levels were used by the research as its independent variable measure. This is because of the importance of walking in the lives of older adults and the fact that walking is the activity that scooter use was thought to replace.

1.4.2 Methodology

The research questions were assessed for the necessary method needed to answer the questions. A longitudinal randomised control, single case trial with an AB[1] design was created. The design of the research was for five visits by all participants, each visit six months apart. The first visit took baseline measures before a mobility scooter was given, free of charge, to some of the participants (participants were to be randomly assigned either to the scooter group (A), the non-intervention group (B), or the control group(C)). The remaining visits measured the same tests each time so as to examine the changes over both the short term and the long term. This method is illustrated in Figure 1.3. Between visits, participants were given pedometers for one week to measure the distance they walked. A relatively small sample per group (n=20) was aimed for but the participants were repeatedly tested over time and so their scores on tests were compared to themselves. Only the level of differences within individuals over time were compared across groups. An ethics application was completed and then approved by the UCL ethics Committee (Project ID number 3351/001). A pilot study was completed before the full experiment began.

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[1] An AB design is a research design that measures a baseline followed by an intervention.
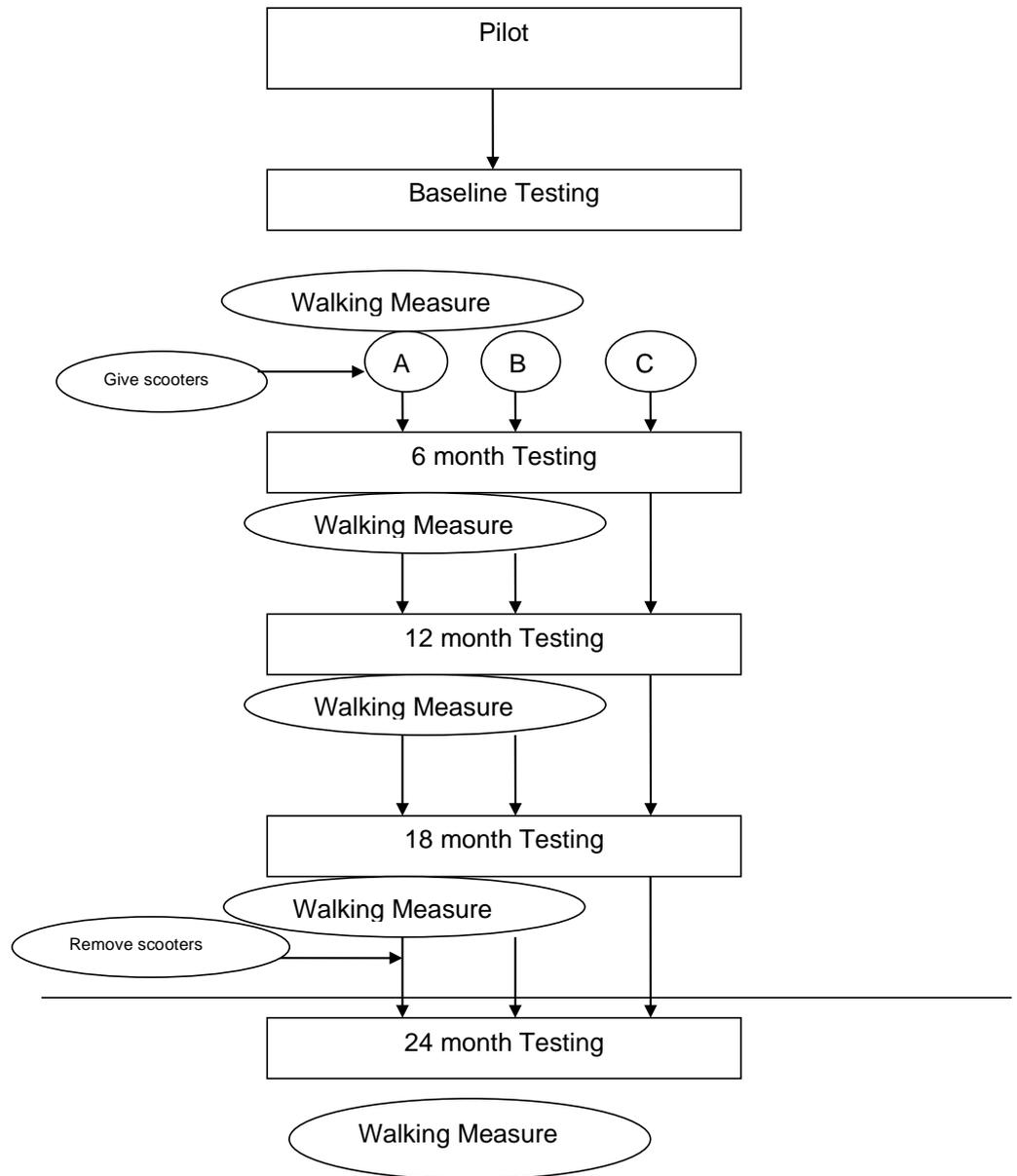
Figure 1.3: Order of tests for originally proposed study

The data generated out of the testing phases was a mixture of objective and subjective data that arose from the research questions. General information included the participants' age at each visit, their mood for the day of their visit, and whether they had ingested any caffeine[2] in the previous two hours. The objective data listed in table 1.1 below was gathered by the physical tests.

Table 1.1: Table showing list of data gathered

Objective Data	Test gathered
Weight: Clothed, No Shoes	Weight Measure
Height: No Shoes	Height Measure
Body Mass Index (BMI)	Calculated from Weight and Height
Time Spent Completing Five Chair Rises (Seconds)	Chair Rises
Grip Strength in Non-Dominant Hand	Grip Strength Test (Three measures)
Grip Strength in Dominant Hand	Grip Strength Test (Three measures)
Distance Walked in Six Minutes	Six-Minute Walk Test
Heart Rate (Beats per Minute) Before Walk Test	Six-Minute Walk Test
Heart Rate, Every Two Seconds, During Walk Test	Six-Minute Walk Test
Heart Rate at End of Walk Test	Six-Minute Walk Test
Respiratory Rate (Breaths per Minute) Before Walk Test	Six-Minute Walk Test
Respiratory Rate Peak During Walk Test	Six-Minute Walk Test
Respiratory Rate at End of Walk Test	Six-Minute Walk Test
Quality of Life	OPQOL Test
Independent Mobility	ADL Test

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[2] Caffeine can effect heart rate if ingested in a two hour period before measurement (Bell & McLellan, 2002)

1.4.2.1   Pre-clinically Disabled

The participants sampled were identified as older adults, who were able to walk, but whose mobility has recently declined making them likely candidates to use a mobility scooter. Many older people who fit this description are classified as having pre-clinical disability[3]. Intervention is most likely to be effective and study is most needed in this population (Sonn, 1996). Pre-clinically disabled individuals can be identified by Fried's frailty questionnaire (Fried et al., 1996), which was incorporated into the eligibility questionnaire. Respondents who reported no difficulty with the mobility tasks listed in the questionnaire were considered to be in the high function stage and therefore ineligible for the study. Respondents who reported no difficulty but who had modified the tasks or changed the frequency of undertaking the tasks were considered to be in the pre-clinical stage of disability and therefore would be included in the study. Respondents who reported difficulty were advancing to manifest disability and were not eligible for the study (Fried et al., 1996; Fried, Bandeen-Roche, Chaves & Johnson, 2000).

1.4.2.2   Participants

In order to be eligible for the study participants had to be (a) over 65, (b) retired, (c) pre-clinically disabled and (d) not already scooter users. Younger adults who were pre-clinically disabled were excluded from the study as their lifestyle and thus mobility patterns were likely to be different. In order to assess eligibility, anyone interested in participating needed to fill out a short questionnaire, which assessed their eligibility (Appendix A). The questionnaire was made available online and in hard copy. Those who wanted a hard copy could telephone and request one. It was then sent to them with a prepaid return envelope.

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[3] Defined in the Glossary of Terms

1.4.2.3 Recruitment

Participants were recruited from multiple sources over a period of 18 months. Recruitment began three months prior to the beginning of the baseline tests. Specific groups whose services were aimed at older people were contacted for help with recruitment from their databases: AgeUK, University of the Third Age, Brunel's Older People's Reference Group (BORG) at Brunel University, Open Age, and the International Longevity Centre – UK. Groups that would include older people as members were also contacted for help with recruitment: Rica, Arthritis care, UCL Alumni database and local community centres in Camden, Archway, Kentish Town, Tufnell Park and Hampstead. Adverts were placed online in local community forums and on the London Gumtree site. Adverts were also placed in local newspapers and magazines in the boroughs of Islington and Camden.

It is unknown how many people viewed the questionnaire or who saw the advert. BORG and Open Age both offered access to their databases and the questionnaire was sent to 150 and 3,000 older people respectively. The *Camden Gazette*, a magazine for older people in Camden, contained a half page advertisement for the study that was circulated to 8,000 people. The advertisement in the *Hampstead and Highgate Express* and in the *Islington Gazette* would have been circulated to approximately 26,000 people.

From BORG and Open Age a total of 200 questionnaires were returned. From the other sources, 60 questionnaires were returned. From the 260 returned questionnaires, 30 people met the criteria. The vast majority who were ineligible did not fit the pre-clinically disabled criteria; they were either not experiencing any changes to their mobility or were too disabled to take part.

1.4.2.4 Recruitment Challenges

One of the known drawbacks of longitudinal studies is recruitment of participants and selective attrition. With selective attrition, the long duration of the project means the increasing likelihood of participants dropping out during the study. This was not a problem in this case, as only two of the participants dropped out. The problem was with recruiting suitable participants. One

reason for the difficulty of recruiting participants is that many people may have been put off participating because of the length of the study, which was advertised as two years. To prevent losing potential interest it had been emphasised that only one hour of participants' time was required every six months and that monetary compensation would given for completing the study. Although there were many people interested in participating in the project, the specific criteria for the participants meant the number who were actually eligible was far smaller.

The initial method had involved randomising the participants into three groups. In reality, the low numbers of eligible participants able to store a scooter meant that this was not practical, leading to a non-randomised participant grouping. Those who were eligible and could store a scooter were placed in the scooter group (Group A), with the remainder being placed in the non-scooter group and control groups (Groups B and C). Only five of the 30 eligible people were able to store scooters. Whilst those in group A were told their usage of the scooter was their own decision, two participants in Group A did not wish to have a mobility scooter and so were transferred to Group B. A further participant in Group A kept a scooter for the entirety of the study but did not use it. This meant that of the 30 people recruited, only two people took up a mobility scooter.

1.5 Questions Raised from Initial Proposal

As has been shown in the section above, in trying to answer the initial questions in a proper way, a very specific sample was needed. In the process of gathering that sample it was discovered that there were other questions that needed to be answered first in order to understand the problem more fully.

Despite the availability of free scooters, the recruitment of suitable participants was very difficult. Despite an increase in the number of scooters in the UK, the number of people who want to start using them or are able to start using them is low. The recruitment undertaken illustrated two reasons for this. Firstly, storage is a problem. Most people recruited (83%) could not store a

scooter at their homes. Secondly, some of those who could store them felt they had "no need" of a scooter, despite their acknowledgement that they were finding their mobility had declined. This highlighted some questions surrounding mobility scooter use among older adults that could not be answered by the currently available literature. In addition, conversations with the scooter users and non-users within the study also raised questions about scooter use that could not be answered elsewhere.

Firstly, from the issues with recruitment it was clear that storage of a scooter was a barrier to ownership. It was important to discover the scale of the problem for current and potential users so as to learn how this could be addressed. Was storage a barrier for people who now own scooters? Did people who have scooters have to create space for their scooter or was there already space present? If storage is a major barrier and it is not addressed, how will people whose mobility declines but who are unable to store such a device manage their mobility? It is important to note that participants were recruited from the Greater London area to ensure that regular visits to the laboratory[4] where the testing took place were feasible. Given the large population and the density of housing in London, it is possible that storage is only an issue in large cities. This needs to be explored.

Secondly, it was clear that the attraction of the mobility scooter as an assistive technology differed between individuals. Three of the five participants in the initial study who were able to store a scooter chose not to use it. Understanding how older people who are not scooter users view mobility scooters will uncover any barriers to their use and help in predicting their future uptake. The value of scooters as a mobility aid can be somewhat qualified by understanding how scooter users view mobility scooters.

Thirdly, during the visits for testing in the initial study, the participants were asked about any changes to their activities since the previous visit six months. For some participants, activities that were previously pursued outside

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[4] The laboratory is located in Tufnell Park, a suburb within zone two of the London transport system.

the home were stopped or not as frequently undertaken as they found them difficult or too tiring to reach. This raised questions about active social participation and whether a mobility scooter delays or increases social activity dropout. Given the importance of social participation to quality of life, social isolation and loneliness (see section 2.2), the role a mobility scooter plays in accessing social activities is important to understand.

Whilst understanding the impact on health of scooter use is important, research needs to be carried out within the context of who uses scooters, who does not and the reason for this. If a scooter does prove to have a negative impact upon health it needs to be weighed against the reasons the scooter was chosen to be used. If a scooter has a positive impact upon health then it needs to be understood why people do not use them. Decisions, including those on health issues, are made not just by weighing the costs and benefits but also by emotional and anecdotal reasoning (Finucane, Alhakami, Solvic, Johnson, 2000; Ubel, Jepson, Baron, 2001; Ubel, 2010). The process of recruiting participants and beginning experiments with scooter and non-scooter users made it clear that individual circumstances (including how an individual views their mobility, independence and mobility scooters) play a large role in whether they will choose to use one. Therefore, understanding why people choose to or choose not to use a mobility scooter will have a big impact on usage, regardless of the effect on health. Whilst this information does not take away from the importance of understanding the health effect of scooter use upon their users, it is information that needs to be understood before beginning to untangle the impact on health.

From this process of working through the initial research project, a new set of research questions arose. This thesis investigates why people chose to use or not to use mobility scooters. It is hoped that the answers to these questions will help uncover the prevalence and trends of scooter use in the UK, to understand the decision-making behind scooter uptake, to identify any barriers to using scooters, and to assess whether these barriers can be (or should be) overcome.

1.6 Revised Research Proposal

1.6.1 Research Aims

The key aim of this research was to understand how older people with mobility difficulties viewed mobility scooters. This meant to understand the perceptions and experiences with mobility scooters both of those older people who use scooters and those who do not. In addition, the research aimed to learn about the prevalence of mobility scooters in the UK population of older people and the presence of any barriers to their use.

1.7 Structure of this thesis

This thesis is divided into six chapters and is organised as follows:

Chapter 2 explores the current knowledge around the topic. Firstly, it discusses the declines in physical functioning experienced in old age and the effect of that decline on mobility and independent travel. Secondly, it explores the current evidence of the physical, psychological and social impact of mobility scooters. Thirdly, it discusses the gaps in the literature. Finally, it details the research questions that arise from these gaps in knowledge.

Chapter 3 details the methods used for the research undertaken. Firstly, it provides the method for English Longitudinal Study of Ageing (ELSA) database analysis. Secondly, it provides the details of the method for the interview gathering and analysis. Thirdly, it provides the method for the mobility scooter users' questionnaire, its inception, collection and analysis.

Chapter 4 reports the results of the ELSA database analysis, the analysis of the scooter user questionnaire, and as well as the scooter user, non-user and stakeholder interviews.

Chapter 5 discusses the results of the analysis, what consensus it has with previous research and what impact it has on users or potential users of scooters.

Chapter 6 begins by summarising the research completed. Firstly it revisits the research questions introduced at the beginning of the thesis and shows how each of these has been answered. Secondly, it describes what questions have been raised as a consequence of this research. Finally it discusses where future investigations should focus their attention, why this is important and to whom.

At this stage it is also important to draw the reader's attention to the Glossary of Terms prior to this chapter. The glossary provides definitions for the key terms that appear throughout the thesis.

The following papers were prepared as part of this research:

Thoreau, R. (2011). Personal Mobility Scooters: Health differences between mobility scooter users and the unaided pedestrian. *Accessibility Research Group Working Paper*. http://discovery.ucl.ac.uk/1317696/

Thoreau, R. (2011). Mobility scooter use and the physical functioning of older adults. Conference Paper in *International Journal of Integrated Care*, 12. Bridging Knowledge, Research and Policy: The Growing Older With a Disability (GOWD) Conference, Toronto, Canada, June 5-8, 2011
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2. Background

Chapter 2 discusses previous research that is important to understanding the benefits and drawbacks of mobility scooters for older adults. The literature comes from engineering, public health, gerontology and psychology. The chapter begins by exploring physical functional decline and the effect this can have on mobility and independent travel. The impact of reduced mobility and independent travel on individuals is discussed next. Finally, the literature around mobility scooters is explored in detail, including illustrating where the knowledge gaps occur.

In searching for relevant literature electronic databases, SCOPUS, PubMed, PsychInfo, EMBASE and AMED were examined. The terms "elderly" and "older adults" were used in conjunction with terms such as "physical activity", "mobility" "assistive technology, "pre-clinical disability", "functional limitations", "walking", "mobility scooters", "electric scooters", "motoris(z)ed scooters" and "powered mobility devices". Government websites (such as Department for Transport, Office of National Statistics and Department of Health) were also examined for additional publications.

The terms "old age", "the elderly", or "older adults" are used interchangeably throughout academic literature. However, these terms range in meaning and can include subsets of people over the age of 60 (Gilleard & Higgs, 2011; Roebuck, 1979; United Nations, 2002; Victor, 2010). This group of the population is heterogeneous, in terms of physical, mental and cognitive health (Ardila, 2007; Maddox, 1987; Seeman et al., 1994). There is no standard age range for "older adults" and therefore, where relevant, the ages studied in particular papers have been identified. Whilst much of the gerontological literature uses the term "older people" it is by no means universal. For consistency, this thesis will only use the term "older adults".

2.1 Physical Functional Decline

Physical functional decline is a decrease of physical ability, common in older adults. It is a term commonly used in clinical health literature, particularly in gerontology. Physical functional decline includes declines in visual and hearing capabilities, balance, cognitive speed, and muscle and bone strength. These often lead, in isolation or in combination, to problems with mobility and with continued participation in activities of daily life. For some people, physical functional decline will affect only a few aspects of their capabilities (for example, bending or walking), whereas in others the ability to maintain more integrated activities will be affected (for example, moving from bed to chair, bathing, using the toilet etc.) (Guralnik, Ferrucci, Simonsick, Salive, & Wallace, 1995).

Amongst older adults, there is a higher proportion of people who have experienced a decline in mobility than there is with those whose self-care[5] capabilities have declined (Aijanseppa et al., 2005). The first outward sign of physical functional decline are often difficulties with mobility, as defined by the ability to move around the environment unaided, such as walking or traversing stairs (Wressle & Samuelsson, 2004). A change in activity patterns in older adults can be both a sign of functional decline and a predictor of functional decline (Gill, Gahbauer, Hon & Allore, 2010). The percentage of adults who experience physical functional decline increases with age (Department of Health, 2000; Katzmarzyk & Craig, 2002; Taylor et al., 2004). For example, in England 26% of males between the ages of 65 and 69 reported functional limitations compared to 57% of males over 85 (Katzmarzyk & Craig, 2002).

2.1.1 Changes to Mobility in Older Adults

Changes to mobility are common in older age and affect a higher proportion of women (Mindell & Craig, 2005; Murtagh & Herbert, 2004). At over 65 years of age, 39% of males and 47% of females have trouble walking 400 metres

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[5] For example, bathing, feeding and toileting oneself.

(Mindell & Craig, 2005). The proportion of people experiencing a decline in physical mobility is known to increase with age. Those classed as walking impaired (who are unable to walk at a speed faster than 0.5 metres per second) rise from 14% of men over 65 to 36% of men over 85, and from 25% of women over 65 to 56% of women over 85 (Mindell & Craig, 2005). Murtagh & Herbert (2004) investigated 1,348 American older adults who were part of a longitudinal study. They found that women were more likely to report functional limitations and specifically were 1.5 times more likely to report mobility functional limitations. However, the women in the study also had more health problems, were more likely to have physically disabling conditions such as arthritis, and reported more pain in muscles and physical fatigue than men.

Among older adults, walking is the most common form of physical activity and can make a great difference in overall health (Hakin et al., 1998; Department of Health, 2000). A brisk or fast (6.44 kilometres per hour or 4 miles per hour) walking pace is linked to a reduced risk of premature death (Manson et al., 2002). Women over 50 years of age who walk for at least 2.5 hours a week have a 30% lower risk of a cardiovascular event (Manson et al., 2002).

However, despite age increasing the likelihood of a decline in mobility, the proportion of older people with mobility difficulties is decreasing (Aijanseppa et al., 2005; Guralnik et al., 1995). Studies show that as people get older their physical functioning declines. However, the ever improving standard of healthcare means that the severity of the decline lessens in succeeding birth cohorts, meaning physical function declines lessen with every generation (Ajanseppa et al., 2005). However, it is important to remember that this decline should be seen in the context of a growing ageing population, which means there will be an increase in the total number of people affected by age-related declines in their mobility (Seeman, Merkin, Crimmins, & Karlamangla, 2010).

2.1.2 Changes to Independent Travel

Not only do changes in physical function affect the ability to walk, they also affect the ability to maintain the capabilities of other means of independent travel. As people age, the number of people who stop driving increases (Department for Transport, 2010). Amongst older people, driving cessation commonly occurs either for health or confidence reasons (Marottoli et al., 1997; Persson, 1993). Driving cessation also affects older people who do not drive, but who relied on their spouse who has either ceased to drive or has died. Older men are still more likely to hold a driving licence than older women (Department for Transport, 2010) and this creates a problem as men tend to die at a younger age than women.

The capacity to drive is crucial to many older adults mobility (Davey, 2007). This type of transport-related social exclusion has a major effect on access to healthcare (Mackett & Thoreau, 2015; Titheridge, 2009). A third of people who do not own a car found it difficult to get to the hospital compared to 17% of those who do own a car (Social Exclusion Unit, 2003); and 1.4 million people a year either miss, refuse or do not seek healthcare due to transport difficulties (Department of Transport Local Government and the Regions, 2001). More recently, a study of 200 patients surveyed in London found that 37% had missed appointment and 47% were late for an appointment due to patient transport issues (Transport for All, 2014). In Northern Ireland, a similar questionnaire of 366 people found that 20% missed appointments and 25% cancelled appointments due to difficulties with transport (Patient and Client Council & Consumer Council, 2013).

However, driving cessation is likely to be less of a problem in large cities where older people are more likely to rely on public transport. For example, London has a lower number of trips made by car versus the remainder of South West and South East England (40% versus 69% of trips respectively), and it is the only region in the UK where households without a car are rising (National Travel Survey, 2012). For these people, the ability to walk to be able to access public transport is key.

Musselwhite and Haddad (2010) examined the travel needs of older people and found that driving cessation caused many changes in travel behaviour, including anxiety about being able to go shopping and to hospital, and to attend doctors' surgeries. Feelings of depression, annoyance, isolation and exclusion were mentioned by participants. These findings echoed Lucas and Jones (2009), who found people who were socially excluded because of transport reported feeling isolated and had to rely on other people to get around. Molloenkopf et al (1997) found a similar result. They studied older adults in three different European countries and found that those without access to a car were more dissatisfied with not being able to make potential trips they would like to.

The number of trips older people make outside their home is altered by the changes to older adult's mobility. Whilst the current trend is for older adults to make more trips than the previous generation, fewer trips are made by older people as they get older (Department for Transport, 2013, Department for Transport, 2014). National Travel Survey statistics showed that 60-69 year olds made approximately 1,000 trips a year compared to approximately 800 trips a year by those over 70 (Department for Transport, 2013). This is not simply an effect of retirement and the reduction of trips due to ceasing commuting; the study showed the number of trips made by older adults subsides continually (Department for Transport, 2014). This has implications for both individuals' physical health and to their quality of life.

2.1.3 Functional Decline as a Clinical Progression: Pre-Clinical Disability

There is a progression that many older adults pass through, from full functional health through functional decline to disability. The work of Fried and colleagues at John Hopkins Medical Institute has developed scales to identify this process of starting to experience downward changes in physical function, referred to as pre-clinical disability.

The team at Johns Hopkins Medical Institute coined the phrase pre-clinical disability as being *"characterized by persons who perceive no difficulty with performance of a task and yet are found to have either (a) general diminution in activities requiring related abilities, or (b) changes in performance of specific tasks"* (Fried et al., 1991). In other words, pre-clinically disabled persons are those whose ability to carry out day-to-day activities has begun to change but who have not yet developed disabilities.

Those individuals who are showing symptoms of pre-clinical disability can be identified by a measure developed by Fried and colleagues (Fried et al., 1996). This is a questionnaire whereby participants are asked to report any difficulty in carrying out a task and whether they have made changes to the way they carry out the task or have changed the frequency in which they carry out the task. Those who experience no difficulty in carrying out the tasks and who report no changes are defined as "high functioning". Those who experience difficulty carrying out the task and report changes in the way the task is carried out are defined as disabled. Only those who report no difficulty in carrying out the task but report changes in the way they carry out the task are defined as "pre-clinically disabled". The measure has been found to be a strong predictor of the risk of developing disability (Fried et al., 2000).

Since 1991, when pre-clinical disability was defined, evidence has been found on the impact that intervention at this stage has on future ability. Those with pre-clinical disability have a 26-31% risk of developing one or more disabilities within 18 months of becoming pre-clinically disabled (Fried et al., 2000). However, an improvement in physical function may be enabled by being able to identify and intervene in the behaviour of older adults with pre-clinical disability, and prevent older adults being at risk of losing their independence (Hakin et al., 1998). Research has discovered the flexibility of these states that all people, including older adults, can move both into and out of (Crimmins, 2004) and intervention is most beneficial at the pre-clinical stage, highlighting the importance of being able to diagnose and intervene early (Warms, Whitney & Belza, 2008; Woods & Watson 2003; Wressle &

Samuelsson 2004). By working with people who have pre-clinical disability, there is the possibility of being able to delay or reduce the onset of disability.

2.2   Implications of Reduced Mobility and Capacity for Independent Travel

2.2.1   Further Functional Decline

Reduced mobility and independent travel can not only be caused by physical functional decline, but it can cause further physical functional decline. For example, the more frequently trips are made outside the home, the lesser the risk of physical functional decline (Kono, Sakato & Rubenstein, 2007).

2.2.2   Decreased Levels of Physical Activity

Participation in regular moderate physical activity is recommended for all adults, regardless of disability status. In the UK, the recommended physical activity levels for adults over 64 is set out as below:

> *"Older adults should aim to be active daily. Over a week, activity should add up to at least 150 minutes (2½ hours) of moderate intensity activity in bouts of 10 minutes or more – one way to approach this is to do 30 minutes on at least 5 days a week."* (Jones & Sandford, 1996)

Internationally, the recommended levels of exercise are similar to that of the UK. For example, in the United States the recommended amount of exercise is 150 minutes of moderate to intense aerobic activity a week, with the caveat that those with chronic conditions unable to reach this target should do as much as their condition allows (Chodzko-Zajko et al., 2009). However, studies indicate people with mobility difficulties are less likely to undertake regular physical activity (DATA2010, 2010; Rimmer, Wolf, Armour & Sinclair, 2007; Rosenburg, Bombardier, Hoffman & Belza, 2011). Furthermore, older people with mobility difficulties take part in less regular physical activity than their more mobile counterparts (Healthy People, 2000). The severity of physical functional decline can be increased by this lack of exercise.

2.2.3 Decreases in Quality of Life

Both the transport and the gerontological research communities acknowledge that there is a link between mobility, independent travel and perceived quality of life (Metz, 2000; Mollenkopf et al., 1997). However, defining and measuring quality of life is beset with difficulty. There are a multitude of measures, as well as no standard definition (Bannister & Bowling, 2004; Metz, 2000; O'Boyle, 1997). Indeed, a review of papers discussing quality of life and older adults shows no definition of quality of life given in any of the papers. Different measures of quality of life were used in all papers, including the Nottingham Health Profile, 15D, the Health Utilities Index Mark 3. The papers also used closed questions on quality of life, such as "*how would you rate your overall quality of life?*" (Rissanen, Aro, Saintonen, Slatis & Paavolinen, 1996; Swatzky, Lui-Ambrose, Miller & Marra, 2007; Zagol and Krasuski, 2010). As stated in the Glossary of Terms, this thesis will use the World Health Organization's Quality of Life Groups definition.

> "*Quality of life is defined as the individual's perception of their position in life in the context of culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by a person's physical health, psychological state, level of independence and their relationships to salient features of the environment.*" WHOQOL Group, 1993

Physical functioning is highly influential for quality of life, as losses in independence and healthy life expectancy are related to even small functional declines in an individual's physical functioning (Bannister and Bowling, 2004; Brayne, Mathews, McGee & Jagger, 2001; Glaser, Suryaprasad, Sawaka & Fitchenbaum, 1981; Hakin et al., 1998; Nagi, 1976; Harris, Sapey & Stewart, 1997; Ravulaparthy, Yoon & Goulais, 2013). For example, Bannister and Bowling (2004) found that being able to walk as little as 365 metres was linked to a higher quality of life score. Ravulaparthy et al (2013) found that older people who engaged in activities outside their home reported a higher quality of life than those who did not.

2.2.4 Increases in Isolation and Depression

A key part of maintaining a higher quality of life is maintaining social connections. Problems with mobility mean that fewer trips are made outside the home, which leads to social isolation and therefore a reduced perception of quality of life (Department of Health 2010; National Travel Survey, 2012). Gilhooly et al., (2002) found that access to private or public transport was linked to higher quality of life. Older people who are socially isolated have an increased mortality risk (House, Landis & Umberson, 1988). Alongside social isolation, loneliness was also separately shown to be linked to a decline in mobility. For example, two large sample studies in the UK; Bowling, Edelmann, Leaver & Hoekel (1989) and Steptoe, Shankar, Demakakas & Wardle (2013) found correlations between mobility and loneliness. Bowling et al (1989) surveyed 662 adults aged 85 or over and found that higher levels of loneliness were correlated to higher levels of impaired mobility. More recently, Steptoe et al (2013) used ELSA data from 2004-2005 to show a similar directional correlation between loneliness and reduced mobility.

Many of the studies on mobility and quality of life focus on the journeys undertaken rather than potential journeys (De Vos, Schwanen, Van Acker & Witlox, 2003). However, studies on driver cessation have shown that the reduction of journeys that could have been made rather than those that were made can lead to a perceived loss of independence, an increase in isolation and increased incidence of depression (Adler Rottunda & Dysken, 2005; Bannister & Bowling, 2004; Gabriel & Bowling, 2004; Musselwhite & Shergold, 2013; Musselwhite & Haddad, 2010).

2.3 Coping with a Decline in Mobility and Independent Travel

When older adults begin to experience a reduction in their mobility and capacity for independent travel, for whatever reason, they have several options open to them. They can either make fewer trips or, in order to maintain their quality of life, they can try to make the trips in a number of other ways. Those

who have stopped driving can rely on walking, public transport, taxis, family and friends or can use a mobility scooter (or some combination of choices) to continue to manage the trips they previously made. Those with difficulty walking can use compensation strategies to continue their walking trips. They can take more trips of shorter distance, use a mobility device or use help from a carer or other person (Weiss et al., 2007).

For many older people whose mobility has changed, a mobility scooter is a potential solution to allow them to maintain their previous levels of independent travel. Given the high proportion of older adults that experience declines in physical functioning and, in particular, declines in mobility and the capacity for independent travel, enabling professionals and older adults themselves to be able understand the impact of potential solutions to these declines is crucial for the health and quality of life of older adults. By providing information on mobility scooters, older adults would be empowered to make informed decisions on their mobility (Di Stefano, Lovell, Stone, Oh & Cockfield, 2009; Laverack, 2007).

2.4 Research on Mobility Scooters

There is very little knowledge about mobility scooters and their impact upon their user, whether from a health perspective, from a user perspective or from a bystander perspective (Lofqvist, Pettersson, Iwarsson & Brandt, 2012). As part of this research, a review of the existing research on mobility scooters has been carried out (Thoreau, 2015). This is attached in Appendix B. The review searched electronic databases SCOPUS, PubMed, PsychInfo, EMBASE and AMED for any literature using the terms "mobility scooters", "electric scooters", "motoris(z)ed scooters" and "powered mobility devices". The review also examined government department websites (Department for Transport, Office of National Statistics and Department of Health) for additional publications, as well as searching for secondary data sources referenced by the papers. The review discussed the available literature, showing that knowledge in this area can be broken down into three categories: prevalence; users' perspectives; and physical health. Further searches

of the literature were carried out using the same electronic databases and using the additional search terms of "assistive technology" and "assistive mobility device".

2.4.1 Prevalence

The prevalence of mobility scooter numbers has only been estimated a few times, but there is evidence to suggest an increase in numbers. Sales of new mobility scooters in the UK rose by £13 million in the space of four years, from £83 million in 2009 to £96 million in 2013 (Keynote Ltd, 2014). In 2006, Barham et al estimated that around 25,000 mobility scooters were bought in the UK each year. New estimates suggest this is now closer to 80,000 each year (Barton et al., 2014), with approximately 350,000 scooters currently being used in the UK (Barton et al., 2014). Thoreau (2011) used the English Longitudinal Study of Ageing database (ELSA) to examine the proportion of over 65 year olds who use mobility scooters. The analysis concluded that 1.4%[6] of those aged over 65 used a mobility scooter.

Current estimates by Barton et al are based on sales data, which is scarce, and it is unclear whether the data is comprehensive. This estimate does not provide data on either how many scooters are bought and sold (it does not cover private second-hand sales) or on the number of people who use scooters as opposed to just owning them. In addition, the estimates by Barham and by Barton were based on different data sets and may say more about the differences in the data than the differences in changes over time. A representative estimate of the number of scooters currently being used and how this number changes over time (using data collected in an identical manner) would be a more useful statistic to understand the role played by mobility scooters in the lives of older adults in the UK. There is also no information on the characteristics of the people who use mobility scooters. Characteristics of users would enable a profile of users to be developed, which would help

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[6] This equates to approximately 250,000 older adults over 65 in England

predict uptake of scooters in the future. However, to date, all this is unavailable.

2.4.2 Physical Health

Two studies have explored the effect of mobility scooters on physical health. Hoenig et al (2007) completed a three-month before and after study on arthritis patients who took up using mobility scooters to examine for changes to their walking abilities alongside a control group. The study found that no differences in walking abilities existed between the two groups at the end of the three-month period, but that the scooter users did participate in a wider range of activities than the non-scooter control group. This paper had limitations in the length of study; the inability to generalise the results to scooter users without arthritis; and the likelihood of the scooter users to already be using wheelchairs at the baseline (Thoreau, 2015).

Zagol and Krasuski (2010) examined the cardiovascular risk and quality of life of people who were prescribed scooters. Using Body Mass Index (BMI), cholesterol, blood pressure, medication and fasting glucose level, cardiovascular risk was calculated for 102 individuals 12 months before they received their scooter and 12 months after. A questionnaire was administered to each participant about their quality of life, to which 28 responded. Results found there was a decline in health after the prescription of a scooter. An increase in fasting glucose level and the incidence of diabetes was found after scooter uptake, and there was a further increase in blood pressure and/or blood pressure medication. The analysis of the quality of life questionnaire found that the patients perceived an improvement in their quality of life. The limitations of this study, as discussed in Thoreau (2015), were a lack of control group, a lack of comprehensive quality of life measure, and no ability for the results to infer causality.

These studies provide some estimates of the impact scooters have on the physical health of their users, but the opposing directions of their findings does not resolve the question of whether scooters are detrimental or benefi-

cial to physical health. Whilst the initial proposal of this thesis aimed to answer this question, the current proposal does not. However, where the data allows, the thesis will examine what physical changes exist between scooter users and non-scooter users, as well as in scooter users across time. This will go some way towards determining whether there is a need to be concerned about physical impact of scooter use.

2.4.3 Users' Perspectives of Mobility Scooters

The review carried out as part of this thesis (Thoreau, 2015) found numerous studies on mobility devices and user perspectives. The literature showed that research on user perceptions and experiences of mobility scooters and wheelchairs (both manual and electric) made no distinction in their findings to which of the devices they were referring (Thoreau, 2015). Similar to scooter users, numerous manual wheelchair users have physical function, allowing them limited mobility (Hoenig et al., 2002). Whilst a valuable starting point, the evidence from these studies is not always relevant to scooter users. In the UK, electric wheelchairs are provided by the National Health Service (NHS) to those people who need wheelchairs full-time and are unable to propel themselves in a manual wheelchair (Standards for Better Health, 2005) unlike a mobility scooter, which is a private purchase. These studies found a positive perception of mobility devices, with users experiencing greater independence, the ability to participate in more activities and an increased perception of security (Brandt, Iwarsson & Stahle, 2004; Edwards and McCluskey, 2010; Formiatti, Moir, Richmond & Millsteed, 2014; Hawkins, Kramer & Capaldi, 1992; Ordonez, 2006; National Health Service, 2010; Samuelsson & Wressle, 2014; Woods & Watson, 2003; Wressle & Samuelsson, 2004; Zagol & Krasuski, 2010). Any negative experiences from mobility devices stemmed from limited access using the device, unsuitability of the device for particular activities, and interaction with pedestrians (Brandt et al., 2004; Edwards & McCluskey, 2010; Formiatti et al., 2014; Hawkins et al., 1992; Steyn & Chan, 2008). All these perceptions by users as well as the uptake of the device are additionally dependent on the users social environment. This includes the

people the user interacts with and their perception of the device (Cook, 1994; Field, 1999).

Whilst these findings are extremely limited in what they can say about mobility scooters, their exclusion from discussion would remove almost all knowledge within the broader area. Only five studies examined the user perspective of mobility scooters as a distinct group (May, Garrett & Ballantyne, 2009; Edwards & McCluskey, 2010; Formiatti et al., 2014; Zagol & Krasuski, 2010, and Johnson, 2015). The first, Zagol and Krasuski (2010), was discussed in the previous review paper (Thoreau, 2015), but the quality of life questionnaire and its results will be discussed in greater detail in this section. The second paper, Edwards and McCluskey (2010), examined the satisfaction and dissatisfaction of powered wheelchair users and mobility scooter users with their devices. The third paper, Formiatti et al (2014), examined the impact of mobility scooters on users within a retirement residence. The fourth study, May et al (2010), examined the experiences of scooter users. The final study, Johnson (2015), examined the experiences of people who hired scooters on a short-term basis.

Zagol and Krasuski (2010)

Zagol and Krasuski (2010) examined the effect of using a scooter on quality of life in the United States. They sent a questionnaire to 102 patients of a medical centre who had been prescribed mobility scooters. The patients were asked to respond to an 11-question quality of life survey that asked about their self-perceived abilities and perceptions before and after they were prescribed the scooter. Figure 2.1 shows a copy of the questionnaire.

Please answer the following questions on the scale indicated (circle one number in each column for each question):	BEFORE the Motorized Wheelchair / Scooter 1 = Very Poor 10 = Excellent	AFTER the Motorized Wheelchair / Scooter 1 = Very Poor 10 = Excellent
1. How would you rate your overall quality of life before and after the scooter?	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
2. How would you rate your ability to do your household chores?	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
3. How would you rate your ability to participate in pastimes and hobbies?	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
4. If you work, how would you rate your ability to perform your job? (Leave blank if you don't work)	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
5. How would you rate your ability to live independently?	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
6. How would you rate your ability to go shopping for groceries, clothes, etc.	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
7. How would you rate your burden to your family? (1=great; 10=none)	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
8. How would you rate your ability to make it to doctors appointments and other appointments?	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
9. How would you rate your ability to visit friends and family?	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
10. How would you rate your overall physical health?	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10
11. How would you rate your overall feelings of mental well-being?	1 2 3 4 5 6 7 8 9 10	1 2 3 4 5 6 7 8 9 10

Figure 2.1: Copy of the Quality of Life Questions used by Zagol and Krasuski (2010)[7]

The analysis of the respondents (n=28) showed that quality of life improved at every facet measured, except the ability to perform their job. Figure 2 below shows the before and after average scores, where ability to go shopping showed the most improvement.
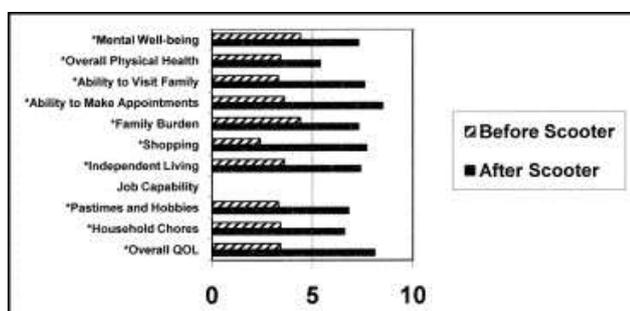
Figure 2.2: Results of Quality of Life scores before and after scooter uptake (Zagol & Krasuski, 2010)[8]

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[7] Reprinted from The American Journal of Cardiology, 105/5, Zagol and Krasuski, Effect of motorized scooters on quality of life and cardiovascular risk, 672-676, 2010, with permission from Elsevier

The study has methodological issues. Firstly, as discussed in section 2.2.3, quality of life is a difficult concept to measure. The questions used in that study measured the individual's perceived capability to do certain tasks, but did not cover many facets that other research considers important to quality of life, including financial situation, relationships, and neighbourhood (Bowling & Stenner, 2010). Secondly, each facet is measured by only one question, which may not cover the complexities of the issue. For example, the question "how do you rate your ability to participate in pastimes and hobbies?" does not uncover whether hobbies are important to them, whether they can afford to do them or whether they can access them. Thirdly, the questionnaire is only issued once and asks the respondent to recall what their quality of life was like before and after the scooter. This leads to a degree of bias from the respondents, as they are assessing their life in the past based on how they feel about it now. They will have been aware that the authors would want to know if the scooter has changed their perception of their quality of life and so would have answered according to how they felt about the scooter. If this questionnaire had been issued once before scooters were prescribed and then again after they were prescribed and did not mention the mobility scooter, the results would show a more accurate reflection of quality of life in each moment.

Formiatti et al (2014)

Formiatti et al (2014) examined the effect scooters had on the social engagement, activity participation and mobility of scooter users within Australian retirement residential settings. The study interviewed 14 residents who had used scooters for a minimum of two months using a semi-structured approach. From the interviews, three themes emerged: knowledge; engagement; and environments.

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[8] Reprinted from The American Journal of Cardiology, 105/5, Zagol and Krasuski, Effect of motorized scooters on quality of life and cardiovascular risk, 672-676, 2010, with permission from Elsevier

Scooter users felt that their engagement with other people and their participation in activities had increased as a result of using their scooter. Users cited independence as a key advantage of using their scooter. However, despite these benefits, users felt there were a number of disadvantages and challenges to using scooters. Firstly, there was a lack of information surrounding scooters. Only a few of the users received training or advice on scooters before they purchased them. Secondly, users had little confidence in the battery life of their scooter and did not travel as far as they would have liked as they feared running out of power during their journey. Thirdly, users had difficulty moving around the built environment, particularly with respect to space and a lack of dropped kerbs. Finally, users perceived and experienced discrimination from non-users not viewing them as having a physical need of a scooter.

The study is limited by the sample used, that of retirement village residents. Living in a purpose-built facility for older people means users' immediate built environment (including their homes, the roads and footways within the village) might be different to those outside the village, as they will be designed and built with older adults in mind. A retirement village also means greater access to services and activities, which would alter their ease of participation and access to resources.

Edwards and McCluskey (2010)

Edwards and McCluskey (2010) examined the characteristics and experiences of users of powered wheelchairs or mobility scooters. They collected questionnaire responses from 202 respondents, 74% of which were scooter users. Some of their published findings gave separate data for scooter users whilst other data did not distinguish between scooter users and powered wheelchair users. In this section, only the results where scooter users are distinguishable have been discussed. The study found that whilst users typically viewed their device as giving them greater independence and quality of life, mobility scooters were not without drawbacks. The study found that there was a lack of training when they bought their scooter and that only 57%

of scooter users were given advice on scooters before they bought them. Users were worried about their battery running out (37%) and 21% had had an accident whilst using their scooter. The study concluded that safety was a paramount concern, and needed health professionals to work in collaboration with scooter suppliers to ensure that information on safe use was disseminated to users.

May et al (2010)

May et al (2010) examined mobility scooter users in Australia and what influenced scooter usage. A questionnaire was sent out to 119 people who had bought a scooter from a retail supplier and 67 people responded. The questionnaire contained a mixture of open and closed questions about scooter use, benefits and problems, as well as socio-demographic questions. In addition, two focus groups were held (with six and nine participants respectively) with members of a mobility scooter support group. The focus groups examined some similar issues to the questionnaire, how and where people used scooters, but also incorporated questions of why people initially chose to use scooters, as well as the importance of scooters.

There were three commonly cited reasons for obtaining a scooter: a change in health, cessation of driving, or cessation of a partner's driving. Some users felt they were reluctant to own a scooter as they perceived a scooter to be for old people and they did not identify themselves as this. Others felt the prevalence of this attitude resulted in people delaying using a scooter and therefore delaying the associated benefit of independence. They felt people should be encouraged to use scooters earlier, before they lost their mobility. Participants raised issues around a lack of information before purchasing a scooter and a lack of training, although this was not widespread across all the participants.

Many benefits of using scooters were cited. Users felt that scooters provided them with similar or improved independence, and that scooters enabled them to carry out tasks, travel to more places and maintain social relationships. The

focus groups showed that scooter users believed they would be housebound without their scooter and relied on their scooter to remain independent.

The negative aspects cited of using scooters revolved around the capabilities of scooter users, negotiating the built environment and interacting with pedestrians. Although users felt a scooter was simple and easy to learn to use, they were concerned about the required capabilities (eyesight and cognitive function) needed to drive a scooter and that not all other users had these. Of particular concern was the need to know road rules and etiquette. Users felt that a proportion of other users were not following the rules and giving non-users a negative perception of all users. Related to this was the interaction with pedestrians, particularly where the footways were narrow. There was a mix of feeling as to whether scooter users were given enough space by other pedestrians. Some participants felt they were not being given enough space by pedestrians and other participants felt that scooter users were demanding more space than was fair. A lack of accessibility of buildings and footways was a common theme from both the questionnaire and the focus groups, with inaccessible building and toilets and a lack of, or too steep, dropped kerbs making trips impossible.

The study has some methodological limitations, chiefly that of the sample used. The users came from a retail database and a scooter support network; both groups are likely to be much more positive about scooters than the general scooter population. Whilst the report does not say, it is likely that the retail supplier used to gather the questionnaire respondents sells new scooters. If true, this means that all scooter users in the questionnaire will have invested a significant sum of money into their scooter and were therefore more likely to view it positively.

Johnson (2015)

This study focused on mobility scooter users who hire their scooters. Johnson interviewed 46 people from across England who had hired a scooter from a Shopmobility service. Shopmobility hires out scooters from within shopping

centres around the UK. The hire is short term, with the maximum duration of a single day. The participants included a range of ages and mix of genders, although 33 were over 60 years old and 38 were female, skewing the results towards the older female. Each interview asked participants about their experiences using a scooter. Half the users interviewed in the study also owned their own scooter, and the majority of users hired a scooter at least once a week.

The study found that four categories emerged from the users' experiences using scooters: (a) the benefits and drawbacks of usage; (b) the built environment; (c) pedestrian interaction; and (d) personal perceptions. The most common activity carried out on the hired scooter was shopping, with meeting friends and attending medical appointments also occurring frequently. The reasons cited for hiring the scooter included that walking had become too painful, that participants were not able to walk far, and that participants were not able to carry their shopping. Benefits to using scooters were more commonly cited than drawbacks. The benefits of using a scooter revolved around being mobile, being able to get around and being independent. The disadvantages revolved around accessibility and interactions with pedestrians.

Users experienced numerous difficulties negotiating the built environment, in particular opening manual doors, a lack of dropped kerbs, uneven footways and cluttered footways and shops. Participants had both positive and negative interactions with other pedestrians. Whilst many users had experienced people assisting them by opening doors or reaching high stock on shelves, others had experiences of being verbally abused. In terms of personal feelings about their scooter, most participants felt positively, citing the aforementioned benefits. However, some felt that their scooter reminded them of their disability or felt it meant that others perceived them differently.

The study is a useful examination of scooter user experiences, the only study that has been completed in the UK, and the only known study to look at those who hire scooters. However, by focusing on users who have hired a scooter from within a shopping centre, the experiences and the users of the scooter

will be skewed towards short-term use for shopping-centred activities in pedestrian-dense areas. Given the frequency of hiring amongst the interviewees, it would have been useful to learn why these users chose to hire a scooter rather than buy a scooter or use the one they already owned.

2.4.4 Training and Guidance

Scooter users' likelihood to use their device appears to be influenced by the amount of training they receive (Centre for Public Health Excellence, 2006). Whilst there is support for training for safe use (Mortenson, Hoag, Higgins, Emery & Joyce, 2014; Townsend & Watson, 2013), training does not always occur. Estimates of the number of scooter users who receive training vary widely. An international survey of scooter users found only 25% had received training (Mortenson et al., 2014). However, a UK study found that a majority of users, 59%, received training, with 42% of users receiving the training from the organisation from which they bought their scooter (Barton et al., 2014). A focus group of scooter users and stakeholders recognised that there were safety risks involved in using scooters, but there is no data to prove this (Barton et al., 2014). Where training does occur it is not available at a national level. Local schemes are often run by the police (for example, Norfolk Constabulary runs training events), or mobility centres (for example Parkgate Mobility runs a scheme in Yorkshire).

Only a third of wheelchair and mobility scooter users ask for guidance from a health professional before buying their device (Bowling & Stenner, 2011). In the UK, some advice is available. Disability Rights UK, a disability network, provides an online guide to the range of scooters available and some guidance on how to choose the right one for individual needs (Campbell, 2014). Rica, a consumer research charity, creates independent reports for older and disabled people on various assistive technology goods. They have a guide on using mobility scooters on public transport and choosing the right scooter (Rica, 2014; Jacobs, Barton & Harnett, 2013). The Department for Transport (2015) also offers some advice on choosing a suitable mobility scooter, as well as explanations on legal rules and requirements.

2.4.5 Policy

In the UK, there has been some policy interest in mobility scooters. The guidance for mobility scooters and electric wheelchairs, known collectively as invalid carriages, was set in 1988 (Department for Transport, 1988). In 2005, the Department for Transport made a review of its guidance (Department for Transport, 2005). In 2010, the Department for Transport sought consultation to amend the guidance for invalid carriage users. In addition, the House of Commons Transport Committee (2009-2010) focused its attention on safety regulations and reports of accidents on mobility scooters, noting anecdotal evidence of increases in numbers of users. It was recommended that any future legislation must be carefully worded so as not to deprive users of their only independent transport mode. The Department for Transport updated the guidance in 2015 (Department for Transport, 2015). The guidance provides information for carrying scooters on public transport; registering Class 3 scooters with the DVLA; legally required construction features; and using the vehicle. Whilst there are capability recommendations, such as 6/24 vision, there are no legal capability requirements. The Department for Transport commissioned Rica to carry out a study on the practices and policies related to scooter use on public transport (Jacobs et al., 2013). The study identified a lack of information about mobility scooter specifications. In order to allow transport operators to know which scooter types would fit on their vehicles and for users to know which operators allowed scooters on board and what dimensions and permits were required, the study recommended that more information needed to be made available.

Conclusions on Scooter Research

The available research on mobility scooters is scarce and has major limitations. The research is not able to identify how individuals choose whether to obtain and use a scooter, or to manage their mobility and independent travel in another way. It does not answer the questions raised out of the initially proposed research about the experiences, perceptions and barriers of mobili-

56

ty scooter use by those who have never used a scooter but whose decline in mobility and independent travel may benefit from it: (a) what are the barriers, including storage, to the uptake of a scooter and (b) why are some older people who experience mobility difficulties not willing to use a scooter. The lack of knowledge available to professionals, to current scooter users and to potential scooter users is limited. This is illustrated by the limited amount of available training and guidance.

The location of where the current research has been carried out means that some of the research that has been undertaken is not generalisable to a UK context. The United States (where research by Hoenig et al as well as Zagol and Krasuski has been undertaken) has a very different health system to the UK and mobility scooters are prescribed by medical practionners and be claimed on medical insurance which does not occur in the UK. Australia (where research by May et al., Edwards and McCluskey as well as Formiatti et al) has a different culture of transport as well as old age. Large residential retirement villages (which contain within them hospitals, nursing homes as well as self contained housing) are much more common than in the UK. The accessibility of services for the residents and the role mobility scooters can play within the villages will be different to that of residential housing within the UK.

2.5 Conclusions

Research into mobility scooters is at a formative stage, with wide scope for future work, particularly in their role in delivering mobility and their impact on health and quality of life. Mobility is an important capability that gives people independence, the ability to travel independently and a higher quality of life. For older adults, mobility declines with age and independent travel also declines, particularly via driving. In order to maintain mobility, some people use mobility scooters to replace trips they previously made walking or by car. What is not clear is the role that mobility scooters play in the lives of those who use them or the perceptions of those who do not use them but would

potentially benefit from using them. Whilst there is a wealth of data on the relationships between physical activity, health and ageing, there is a lack of evidence on the role mobility devices play in both physical function and in quality of life. It is plausible that some scooter users sacrifice physical functioning for improved activity participation and independence. Understanding (a) how and why people choose to use or not to use scooters, (b) the benefits and drawbacks of using scooters and (c) the experiences of using scooters would enable stakeholders and individuals to assess whether using a scooter would improve mobility, independence and quality of life.

2.6 Research Questions

In order to reduce this knowledge gap, some research questions have been created. As research into mobility scooters is relatively new, this is an exploratory process that necessitates a series of research questions rather than a single hypothesis.

Research Question 1: Why do some people (with similar health/capabilities) choose to use a mobility scooter while others do not?

Research Question 2: Do non-scooter users' perceptions of using mobility scooters match the experiences of mobility scooter users?

Research Question 3: What are the barriers to using a mobility scooter and what can be done to overcome them?

Research Question 4: If the reason for not using a scooter is "I do not need one":

...what do they consider "needing" a scooter to mean?
…would they choose to use one if they did need it (why not if "no")?
…when would they perceive themselves as needing one?

Research Question 5: Does using a mobility scooter change the number of trips made outside the house?

Research Question 6: Does using a mobility scooter change a person's perception of their quality of life?

Research Question 7: What is the prevalence of mobility scooter use in older adults?

Research Question 8: What changes in scooter users occur pre and post mobility scooter uptake?

When designing a research plan, it is important to remember that there is no single correct way in which to conduct any piece of research (Blandford, 2013; Woolrych, Hornbaek, Frojaer, & Cockton, 2011). What is important is that the data collection and analysis methods are appropriate for the questions the research aims to answer.

In order to answer these questions, a mixed methods plan was devised. The nature of the research questions indicated the need to include both qualitative information and quantitative information. Some of the research questions aim to explain a problem and understand its sources, whilst other questions require quantification. Mixed methods research is viewed as a pragmatic method of research that works if it helps answer the research question (Feilzer, 2010; Howe, 1988; Krathwohl, 1993; Morrison, Haley, Sheehan & Taylor, 2011).

A questionnaire was chosen to gather some of the more contextual qualitative data. However, there was the need to talk directly to older people of similar mobility capabilities who use mobility scooters on a regular basis and those who do not. The best way to gather this information, with as much detail and context as possible, was through interviews. Given the constraints of time and resources of a PhD it was decided to aim for at least 10 non-scooter user and 10 scooter user interviews, along with four stakeholder interviews. This would

allow for a range of responses to be given to the questions, whilst being able to draw together common themes. Given the amount of data required by each interview it was envisaged that each interview would last one hour. In addition, quantitative data would provide answers to a number of the research questions, particularly questions 5, 7 and 8. This data can partly be gained from an existing database (ELSA) but needed additional data that could be gathered by creating and implementing a questionnaire. Table 2.1 summarises what type of analysis needed to be undertaken to answer each question.

Table 2.1: Research Questions and their Analysis Type

	Research Question	Type of Method	Method
1	Why do some people (with similar health/capabilities) choose to use a mobility scooter and others do not?	Qualitative	• Questionnaire • Interviews (with users and non-users)
2	Do non-scooter users' perceptions of using mobility scooters match the experiences of mobility scooter users?	Qualitative	• Questionnaire • Interviews (with users and non users)
3	What are the barriers to using a mobility scooter and what can be done to overcome them?	Qualitative	• Interviews (with users, non-users and stakeholders)
4	If the reason for not using a scooter is "I do not need one": ...what do they consider "needing" a scooter to mean? …would they choose to use one if they did need it (why not if "no")? …when would they perceive themselves needing one?	Qualitative	• Interviews (with non-users)
5	Does using a mobility scooter change the number of trips made outside the house?	Qualitative Quantitative	• Questionnaire • Interviews (with users and non-users)
6	Does using a mobility scooter change a person's perception of their quality of life?	Qualitative	• Interviews (with users)
7	What is the prevalence of mobility scooter use in older adults?	Quantitative	• ELSA Database
8	What changes in scooter users occur pre and post mobility scooter uptake?	Qualitative Quantitative	• Questionnaire • Interviews (with users) • ELSA Database

The methods applied to gather the data needed to answer this research were therefore:

1. A questionnaire for mobility scooter users on the activities they undertake on their scooter and their perceived advantages and disadvantages to using one.
2. Analysis of the ELSA database to discover prevalence of mobility scooter users in the older population, as well as changes pre and post scooter uptake.
3. Direct interviews with users, non-users and stakeholders of mobility scooters on the experiences, perceptions and barriers of using scooters.

3. Method

Now that the methods of extracting the information have been stated, the process of each of these methods will be detailed. Firstly, the ELSA database analysis is discussed. Secondly, the method for creating the interview questions and the method for the interview analysis is discussed. Finally, the creation and analysis of the questionnaire is discussed. Each of these three sections include both why each method was chosen and how it was undertaken. This is important, not only to allow the study to be replicated, but also to show the methods have scientifically justifiable roots and fulfil the purpose of the questions.

3.1   ELSA Data Extraction and Analysis

The English Longitudinal Study of Ageing (ELSA) is a longitudinal survey of ageing amongst a representative sample of the over-50 population living in England (n= between 9,400 and 12,000). Quality of life, health, social interactions, household makeup and financial security is explored by the survey. It is carried out every two years (waves) by interviewing subjects in a structured interview style in their own homes. In alternate waves, a nurse visit is made to most respondents (at least 78%, which corresponds to 7,666 visits in wave 2 and 8,641 visits in wave 4) to collect additional specific health data. Data is collected in waves. Each wave is collected across a period of one year, starting in March 2002. A new wave of data is collected every two years.

There are other longitudinal and cohort studies in the UK that were investigated for suitability (see Table 3.1). ELSA was the only study that included data on whether mobility scooters were (or had been) used alongside health data. It also had the widest sample, with participants from across England.

All waves of the ELSA data included questions on whether a mobility scooter had been used. Waves one to five had data available at the time of analysis.

Table 3.1: Longitudinal studies of older people

Study	Age	Number of participants	Region	Mobility Scooter Data
Aberdeen Children of the 1950s (ACONF)	60s	Not available	Aberdeen	No
Cognitive Function and Ageing Studies (CFAS I and II)	65+	18,000	Scotland	No
English Longitudinal Study of Ageing (ELSA)	50+	12,000	England	Yes
Hertfordshire Cohort Study	65+	1,000	Hertfordshire	No
Lothian Birth Cohort 1921 and1936	95 and 79	1,000	Scotland	No
Newcastle 85+	85+	1,000	Newcastle and Tyneside	No
Whitehall	63+	10,000	London	No

From this data it is possible to extract all the people who have used a mobility scooter. For simplicity, those who in any of the waves used a mobility scooter will now be referred to as "scooter users". The scooter users have been further filtered to include only people who did not use scooters before wave two. This is so that there is data for all scooter users before they began using the scooter.

The data on scooter users was then restructured, so that instead of having data by wave, data was ordered so that all scooter users had the data from before they used a scooter in the same variable and subsequent wave data matching. This allowed the data to be compared in a homogenous way focusing on scooter use over time, which was not possible by analysing the waves as all the scooter users started using scooters in different waves.

The differences between scooter users before scooter uptake and non-scooter users (in wave one) were compared. There were significant differences in many areas, crucially in physical activity frequency, in self-reported health and in difficulty walking a quarter of a mile. These are likely to be characteristics that influence people into using a mobility scooter. Therefore, it was important to create a subset of non-scooter users that more closely resembled scooter users before their scooter uptake.

Scooter users clearly had much poorer self-reported health, did less exercise and were less likely to be able to walk a quarter of a mile. With this in mind, from all the non-scooter users all those who:

- i. Were unable to or had much difficulty walking a quarter of a mile (n= 100)
- ii. Hardly ever or never participated in mild physical activity (n=100)
- iii. Reported "poor" health (n=30)
- iv. Reported "fair" health AND had "some difficulty" walking a quarter of a mile (n=34)

were selected for a subset of non-scooter users. This created a sample of 228.

This new non-scooter group at wave one was then compared to the scooter group in their 'before scooter' time. Of this sample, no significant differences were found in age, gender, BMI, grip strength, self-reported health, mild physical activity frequency, or in difficulty walking a quarter of a mile.

With the data restructured, it was analysed in three stages. Firstly, the scooter users were analysed to look for similarities and differences within their char-

acteristics as a group before they became scooter users and in the first wave in which they were scooter users. Secondly, scooter user data was examined for differences in scores individually across time. Thirdly, the subset of non-scooter users was compared to the scooter users across time.

Where the data is nominal (i.e. categories such as increased difficulty walking or regular physical activity) chi-squared tests were used to test for differences between groups. Significant differences were accepted at the 0.05 level. Where the data was measured by time (interval data) paired t-tests were used to test for difference either between users and non-users or before and after uptake. The data was analysed using Statistical Package for Social Scientists (SPSS) version 22.

3.2 Interviews

As discussed in the previous chapter (see section 2.6), a series of interviews has been chosen as the most appropriate method to answer many of the research questions. The following section details how the interviews were carried out, including interview type, interview questions design and analysis type.

3.2.1 Rationale for Semi-Structured Interview Methodology

A semi-structured interview style was chosen for the interviews. This method is where interviews are kept to a set of specific questions across all interviews but allow interviewers to ask additional questions in order to gather more relevant data and to change the wording of a question.

There are numerous benefits for using semi-structured interviews to elicit the answers to the research questions. Firstly, semi-structured interviews are a good method to explore attitudes and perceptions. Secondly, they enable a richer data set to be collected about each individual, with insights into personal histories and reasoning behind answers. Thirdly, they allow issues related to the topic but not listed in the questions to be explored (Bryman,

2012). Finally, semi-structured interviews allow a degree of standardisation across all interview participants, i.e. all interviews contain a set of the same questions. However, most questions asked would be open-ended, allowing the themes and responses to be driven by the individual participants.

The data required from the interviews could have been gathered from the creation of a single long questionnaire. However there were several reasons why interviews were chosen as a method over a long questionnaire. Firstly, evidence suggests that response rates to questionnaires are low with long questionnaires having even lower response rates (Baruch & Holtom, 2008). This would have meant recruitment of suitable participants would have been more difficult as more participants would have been needed to combat non-responses. Secondly, additional information from non-verbal cues or from asking additional questions cannot be gathered in questionnaires which would have lead to less rich, less contextual information being gathered. Thirdly, interviews are better suited to exploring attitudes, beliefs and motives as people are more willing to respond with complex or long answers when responses are verbal rather than written. Finally, interviews help comparability by ensuring that there are no missing answers (Bryman, 2012). If there are missing answers to a questionnaire it is difficult and often impossible to go back to the respondent.

The data required could have been gathered using structured interviews. This method works on the basis that every question, and its wording, be identical in every interview. This is so that a variation in the answers can be attributable to the respondents rather than a variance of wording (Gordon, 1975). However, it needs to be acknowledged that not every word has the same meaning to everyone and it is the overall meaning that needs to be the same, not the wording (Treece & Treece, 1977). In a structured interview, the wording of the questions would not change regardless of whether or not (or how) the question was understood by the interviewee. In a semi-structured interview, the wording of the questions can be changed as long as the meaning is the same. Whilst every attempt was made to keep the wording the same, where the interviewee had difficulty responding, the question could be re-

worded in language better suited to them as an individual. The interviewer has the chance to query the meaning of the language used by the interviewee by using a semi-structured interview in a way that a structured interview does not. In addition, the semi-structured interview allows space for probing. 'Probing' allows the interviewer to clarify to the interviewee what the question actually means, to ask for clarification when an answer is unclear and it can allow exploration of issues raised by the interviewee so that a better understanding of the interviewee's actual understanding of the issues at hand can be obtained. The answers can be directed to the issues raised in the research questions rather than just to the interview questions themselves in a semi-structured interview.

There are both advantages and disadvantages to using semi-structured interviews in this situation. The questions are not standardised because the wording of the questions can be altered. This disadvantage can be reduced in two ways. Firstly, it can be reduced by limiting as much as is practical the variability in the wording of the questions. The questions for the interview should be carefully constructed so that most people would be able to clearly understand what they mean, and so any variability will be due to follow-on questions as a result of the interviewees' answer rather than variability within the question. Secondly, variability can be reduced by using only one interviewer to remove any inter-interviewer variability, or a lack of consistency between interviewers.

3.2.2 Interview Question Method

The creation of the interview questions is a crucial stage in the method as the questions determine what responses are elicited. The questions asked in the interviews must elicit responses that help answer the research questions. This requires a strong connection between the research questions and the interview questions. It is also important that the interview questions allows the interviewee's opinions and perspectives to be voiced without bias whilst maintaining enough standardisation within all the interviews so that responses are comparable during analysis (Barriball and While, 1994). In order to gather

answers to the research questions whilst letting the interviewee's opinions and experiences be expressed, the interview questions used were created using the following structure as set out in Bryman, 2012 (Figure 3.1).
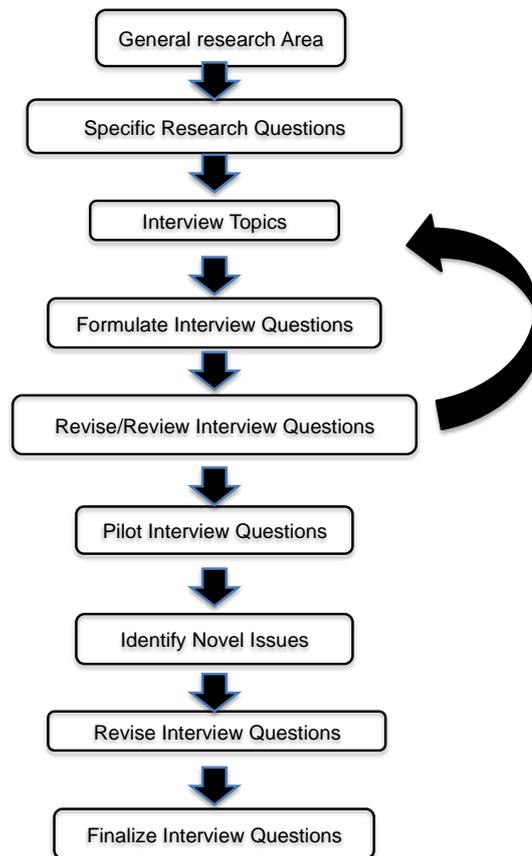
Figure 3.1: Interview Question Structure Process

3.2.3 Interview Topics

A list of topics that needed to be answered in order to cover the Research Questions was made. The topics were deemed to be:

1. Reasons for Mobility Scooter Use
2. Reasons for Not Using a Mobility Scooter
3. Perceptions of Mobility Scooters
4. Barriers to Use
5. Changes in Behaviour Post-Scooter Uptake
6. Travel Mobility and Behaviour
7. Quality of Life

All the research questions, except question 7 (about scooter prevalence) required answers from the interviews. Topics 1 and 2 answer Research Question 1 (Why some people choose to use mobility scooters and others do not?) and Research Question 4 (If the reason for not using a scooter is "I do not need one", what do they consider "needing" a scooter to mean/would they choose to use one if they did need it/when would they perceive themselves needing one). Topic 3 answers Research Question 2 (Do non-scooter users' perceptions of using mobility scooters match the experiences of mobility scooter users?) and helps to answer Research Question 4. Topic 4 provides information to help answer Research Questions 1, 3, 4 and 5. Topic 5 seeks to answer Research Question 8 (What changes in scooter users occur pre and post mobility scooter uptake?). Topic 6 aims to gather information to answer research questions 1, 2, and 4, as well as Research Question 5 (Does using a mobility scooter change the number of trips made outside the house?). Topic 7 seeks to provide additional information to Research Questions 1 and 2, and to help answer research question 6 (Does using a mobility scooter change a person's perception of their quality of life?).

3.2.4   Formulating Interview Questions

From the topics created above, the interview questions were formulated and then revised following the structure set out in Figure 3.1. As the questions were reviewed and revised, a number of different iterations of the interview questions were made. In the first iteration (Appendix C) of the interview questions, the interview questions were written under each research question to ensure that the questions mapped on to what was trying to be answered.

3.2.5   Reviewing and Revising the Interview Questions

In the second iteration of the interview, questions were then reviewed to ensure they covered all the research questions and that they were phrased correctly. In this iteration, the questions were reformatted from being written under the research questions to being sectioned into topic headings. Some of these matched the topic headings in the original interview topic list but some

were different. Additional questions were added, as well as a series of questions for stakeholders. The questions were reviewed by the author and by members of the University College London Accessibility Research Group. The Accessibility Research Group consists of academics, researchers and doctoral students researching matters of accessibility in the built environment. They were asked to assess whether the questions were comprehensible and whether they felt the questions would answer the research questions they were assigned to answer. This iteration is available in Appendix D.

Following the second iteration, the interview questions were reviewed and revised again. In this third iteration, the questions were reviewed to ensure (a) the language used was comprehensible and relevant for the interviewees, (b) there were no leading questions or questions revealing interviewer bias, and (c) the questions would invoke answers that were likely to help answer each of the research questions. As a consequence of this process, some questions were reformatted. The questions that were altered were:

The question,
> *What sort of difficulties do you have travelling around?*

was changed to
> *How do you find travelling to these places?*

The later version of the question did not lead the interviewee into a negatively connotated answer. Where the answer was negative or positive (or both), the interviewer was able to probe for more detail rather than having only negative aspects revealed because of the leading question.

On review, a question was found to be affected by hidden assumptions. This was changed so that the interviewee could answer more openly. Therefore the question:
> *Tell me about why you decided to get a scooter?*

was changed to
> *Tell me about why you got a scooter?*

as the first version assumed the interviewee made the decision themselves to get a scooter, whereas the decision might not have been theirs (for example, they could have been given it by a relative/friend/carer).

One question that occurred in both the users and non-users question list was altered to make them more standardised to ensure that everyone would answer the same question. Questions about trips was changed from:

> *Thinking about the last week, what sort of trips did you make using your scooter?*

to

> *Thinking about the last 7 days, what sort of trips did you make from home?*

A week could be a fuzzy concept that people interpreted differently. In the former version, an interviewee could comprehend the question as meaning the preceding week, or the preceding days in the current week (Monday through Thursday if interviewed on a Friday). This could mean that the answer could refer to anything between 2 days and 10 days. The change to "7 days" meant that no matter what day the interview was held on, everyone would be able to answer the question with the same understanding. The inclusion of 7 days versus asking about 2 days or 10 days was so that all days of the week were included (weekend days versus weekday days have different patterns of travel even for people who are retired), whilst not asking for more data than could be recalled.

The individual characteristics questions were moved to the end of the interview. This was done as some research suggests that these questions should not be at the beginning because the interviewee responds better when the questions that are at the heart of the research come first (Bryman, 2012). This means that interviewees understand the topics of interest at the start of the interview (rather than perceiving a seemingly random series of questions) and that the most important questions are asked before the interviewee is fatigued. General questions were placed ahead of more specific questions so that the answers to the specific questions did not influence the answers to the

general questions. This also helped to ensure that interviewees understood the questions.

3.2.6 Interview Questions Pilot

In the formulation and revision stages, the questions were again examined by colleagues to assess whether there were any leading questions. The questions were given to three different colleagues (two researchers and a postgraduate student) who all had experience of holding structured interviews. They were asked to look for any incomprehensible questions and give any other feedback on how the questioning might affect the interviewees. In addition, the first interview in each category of user was considered a pilot. After the pilot interviews, no changes were made to the interview questions. One pilot interviewee noted that whilst completely comprehensible, a faster speed of talking might be difficult for some interviewees to understand and therefore a note was made to speak slowly and clearly for all interviews to avoid having to repeat the questions asked.

3.2.7 Finalise Interview Questions

The final version of the interview questions is shown below. In the scooter user interview questions, all the listed questions were asked to all interviewees. In the non-scooter user interview questions, most questions were asked to all users. However, some questions would be dependent on the answer to the *"what are the main reasons you do not use one?"* question. For example, if the respondent stated they do not use a scooter because they were too expensive, they would be asked a follow-up question of *"If a scooter was made available to you for a low price or for free, would you use a scooter?"* However, if their reason for not using a scooter was not related to expense, then this follow-up would not be asked.

Interview Scooter Users: Interview Questions

A. Views on Scooters

1. Tell me about why you got a scooter.

2. For you, are there advantages of having a scooter?
    If yes, can you tell me what these are?

3. For you, are there disadvantages of having a scooter?
    If yes, can you tell me what these are?

4. Has having a scooter met your expectations?

5. Under what circumstances should someone consider using a mobility scooter?

6. What difference has using a scooter made to your life?

7. What kind of impact, if any, do you feel having a scooter has had on your quality of life?

8. Would you encourage people to use a mobility scooter?
    If yes, what do you think would encourage people to use a mobility scooter?

9. In what circumstances should someone consider using a scooter?

B. Travelling around

10. Thinking about the last 7 days, how many days did you make a trip using your scooter?

11. Thinking about the last 7 days, how many days did you make a trip using public transport?

12. Thinking about the last 7 days, how many days did you make a trip by foot?

13. Thinking about the last 7 days, how many days did you make a trip in a car or taxi?

14. Where did you go?

15. How long?

16. Did you go to these places before you got your scooter?

17. Is there anywhere you would like to go on your scooter but currently can't?
    Why not?

18. Think about the amount of physical activity (any exercise incl. walking) that you do now. How does this compare to the amount you were doing before you got the scooter.
    If changed – why?

C. Access to Scooters

19. Where do you store your scooter?

> *Did you have to move or create space?*
> *If in flats – store in communal space?*

20. People come by their scooter in different ways. Some people are loaned a scooter from a local scheme, other get a grant to help them buy one, others pay for theirs outright. How did you acquire yours?

D. Perceived Health and Quality of Life

21. How is your health in general? Would you say it was…

> *Very good*
> *Good*
> *Fair*
> *Poor*
> *Very Poor*

22. How is your Quality of Life in general? Would you say it was…

> *Very good*
> *Good*
> *Fair*
> *Poor*
> *Very Poor*

23. How important to your quality of life is your ability to get around outside your home?

> *Very important*
> *Important*
> *Somewhat important*
> *Not very important*
> *Not important at all*

E. Individual Characteristics

24. Age:
25. Gender:
26. Mobility Aids Used (and frequency):
27. Incidence of Falls in last 18 months:
28. Transport modes used:
29 Illness:
30. How long have you had a scooter?

Interview Non-scooter Users: Interview questions

A. Level of mobility
1. You have told me previously that you travel by foot/Public Transport/car and that you do/do not use a walking stick. Is this still the case?

   If not, what has changed since then?

B. Travelling around

2. Thinking about the last 7 days, how many days did you make a trip using public transport?

3. Thinking about the last 7 days, how many days did you make a trip by foot?

4. Thinking about the last 7 days, how many days did you make a trip in a car or taxi?

5. Where did you go?

6. How do you find travelling to these places?

7 Is there anywhere you would like to go but currently can't?
   Why not?

C. Views on mobility scooters
8. What do you think of mobility scooters?
   Dis/Like them
   See them in/frequently
   What do they know about them?

9. Have you ever considered using a mobility scooter?

10. What are the main reasons that you do not use one?

11. If do not need….. Do you think there are any circumstances where someone should consider using a scooter?
   If no, why not?
   If yes, what are they?
   If yes, would you use one in these circumstances?

12. If expense is a barrier… If a scooter was made available to you for a low price or for free, would you use a scooter?
  If no, why not?

13. If storage is a barrier…. If you didn't have to store your scooter at home but could be lent one or if storage space could be found for you, would you use a scooter?
  If no, why not?

14. If storage is a barrier and there is a local scheme in place… Did you know Scoot-ability/Shopmobility run a scheme where you can borrow a scooter?
   o Have you used?
   o Would you consider using?
     If not, why not?

15. Do you think there would be any advantages for you personally using a mobility scooter?

> *If yes, what would they be?*

16. Do you think there would be any disadvantages for you personally of using a mobility scooter?

> *If yes, what would they be?*

17. [Ask only if they haven't said they do not need one] If you had a scooter today, how much did you think you'd use it?

D. Barriers to use
18. Do you think there are barriers to using a mobility scooter?

> *If yes, what are they?*
> *If yes, what do you think would help overcome these?*

E. Perceived Health and Quality of Life
19. How is your health in general? Would you say it was…

> *Very good*
> *Good*
> *Fair*
> *Poor*
> *Very Poor*

20. How is your Quality of Life in general? Would you say it was…

> *Very good*
> *Good*
> *Fair*
> *Poor*
> *Very Poor*

21. How important to your quality of life is your ability to get around outside your home?

> *Very important*
> *Important*
> *Somewhat important*
> *Not very important*
> *Not important at all*

F. Individual Characteristics
22. Age:
23. Gender:
24. Mobility Aid:
25. Incidence of Falls in last 18 months:
26. Transport modes used:
27. Illness:

3.3 Interview Approach

3.3.1 Ethics

An amendment to the original project's ethics application was made to allow for the interviews and the questionnaire. This was granted (UCL Project ID 3351/001).

3.3.2 Recruitment

Choosing an appropriate sample size for qualitative studies is often arbitrarily reached (Marshall et al., 2013), with a minority of qualitative research showing why they chose the number of interviews they use. Indeed, the literature on interview sample size is scarce (Marshall, Cardon, Paddar & Fontenot, 2013; Mason, 2010). It can be argued that in qualitative research, the number of interviews is not significant, it is about the process of gathering information and that more data does not necessarily lead to more information (Mason, 2010). In addition, interviews and their analysis are labour intensive and therefore a large sample is often impractical (Mason, 2010). Other research argues that the number of interviews overlooks other important factors, such as the duration of interviews (Onwuegbusi & Leech 2007). In Chapter One, it was shown that the recruitment of mobility scooter users was very difficult. To achieve the desired number of participants for the interviews purposive recruitment was used. Purposive recruitment is a style of participant recruitment whereby potential participants are targeted non-randomly to fit a specific criterion, in this case those that use mobility scooters or stakeholders who liaise with mobility scooter users. After a number of interviews have occurred a data saturation point may be reached. Data saturation is where additional data does not add any more information. When coding, data saturation is reached when no more codes are being added. Estimates at when data saturation occurs vary across studies and styles of analysis. Guest, Bunce & Johnson (2006) found that data saturation occurs after 12 interviews, whilst Marshall et al (2013) suggest 15-30 interviews is appropriate. Mason (2010), examined PhD studies in the UK where interviews took place and found that

where content analysis of interviews took place, the range of people interviewed ranged from 2 to 70, with a mean of 28 interviews.

It was estimated that the interviews would be quite long; the two pilot interviews took 45 minutes and 1 hour. Therefore, a large number of interviews was not appropriate. In order to have enough data to fully explore the issues without gathering more data than was practical to examine, a sample size of 30 was chosen, with at least 12 interviews each of non-scooter users and scooter users. This target meets the recommended criteria of both Guest et al (2006) and Marshall et al (2013). A smaller number of stakeholders (four) would be approached to be interviewed. The reason for a smaller sample here is that only a single research question (Research Question 3) needed stakeholder interviews.

All the participants in the initial longitudinal study were approached to be interviewed. Participants in this group made up the entire non-scooter user interviewees. The scooter users were more difficult to recruit. They were recruited from a number of sources. Firstly, the two participants in the initial longitudinal study who were scooter users were approached to be interviewed. Secondly, any people who applied to be part of the initial longitudinal study but were rejected because they already used scooters were re-approached to be interviewed as a scooter user. Thirdly, an advert was placed on the TARSAN website[9] and this was tweeted on the TARSAN Twitter feed and retweeted by three other Twitter groups. Fourthly, scooter users on the streets in London were approached and given an advert for the interviews. Fifthly, the transport executives of the UK Age Action Alliance[10] were given adverts for the interviews and were asked to pass these on through their networks. Finally, all interview participants were asked if they

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[9] TARSAN, Transport Accessibility Rehabilitation Services Advisory Network, is a user advisory network of people interested in participating in accessibility research.
[10] Age Action Alliance is a network dedicated to improving older people's quality of life by bringing together older people and cross sector organisations.

could pass on the details of the project to anyone they knew who were scooter users.

Stakeholder recruitment was achieved through different sources. Firstly, contacts within the Department for Transport, Transport for London, Transport for All, AgeUK, Rica, the UK Age Action Alliance and the International Longevity Centre were contacted and asked if they knew people within their organisations and networks who worked with or around mobility scooters. Secondly, colleagues within the Centre for Transport Studies were approached to see whether they had contacts that might be relevant. Finally, the managers of Shopmobility centres across England were contacted.

3.3.3 Equipment

Where permission was given, interviews were recorded. This was done using a computer software recording application. Additional notes were taken at the time of interview to record context and non-verbal cues that audio recordings would have missed. Where permission to record was not given and interviews were not recorded, the interviewer took detailed notes including key phrases verbatim. After each interview the recorded interviews were fully transcribed. The non-recorded interviews were described as fully as possible. The four stakeholder interviews were not recorded. Additionally the sound on the recorder failed for four of the interviews. For the stakeholder interviews, permission to record was not granted so thorough notes were taken during the interview with additional notes taken immediately afterwards. For the interviews where the recording failed, this was discovered immediately and therefore notes were taken immediately after this occurred to supplement the notes that were taken at the time of recording.

3.3.4 Interviewer

One interviewer carried out all the interviews. Interviewees were able to bring someone with them if they felt uncomfortable being interviewed on their own. This happened on two occasions. In both cases the additional person partici-

pated in the interview. Where their comments have been included in the results they have been acknowledged as the partner of the person who was sought to be interviewed (see section 4.3). Participation of the additional person, in one case, was by contributing their own experience of their partner using a mobility scooter. In the other case the additional person offered their partner some translation into English of words they wished to use to express themselves better. Whilst the interviewer could not confirm whether the translation was accurate, a rapport with both of the participants had been created prior to the interview through several previous visits and there is no reason to doubt the additional persons translation. In both cases, the original participant was not interrupted or corrected in what they said by the additional participant. They were not observed looking to their partner for the "answer" to a question and did not appear anxious or uncomfortable with the additional participant. Therefore the additional participant in these two cases is unlikely to have affected the findings.

Where the interviewer did not feel comfortable with interviewing the participant on their own, a chaperone was present. This happened on two occasions. In these cases, the chaperone was another PhD student with experience in interviews and in non-verbal communication. In both cases, the chaperone was introduced to the interviewee and their presence explained as an observer. In order to limit the influence of the chaperone on the results, the chaperone did not participate in the interview.

3.3.5 COREQ

In qualitative research it is critical that every aspect of the research process is documented and reported. This allows others to understand what the process was and to be able to replicate it. COREQ (Consolidated Criteria for Reporting Qualitative Research) is a reporting criteria checklist that lists all the components of the method that need to be reported (Tong, Sainsbury & Craig, 2007). A completed COREQ checklist for this project is attached in Appendix E.

3.3.6 Trustworthiness

Trustworthiness is important to be able to demonstrate in any piece of qualitative research, in particular the credibility, transferability, dependability and confirmability of the research. Trustworthy can be defined as honest, reliab;e or dependable. In a qualitative research setting trustworthiness ensures the findings are consistent and could be repeated and or have applicability in other contexts. It also gives confidence in that results are credible and have been shaped by the participants rather than by the researchers (Shenton, 2004). The process outlined in 3.2.2 – 3.2.7 aimed to ensure the dependability and confirmability of the research, that the interviews were non-leading and allowed issues to be raised by the interviewees rather than the researcher. In order to improve the credibility of the research It was important that the rapport between the interviewer and the interviewees was sufficiently relaxed to encourage the interviewees to be comfortable enough to tell the truth and professional enough so that they trusted the researcher. At the beginning of the interviews the researcher gave a statement to each interviewee to explain the purpose of the interview and how the interview would run. Included in this statement were the following words.

> *" Please try to answer each question as honestly as you can. There are no right or wrong answers – the important thing is for you to share your experiences and opinions. I will be recording the interview and taking notes to make an accurate record of what is said. This will be kept confidential. I will not disclose any information that can be identified with you, nor connect your name to any information that is presented"*

This was included to encourage interviewees to be honest in their responses. After the interviews were transcribed, laughter was shown to be a frequent occurrence in the interviews. This demonstrates the comfort and rapport between the interviewer and interviewees.

3.4   Interview Data Analysis

3.4.1   Rationale of Analysis Method

There are two parts to progressing from transcripts to results; data extraction and data analysis. The methods that can be employed to get to the results

are numerous and depend upon the nature of the data involved, the type of data and the time/resources available. A content analysis approach to the interview data was chosen to extract and analyse the data. The reasons behind this choice of approach are outlined in the following section.

There are two main approaches to analysis, a deductive approach and an inductive approach. The deductive approach is used where there are already specific questions that need to be answered. In this case, the researcher was looking to group the data under those question headings and look for similarities and differences. The inductive approach looks at the data without preconceived ideas and allows themes and theories to emerge from the data. Data extraction and data analysis can be carried out together or separately depending on the method of analysis. In terms of analytical approaches, there are: discourse analysis, grounded theory, framework analysis, thematic analysis, narrative analysis and content analysis.

Discourse analysis is an inductive approach that focuses on the words and phrases used by the interviewee that can illustrate the individual's perspectives. This is most suited to analysing media content.

Narrative analysis is an inductive approach that uses the data to create narrative stories about the person being analysed.

Grounded theory is an inductive approach that is a continual cycle of coding, analysing, recoding and analysing until the researcher feels the cycle has been saturated. This is a useful approach where topics have never been studied before and the researcher is unsure where the focus of study should lie.

Framework analysis is a deductive approach. It separates data extraction and analysis into separate tasks that are done one after the other, as opposed to a continual refinement of content analysis and grounded theory. In framework analysis, data is put into a matrix (by short paraphrasing rather than verbatim) of case by theme. Analysis is achieved

by comparing and contrasting across themes and/or cases. The aim of this analysis is to describe "what" is happening rather than to answer "why" it is happening.

Content analysis is an inductive approach in that it generates its codes, categories and sub-categories from the data itself rather than from specific research questions. In this approach, there is a continual re-finement of the codes used in a similar fashion to framework analysis.

Thematic analysis is a type of content analysis that is used to describe a person's experiences and uses this to explain why situations happened as they did.

The research in this thesis is a new area of research and so far it has not been possible to identify any previous research on this topic that has been published. No hypothesis has hitherto been created as to whether differences or similarities exist between scooter users and non-scooter users and there are no theories as to what scooter users experience with their scooters. Therefore, the aim of the data analysis is to explore the research area and to pull out the key themes rather than having themes taken from the research questions. Therefore, the extraction and analysis of the data collected for this project must take an inductive approach.

Neither discourse analysis, narrative analysis nor thematic analysis is suitable in the context of the data gathered here as each seeks to describe the data in ways that would not answer the research questions. A narrative and thematic analysis would focus on the individual's experiences rather than on whether there are themes in experiences across individuals. A discourse analysis would focus on the words used rather than their answers as a whole. The open nature of the grounded theory approach means that it would not be a suitable method of answering the specific nature of the research questions. Content analysis is the most suitable approach for the data and the research questions because it is structured to allow a replicable way of extracting data whilst being sufficiently flexible to allow themes to emerge from the data.

3.4.2 Content Analysis Method

In order to keep the analysis method used as clear and as replicable as possible, a structured plan was adopted. This structure was outlined in Hsieh and Shannon (2005) as the structure for content analysis and is shown in Figure 3.2.

Familiarisation
Read Fieldnotes
Reread transcripts
Listen to Audio

Initial Coding
Generate possible codes from Research Questions
Generate possible codes from four interviews (by hand)
Generate possible codes from four (diffferent) interviews (Nvivo)

Final Code List
Create a combined table of codes
Remove duplications
Combine similar codes
Check codes are neither too broad or too narrow
List operational rules for codes

Code all Interviews

Charting
Categorise codes into key themes and subthemes
Map relationships between categories

Interpretation

Figure 3.2: Process for Content Analysis (Hsieh & Shannon; 2005)

3.4.2.1   Familiarisation

After every interview, fieldnotes (notes about the interview and its context in the interviewee's life) were written. During the familiarisation stage, the interview transcript and the fieldnotes of each interview were read multiple times. The aim of familiarisation was to get to know the data in great detail, so that themes or relationships were not missed later on.

3.4.2.2   Initial Coding

In order to come up with a complete list of codes[11] for analysing the interviews, a series of lists of codes was created. First, a list of codes was created from the research questions and pulling out what responses the research questions might elicit. Secondly, a list of codes was created from an initial coding that was carried out by hand on four interviews (two scooter users and two non-scooter users). For these four interviews, the transcripts were printed out and each line of transcript was numbered. The text was read line by line and code or codes were assigned to each line of text. These codes were derived directly from the interview text. The text the code referred to was highlighted and these codes were then annotated in margins. Thirdly, a list of codes was created from an initial coding using Nvivo software of four interviews (two scooter users and two non-scooter users). Again, these codes were derived directly from the four interviews being used. From this process, three code lists were produced (Appendix F).

3.4.2.3   Final Code List

The three lists of codes were combined to form a large list of codes. This generated a large list of over 100 codes. Duplications were removed. The full list of codes was examined and categorised into a smaller list

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[11] In qualitative analysis a "code" is a word or words that represent the meaning of the text that has been marked.

of codes (Appendix G). Some codes were too narrow so a broader code was used, which replaced several codes. For example four codes, "difficult to walk up hills", "difficulty walking", "difficulty with steps" and "discomfort when walking" were combined under "mobility problems". In this process, four codes were dropped and three were added. The codes "positive" and "accessibility" were not included in the final code list. Both of these codes were generated when thinking about the research questions, and the responses of the interviewees were far more specific than these codes. "Accessibility" was not generated from coding the interviews, however, many times the issue of accessibility of buildings and footways was raised but these were coded under other codes (for example built environment positives and built environment negatives).

Three codes were added to the list of codes that were not previously generated. These were added as antonyms for some of the included codes. For example, "bad health", and "built environment positives" and "good health" and built environment negatives" added. These were added as their corresponding codes were frequently used in the initial coding and it was hypothesised that these might occur in further analysis.

The result of this process left 41 codes (Appendix H). Once the final code list had been created, a definition for each code was written so it was clear what could be coded under each code (Appendix I).

3.4.2.4 Coding All Interviews

The coding was completed using Nvivo software (version 10.1.0 (1179)). All interviews were coded, including those interviews that had been coded in the previous session, in which case they were recoded. Whilst coding, a line of text would elicit a topic that was not listed in the codes created. In this case, a new code and operational definition was added to the list. When this occurred, the previously analysed interviews were re-examined to see if this new code applied to them. This only happened once. The additional code was "use of wheelchair", where interviewees mentioned using a wheelchair.

3.4.2.5   Charting

Once all the interviews had been coded, the codes were then examined. Firstly, all the codes were examined, looking at frequency of reference (by source as well as by frequency of citation). The most highly cited codes were identified as themes. Secondly, the codes and the relationships between them were mapped. One of the easiest methods of looking for relationships is visually (Bryman, 2012). This allows for ease of reordering as relationships become apparent. In this case, the process was done by placing the codes on paper and physically moving them around. This mapping brought out the key themes: benefits; drawbacks; barriers; consideration; and regulation. The full maps showing the relationships between the codes under these themes are shown in Chapter 4 (see section 4.4).

3.4.2.6   Quasi-Quantification

Two schools of thought exist in relation to the quantification of qualitative data. The first school of thought is that qualitative data is about constructing social realities, in this case of people with declining mobility who use or do not use mobility scooters. This school of thought believes that the emphasis of qualitative research is on discovery rather than generalisability, and as such, quantitative analysis has no place (Guba and Lincoln, 1994). The second school of thought says that some quantification of qualitative research allows the relative frequency of the issues being raised to be acknowledged (Silverman 1984).   This can show which issues were being raised by multiple interviewees rather than single interviewees, which has implications as to the issues that need to be addressed more urgently.

Whilst it was felt that any quantification of the interview data did not equate to generalisability and that the social realities discovered were of more importance, some quantification of codes was carried out in this research. This was done so that the issues which were important to more interviewees could be highlighted over those only important to a few.

3.5 Questionnaire

The questionnaire was created to better understand mobility scooter users, their experiences using scooters, and their needs. Specifically, the questionnaire was needed to help answer research questions 1, 2, 5 and 8. In addition to answering these questions, some information on the characteristics of the respondents was asked in order to understand what type of scooter users had responded; this was important to see how much these respondents differed from those that were interviewed.

As with the process for creating the interview questions, it was crucial that the questionnaire was created to answer the research questions and elicit users' perspectives without creating any bias in the responses. To do this, a similar process to the one described in section 3.2 was used to design the questionnaire.

3.5.1 Questionnaire Questions

The topics of the research questions that could be answered using a questionnaire were listed alongside a list of personal factual information that would be useful.

Topics
Advantages and Disadvantages of using a mobility scooter
Number of Trips taken outside the house
Reasons for using a mobility scooter
Changes after taking up a mobility scooter

Personal Factual Information
Age
Gender
Mobility level
Scooter user (length, frequency and reliance)

Figure 3.3:Research Question Topics and Personal Factual Information to be gathered

3.5.2 Formulation of Questionnaire Questions

Questions that encapsulated the topics listed in Figure 3.3 were created. Whilst closed questions are easier to answer, reduce respondent fatigue and help produce a higher response rate (Bryman, 2012) they do not allow for the respondents to give any context or perspective. Therefore a questionnaire with a mixture of open and closed questions was created.

3.5.3 Reviewing/Revising Questionnaire Questions

Each question in the draft version of the questionnaire (Appendix J) was reviewed for questions that were too long, that were ambiguous, that were leading, or that were double barrelled. In addition, all questions were examined to see what kind of responses they would elicit, i.e. the author asked themselves, *"how would I respond to the question?"*.

The sequence of the questions was reordered. The aim of this was not to overwhelm the respondent at the beginning of the questionnaire and not to leave important questions to the end when fatigue may occur. An introduction and acknowledgement was added to explain the purpose of the questionnaire, as well as details about the origin of the questionnaire and data protection. The questionnaire was also spaced to be easier to read. The resulting second draft of the questionnaire created is shown in Appendix K.

3.5.4 Piloting the Questionnaire

The next stage of the questionnaire's creation was to have it reviewed by other members of the Accessibility Research Group and piloted. This stage resulted in the addition of one new question. Question 17 (*Are there any other comments you would like to make regarding your use of your mobility scooter?*) was added to ensure that any perspectives that the respondents felt had not been represented in the questionnaire could be included. Question 7 was reworded and formatted as it was found to be unclear. Finally, Question 16 was reworded and made into a question with age brackets. It was felt that some people do not like to give their age, therefore it was altered to make the

questionnaire less personal whilst still being able gather age demographics. A larger font was used to make it as readable as possible. The final questionnaire is shown in Appendix L.

3.5.5 Implementation

The questionnaire was distributed in a number of settings. It was given out at the annual national Mobility Roadshow held in Peterborough[12], in a local Shopmobility franchise in Reading[13] and to contacts within the UK Age Action Alliance. It was given out only to people who owned and used mobility scooters. The questionnaire was anonymous and was returned via a post-paid envelope. Over 100 questionnaires were given out and a total of 38 questionnaires were returned.

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[12] A city in the East of England
[13] A city in the South East of England.

4. Results

The results of the three research methods have been laid out in this chapter. The first section of the chapter examines the results from the analyses carried out on the ELSA database. The second section of the chapter details the results from the questionnaire. The third section of the chapter details the results from the interviews.

4.1 ELSA Results

4.1.1 Prevalence

The number of older adults over 65 using mobility scooters is small but is increasing. In 2003, 1.4% of over 65-year-olds used mobility scooters, but this had doubled to 2.8% by 2011. Using ONS population figures, this means that 240,000 over 65-year-olds used scooters in 2011 (ONS, 2012). Figure 4.1 shows the change in percentage of the older population using scooters by age. The number of users over 65 is increasing faster than all users over 50.
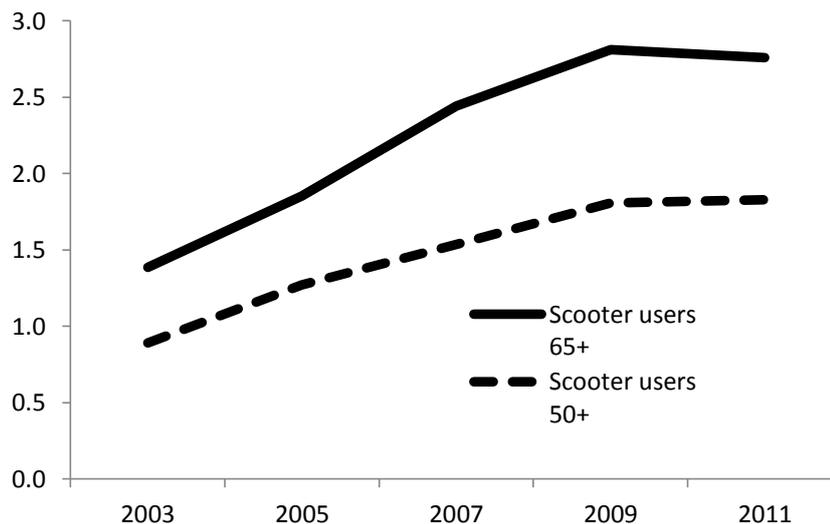
Figure 4.1: Percentage of Scooter users above 50 and above 65 years old from Wave1 to Wave 5 of the ELSA database.

By using ONS population data for the population in each age group, it is evident that although the percentage of scooter users in each age group

dropped in 2011, the overall population increases mean that the number of people using scooters still rose, as illustrated in Figure 4.2.
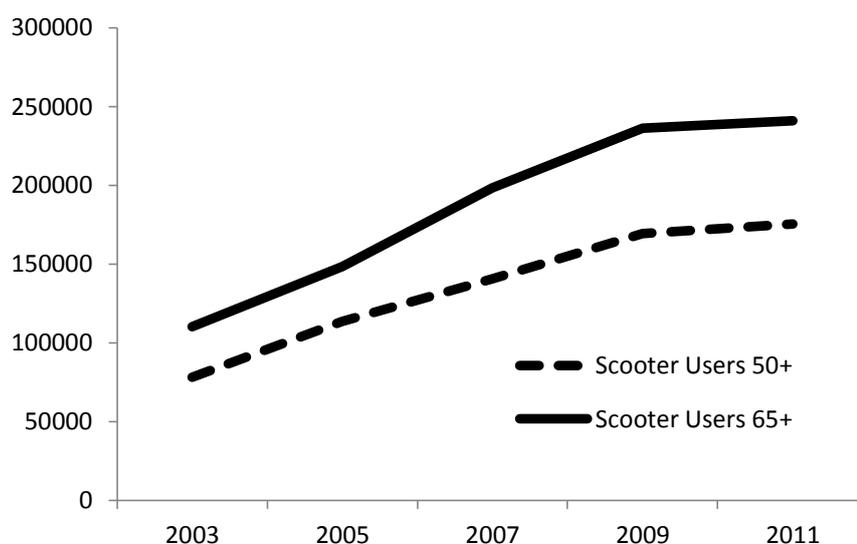
Figure 4.2: Number of Scooter users above 50 and above 65 years old using ELSA data and ONS population estimates

Table 4.1 shows the percentage of men who use scooters. The number of men using scooters is slightly lower than the number of women. However, given there are fewer men over 65 in the general population than there are women, this percentage does not indicate any gender differences. For every 100 women over 65 there are 79 men (ONS, 2010).

Table 4.1: Gender breakdown of those who use scooters taken from Wave 1 to Wave 5 of the ELSA database

Year	Percentage of men	Percentage of women
2003	46.75	53.25
2005	45.45	54.55
2007	48.15	51.85
2009	43.88	56.12
2011	41.43	58.57

Most people who use a scooter also use additional mobility aids. The frequency of using additional aids or the type of additional aids does not appear to follow any trend across the years. The walking stick or cane is the most common aid used, with between 71% and 84 % using one. The number of people who also use a manual wheelchair varies between 23% and 39%. Table 4.2 below shows the percentage of users who use each type of mobility device.

Table 4.2: Percentage of scooter users using additional mobility devices

	Walking Stick	Walking Frame	Manual Wheelchair	Electric Wheel-chair	No other mobility aid
2003	77.9	23.4	39.0	3.9	9.1
2005	72.7	26.1	22.7	4.6	8.0
2007	71.3	24.1	27.8	6.5	12.0
2009	75.5	28.8	32.4	9.4	10.8
2011	83.6	29.3	30.7	5.7	7.9

4.1.2   Scooter users: Changes pre and post uptake

As described in section 3.1, scooter users who did not use a scooter in the first wave of ELSA but began using one in the following waves were identified and were examined for changes to their responses to questions across the remaining waves of the study. A series of paired samples t-tests and cross-tabulations were carried out on the scooter user scores on different variables to look for changes to the scores over time as the users continued to use their scooters. Where scooter users stopped using scooters, their data was included only up to the point at which they stopped using the scooter.

Lower Body Strength (Chair Rises)
Scooter users were slower to complete five chair rises after uptake of scooter use, compared with before. A paired samples t-test was conducted to compare chair rise times before and after scooter uptake. Although the time taken

to complete five chair rises was slower after the individuals had started using scooters, (x̄=15.13 seconds before uptake versus x̄= 17.95 seconds post uptake), this was not found to be significant (t(9) =-1.91, p=0.88).

Physical Activity

In terms of the ease of undertaking physical activity and the amount that they undertook, there is a mixed picture for scooter users. As shown in Table 4.3, after people started using a scooter, most users either experienced no change in the difficulty they had walking or experienced increased difficulty. Perhaps as a result of this difficulty, the levels of physical activity achieved also changed post scooter uptake (Table 4.4). Although it was more common for scooter users to increase their levels of mild physical activity once they used a scooter, the amount of moderate activity they took part in declined. However, this result must be tempered with the evidence that over half of scooter users made no change in the amount of moderate physical activity they undertook, and a third made no change in the mild physical activity they undertook.

Table 4.3: Change in difficulty of walking after mobility scooter uptake.

Difficult walking	Percentage
Increased difficulty	41
Reduced difficulty	13
No change in difficulty	46

Table 4.4: The percentage of scooter users who change their level of physical activity level after mobility scooter uptake.

	Less Active	More Active	No Change in Activity
Mild Physical Activity	21	47	32
Moderate Physical Activity	31	15	54
Vigorous Physical Activity	5	0	95

4.1.3 Scooter Users versus Non-scooter Users: pre and post uptake

As described in Chapter 3, section 3.1, the scooter users identified above were matched with non-scooter users who had similar physical functioning levels before uptake. The ability of scooter users to achieve physical tasks compared to non-scooter users is mixed. Before uptake, the groups had no significant differences (at 0.05 level) in mild, moderate or vigorous physical activity. After uptake, there were no significant differences (at 0.05 level) in mild or vigorous physical activity levels, but there was a change in the level of moderate exercise (Table 4.5). An analysis of the changes to moderate exercise made (less activity, more activity, no change in activity levels) found scooter users were more likely to change their exercise levels over time and were more likely to exercise less than non-scooter users.

Table 4.5: The percentage participating in moderate physical activity after scooter users have started using a scooter compared with non-scooter users across the same timeframe

	Moderate Physical Activity After Uptake	
	Regular	Rare
Scooter user	18	82
Non-scooter user	64	36

Chi square = 28.301, df=1, sig = <0.01

There were no significant differences in self-reported health, BMI or grip strength between scooter users and non-scooter users before or after scooter uptake. There were significant differences in the level of difficulty walking, and the level of lower body strength after uptake where there were no differences before.

Table 4.6: Difficulty in walking one quarter of a mile

	No Difficulty	Some Difficulty	Much Difficulty	Unable To Do This
Scooter user	2 (5%)	4 (10%)	11(28%)	22 (56%)
Non-scooter user	53 (23%)	47 (21%)	40 (18%)	88 (39%)

Chi sq = 11.724, df = 3, sig =<0.01

Table 4.7: Outcome of single chair rise

	Not Able To	Without Arms	With Arms
Scooter user	18 (56%)	11 (34%)	3 (9%)
Non-scooter user	80 (38%)	122 (58%)	9 (4%)

Chi sq = 6.576, df = 2, sig = <0.05

4.2 Questionnaire Results

Over 100 questionnaires were given out and a total of 38 questionnaires were returned. A summary of the characteristics of the responses has been tabled (Table 4.8).

Table 4.8: Showing Characteristics of Questionnaire Respondents

Characteristic	Number of Respondents (%)
Male	19 (50)
Over 65	22 (58)
Use Other Mobility Devices	34 (90)
Walking Stick	27 (71)
Walking Frame	5 (13)
Wheelchair	16 (42)
Owned Scooter 2 Years or More	24 (64)

The majority of participants had been using their scooters for years, with 64% having owned them for at least two years; those who had owned them longer than two years had owned them for an average of eight years. Similar to the

results from the ELSA analysis, mobility scooters were not used in isolation from other mobility devices, with 90% of participants currently using other mobility devices in addition to their scooter (70% of these used a cane and 42% a wheelchair).

4.2.1   Change in the Number of Trips

Most users (69%) felt that they made fewer trips by foot once they owned a scooter. Only 4% thought they made more trips by foot. The length of the trips they made by foot also reduced since they started to use a scooter; 46% said they walked less far, 25% said their trips by foot were the same length, and 29% said they walked further.

4.2.2   Changes Post Scooter Uptake

In comparison to when they were not using a scooter, 56% of participants said they had made no changes to the activities they carried out now that they used a scooter. Scooter users used their scooters on a regular basis, with 15% using their scooter every day, 44% using their scooter most days; and 21% using them once a week.

4.2.3   Reasons for Taking up Scooter

Many of the participants (14/38) cited a medical condition that made walking difficult; the most commonly mentioned was arthritis, but others included myalgic encephalomyelitis (known commonly as ME or Chronic Fatigue Syndrome), multiple sclerosis, a neurological disorder, post polio syndrome and hip replacement. Those who did not cite a specific medical problem stated that walking had become difficult, painful or too slow. Most of the participants cited independence, mobility or the ability to get "out and about" as the advantage of having a scooter.

In the open ended questions, the respondents most frequently cited inde-pendence as an advantage to using a mobility scooter. The most commonly cited disadvantage was accessibility within the built environment.

4.3 Interviews

A total of 32 interviews were carried out. Broken down into groups; 13 non-scooter users, 14 scooter users, and four stakeholders were interviewed. The partners of two of the scooter users were present at the interviews and contributed to the interview of their partner. Their contributions have been included in the analysis, although they were not recorded as participants in the tables below.

Table 4.9: Summary of characteristics of Interview Participants

Interviewee Type	N	Age range	Percentage Female	Use Wheelchair	Other mobility aid
Scooter User	14	55-96	50%	6	13
Non-Scooter User	13	70-86	63%	0	4
Stakeholder	4	N/A	N/A	N/A	N/A

The interviewees have all been given pseudonyms to protect their identity, but the gender of each interviewee corresponds to the gender of their pseudo-nym. In some areas of the text, the number of interviewees being referred to is not explicit. In these cases the words "a few; some; most; or all" are used. These words are defined as follows:

"A few" refers to between three and five interviewees

"Some" refers to between six and eight interviewees

"Most" refers to upwards of nine interviewees

"All" refers to all interviewees

4.3.1 Non-Scooter Users

4.3.1.1 Characteristics of Non-Scooter Users

All non-users were able to walk and walked outside their home, with some using a walking stick. Five participants used a walking stick and the remainder used no mobility aids. Nine of those interviewed were female and four male. They ranged in age from 70 to 86, with a mean age of 80. All were retired. All non-users were found to be classed as "pre-clinically disabled" at the time of the beginning of the initial longitudinal study (see the Glossary of Terms and Chapter 2, and explanation 2.1.3 for definition). None of the non-users had ever used a mobility scooter. All non-scooter users lived in Greater London. The ethnicity of the non-mobility scooter users was predominantly British, however two of the users had different ethnicity; one being from Australasia and one being from the Indian subcontinent. All users lived permanently in England.

Table 4.10: Characteristics of Each Participant (Using Pseudonyms)

	Age	Gender	Scooter User	Other Mobility Devices Used?	Location
Betsey	83	Female	No	Walking Stick	London
Bill	85	Male	No	No	London
Carla	87	Female	No	Walking Stick	London
Daniel	70	Male	No	No	London
Estella	70	Female	No	No	London
Esther	88	Female	No	Walking Stick	London
Harriett	77	Female	No	No	London
James	80	Male	No	No	London
Janet	77	Female	No	No	London
Martha	76	Female	No	Walking Stick	London
Mathew	82	Male	No	Walking Stick	London
Rosa	82	Female	No	No	London
Sally	86	Female	No	No	London

4.3.1.2   Benefits

In order to answer Research Question 2, non-scooter users were asked what they thought the advantages of scooters were, both for the people who used them and potentially for themselves. All non-scooter users had something positive to say about mobility scooters. This centred around users' needs. Most participants felt that scooters were useful to the people that needed them. The words used to describe their value included; "*good*", "*a boon*", "*convenient*" and "*useful*".

> "*They look like a boon to people who are immobile.*" **Martha**

> "*I think it's good for people […] who are physically incapacitated.*"
> **Daniel**

A few participants mentioned their value for independence in enabling people "to get out and about".

> "*It's a good idea, if you can't get out the house, you can't use public transport, I think they're a good thing to get you around.*" **Estella**

> "*I suppose they're doing somebody a lot of good, you know, letting somebody out and about.*" **Betsey**

> "*I know that it's a great thing and it makes people get out and about.*" **Sally**

4.3.1.3   Drawbacks

Footway Space

A few of non-users (four out of 13) mentioned that they felt scooters took up too much space on the footway. None of the non-users talked about the physical size of the scooters, their focus was on the footway. It was unclear from the participants' answers whether they felt the scooters were too big and therefore took up too much space, or whether they felt the scooter users dominated the footway because of the style in which they drove.

"We've obviously got to control them, because they do tend to take up the pavement." **James**

"I'd be taking up pavement space." **Betsey**

"The pavements are so full and there's small children and there's everything, and then one of those comes along and there just isn't the room." **Sally**

Rosa: *When I take my husband out in the wheelchair I find it difficult because people seem to be unaware spatially and they'll all stand and block the pavement around places like the bus stop and the opening to the gardens nearby for the flats. So in a mobility scooter, I could see that would be…*

Interviewer: *The same as you deal with your husband in his wheelchair?*

Rosa: *Yes.*

Speed

A few non-scooter users mention the speed of mobility scooters.

"I think sometimes they go too fast on the pavements." **Martha**

"They're driving them round on the footpaths at high speed, and they're dangerous on the road…and they shouldn't travel any faster than walking pace, i.e. 4 miles per hour…Somebody only needs to stop and turn to look in a shop window, and they'd get cleaned up. It definitely should be restricted to 4 miles per hour." **Daniel**

"There used to be a woman that used to go in the Finchley Road and you'd see her shooting down, oh years ago…. I used to think, God, she takes her life in her hands." **Sally**

Aggressive scooter users

Five of the non-scooter users mentioned that they had observed what they perceived as dangerous or aggressive scooter users.

"I've seen quite a few people using them aggressively – 'Get out of my way' kind of attitude – which I object to. It's interesting, when they're not powered by electricity, people are a lot more patient in getting through a crowd. Give them a powered-up device and… (laughs)… I think a scooter is a bit arrogant, because they're driving them round on the footpaths at high speed, and they're dangerous on the road." **Daniel**

"I think they're a menace." **Betsey**

Accidents

Four non-scooter users reported having been knocked down or nearly knocked down by people driving scooters. None reported any injuries, but they clearly felt wary of them.

"I was knocked over by a mobility scooter…Coming out, the M&S man gave me his hand and took me up but the man who was on the mobility scooter didn't look, backed out and if the man hadn't been holding me I would have fallen right over. Because they back…they back out they do not turn round, they just back up." **Esther**

"I've nearly been knocked down by one." **Betsey**

"I nearly got run over by one. I only escaped damage by leaping in the air – literally. I was so cross, but the poor woman who was in it was in tears, she was so upset, I ended up comforting her. I had come down to a car park, which is quite…It's a shortcut, and it leads down onto a pavement, and I just came down onto the pavement, and out of the corner of my eye, I thought something was hurtling towards me, and as I looked around, it got to me, and I just leapt forward, and she went straight on. If I hadn't leapt, she'd have run me over." **Rosa**

"Well I've seen them because you nearly get run over on the road by them." **Sally**

4.3.1.4   Consideration

During the interview, non-scooter users were asked who they thought should use a mobility scooter, and subsequently they were asked if they needed a mobility scooter, for the reasons they just gave, would they use it and how would they feel about it. Perceptions of people who should use scooters varied from focusing on the needs of the user to focusing on the capabilities of the user.

Most people felt that a level of physical disability in the legs was a justification to use a scooter. The emphasis was placed on allowing the user to move around where they could not otherwise do so freely.

> *"Anybody who can't get out and about really."* **Martha**

> *"Anybody who can't get on a bus or can't walk to their local shop."*
>   **Estella**

A few non-users identified that scooter users should be able to walk, but that a scooter should be considered by people who could not walk far or without difficulty.

> *"People that can only walk a little way. They can get themselves in shops and out of shops, but can't walk much further than that."*
>   **Harriett**

> *"Well, I think they're very useful for somebody who's unable to walk unaided or walk very slowly."* **Rosa**

Capabilities of the User

Some participants were more concerned with the physical capabilities of the person using a scooter rather than the needs of the user.

"Well I think people who have been driving for all their life or whatever and had more sense of direction than I have and are not quite as less sight [sic], *they have got more sight than I have that's the thing, and they must be able to see properly."* **Esther**

"Well, I mustn't sound sexist because I've seen them, confident men and women, I've, sort of, seen the man. I think people perhaps who've done a lot of driving." **Carla**

"Anyone who knows how to use them…So I think anyone who needs one, definitely needs to show…Perhaps have some sort of test?" **Rosa**

Exercise

Not everyone felt that scooters should be considered an option. Two users voiced concerns that anybody should consider using them. Their concern with their uptake was whether the scooter was doing more physical harm by removing all physical activity from the user.

"Nobody, I don't think, I think people should plan that they're not going to use them, that they're going to manage some other way." **Betsey**

Non-scooter users worried that using a scooter would result in a lack of exercise. Five of the non-users talked specifically about this as a concern.

"But maybe the old-fashioned wheelchair, that would give them some exercise, so that actually might be better because if you're just sitting in a chair and you can't move you're not getting much…the exercise of a wheelchair might be better for them I was thinking." **Martha**

"It must reduce their fitness somewhat. So if I had to use a chair, I'd rather use hand-powered." **Daniel**

Scooter users have "given up"

Scooter users having "given up" refers to the perception by many interviewees that people who use scooters had given up on their ability to be mobile. Almost half (six out of 13) of the non-scooter users felt that using a scooter was a way of giving up on trying or being able to walk.

"Often, one of the things that strikes me is that big fat people would use them – it's as though they're doing a real copout on life." **Daniel**

"Well, I can't think that they're doing the people who use them an awful of lot of power of good. I mean, they seem stolidly stuck in them." **Betsey**

"Well, I don't know really. I suppose if you need it, you need it, don't you? So I suppose there's no shame in it. Because I feel as though I've let myself down and, yeah, I'm getting well past it. The fact that I need it. I'd feel as though my body was giving up." **Mathew**

"I could see it would be useful, no that's not true, because you should really keep moving […] so I don't know they're really playing a very good purpose in some ways, but I think it's become a way of life in some ways […] I've seen people like this sitting in them. I think that they're not helping to move really." **Sally**

"I think it would be a backward step if, as soon as you have any difficulty at all, you go on a scooter, a mobility scooter. Because walking is a mindful form of exercise and it is one that most people can do to some extent. And health-wise, even my husband, who is on crutches." **Rosa**

Personal consideration

For many of the non-scooter users, the idea of needing a scooter was not a positive prospect. For some (Martha, Daniel, Mathew), it was seen as a loss of mobility, which they would be disappointed in. For Mathew and Daniel it was seen as a loss they could avoid and therefore one they perceived they would acquire with a sense of shame. Others were more pragmatic about the idea, but still viewed it negatively (Betsey, Bill, Estella).

"Well, it's that loss of mobility, I think it must be very hard to bear. I would find that very depressing." **Martha**

"I think it's the first sign of letting go [of] your own physical health…I'd rather go into a hand-propelled wheelchair." **Daniel**

"I feel as though I've let myself down…as though my body was giving up." **Mathew**

106

> *"I suppose if I had to use one I'd be very grateful for them, but I'm hoping I won't have to have to have one."* **Betsey**

> *"Well, I wouldn't do it unless I had to do it."* **Estella**

> *"I'd accept it that this is what I've got to do then. You know, if it was the only way to get about or something like this, that would be just as simple as that."* **Bill**

> *"I have no confidence in steering it, in avoiding other people, and going up and down if you have to go up and down any kerbs."* **Carla**

Only two people viewed the prospect of using a mobility scooter with a positive perspective, but even one of these people countered it with a negative perspective.

> *"Well I would be able to visit more places."* **Esther**

> **Sally:** *"Well if I really needed one, I don't know why I'd need one, but it may arise and then I think it must be rather nice! But I wouldn't like it."*

> **Interviewer:** *"Why wouldn't you like it?"*

> **Sally:** *"Because you're depending on somebody else, I mean if you really are needing one then you're very dependent."*

A few participants' perceptions of who should use a scooter matched with their own capabilities, yet despite this they did not see themselves needing a scooter. The following extracts from Harriett's interview reflect this.

> **Interviewer:** *"Who do you think should consider using a scooter?"*

> **Harriett:** *"People that can only walk a little way. They can get themselves in shops and out of shops, but can't walk much further than that."*

> **Interviewer:** *"Have you ever considered using a mobility scooter?"*

> **Harriett:** *"No."*

> **Interviewer:** *"Why not?"*

> **Harriett:** *"I don't think I'm ready for it."*

Interviewer: *"In what sense are you not ready for it?"*

Harriett: *"I can still walk quite a distance – with public transport, of course."*

However, later on in the interview.

Harriett: *"I can't walk for too long. So when we went on Monday to Wisley, which is a big Royal Horticulture Society garden place, I couldn't go round the gardens, because I knew that it was too far – I'd be too long on my feet. We went round the plant houses, and then we went round the shop, and then we sat and had a coffee, but I knew I couldn't do the actual gardens themselves, big area of gardens – I couldn't do that. I can't go anymore to the Ideal Home Exhibition. I could do, but I'd always be sitting down and standing up, sitting down and standing up. That's a lot of the things I'm not doing now. I don't go to any of the exhibitions. I used to go to* (inaudible) *show, I used to go to Ideal Home, craft show – I've stopped doing that…my legs are just stopping me doing what I want to do."*

4.3.1.5 Barriers

Research Question 3 wanted to know about possible barriers to use for non-scooter users. In response to numerous questions, barriers to scooter use were given.

Difficult to use

Some non-scooter users expressed concern that they would find a mobility scooter difficult to operate or would be a danger to others if they were to use one. Interviewees were not asked about what they would be like driving a scooter, but some mentioned their fears when they were asked about what they thought of scooters.

"I think I'd be dangerous on one of those." **Sally**

"I think I'd be a danger to the public." **Betsey**

"How I'd cope, I don't know, because I've never driven a car, so I'd probably be a bit nervous at first." **Harriett**

"But I would be very scared. I think I would be a menace on the pavement, on the road or whatever." **Esther**

"I'd be frightened to death, I wouldn't go near one." **Carla**

The Built Environment

Two non-users perceived that scooters would face difficulties with the built environment. This was because they had become aware of them through others.

"My friend's husband's just got one […] he was very worried about raised kerbs and things, how he's going to manage." **Estella**

Storage

A total of eight non-users mentioned that a barrier to using a scooter would be storage.

"Where would I store it, I mean, where do you store these things? I'm in a first floor flat, they're huge." **Betsey**

"Well I would certainly have problems from storing the darned thing." **Bill**

Expense

A few non-scooter users raised the cost of mobility scooters. No non-scooter users thought scooters were cheap.

"I wonder how people can afford them." **Daniel**

"They're not a cheap item." **James**

"They cost quite a lot of money." **Janet**

Overall, non-mobility scooter users understood that scooters allowed their users to travel independently. However, they were wary of scooters users due to negative experiences interacting with them, particularly on narrow pavements. They would generally be reluctant to start using a scooter, feeling that they would have given up on their body. If they did feel they needed a scooter, they saw the expense and the storage space as the biggest barriers to their use.

4.3.2 Scooter Users

4.3.2.1   Characteristics of Users

A total of 14 scooter users were interviewed. The scooter users interviewed ranged in age from 55 to 96, with a mean age of 82. Two users were under 65 but had retired early due to ill health. None of the users worked, although one volunteered. Half the scooter users were female and half were male. The ethnicity of the mobility scooter users was predominantly British, however two of the users had different ethnicity; one being from Europe and one being from the Indian subcontinent. All users lived permanently in England.

The scooter users had more mobility difficulties than the non-user sample. Using additional mobility devices was the norm: eight users used walking sticks; three used crutches; six used a wheelchair; and one person used no other mobility aids (see table 4.11). Six of the users could not get outside their house without a wheeled mobility device and used either crutches or a wheelchair indoors. Five users were able to walk around outside their house without a scooter and could walk to some locations. The remaining four users had a level of mobility in between these two groups, in that they were able to walk a short distance but not as much as the group who did some walking.

Nine of the users lived in London, one lived in a London commuter town just outside the M25[14]. The remaining four participants lived in small towns in Yorkshire[15]. The scooter users came to acquire their scooters in different ways. All except one owned their own scooters. One person regularly hired a scooter and one person owned their own scooter and hired a scooter. Of the 13 who owned their own scooters, two users were offered scooters as part of the previous longitudinal study and two users were offered scooters by family members. Another user started using the scooter as his deceased spouse had owned one and he had kept it.

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[14] The London orbital motorway situated between 20 and 30km from the city centre and is 188km in length.
[15] A county in Northern England

Table 4.11: Characteristics of Each Participant (Using Pseudonyms and Excluding Partners[16])

	Age	Gender	Scooter User	Other Mobility Devices Used?	Location
Agnes	71	Female	Yes	Wheelchair Crutches	London
Annie	62	Female	Yes	Wheelchair Crutches	Hertfordshire
Belinda	70	Female	Yes	Wheelchair	London
Camilla	81	Female	Yes	Walking Stick Walking Frame	Yorkshire
Emily	80	Female	Yes	Wheelchair	London
Molly	55	Female	Yes	Walking Sticks	London
Sophy	76	Female	Yes	Walking stick	London
Abel	80	Male	Yes	Walking Stick	London
David	89	Male	Yes	Walking Stick	Yorkshire
Edward	84	Male	Yes	Wheelchair Walking Stick Walking frame	Yorkshire
Herbert	68	Male	Yes	Crutches	Yorkshire
Oliver	92	Male	Yes	Walking stick	London
Philip	89	Male	Yes	No	London
Rasheed	75	Male	Yes	Walking Stick Wheelchair	London

4.3.2.2   Benefits

To help answer Research Questions 1, 2 and 6, scooter users were asked about the advantages of using scooters. All but one user, when asked, gave advantages for them personally using a scooter. The remaining participant was positive about their scooter but did not name any specific advantages.

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[16] The partners of Rasheed and Annie were present for their respective interviews

Able to do the shopping

The ability to be able to shop was the most frequently cited advantage. This is to be expected as it was also the most frequently mentioned activity carried out on the mobility scooter.

> *"Before I started using it, my legs are slowly getting weaker and weaker […] now I find that a big effort. So having the scooter to do all that is an enormous benefit. Instead of the shopping being a bit of a, "Oh, dear, I've got to go shopping, this is an effort," it's quite nice."* **Belinda**

> *"[X] takes me shopping in the car it's easy to put the folding one [scooter] into the car and hike it out and then we go round the shops, lovely […] just being able to go and do shopping relatively easy without having to do a lot of walking, carrying as big as you stuck the stuff on the footplate and on a bag behind. It makes a lot of difference."* ***Annie***

> *"Well I can carry a lot more weight shopping wise."* ***Philip***

Independence

Independence was the most commonly cited advantage, with 10 of the 14 users interviewed mentioning a gain in independence as an advantage to using a scooter. Six users cited "*independence*" specifically as a word. An additional two users used the word "*freedom*". Others talked about independence in other ways.

> *"Well if my legs are bad it's an advantage because I can just sit on that and go where I want to go, so it's as simple as that."* ***Oliver***

> *"It gives me that little bit of extra freedom, where I couldn't walk, and I can do what I like."* ***Belinda***

> *"Well, it is independence. I am not dependent on* [X] *or* [Y] *getting the car out and driving me there, to the shops even if it's just to the corner shop for a pint of milk I don't have to wait for someone to take me."* ***Annie***

Independence is perhaps a more important issue, or a more common advantage for women. Six of the seven women interviewed talked specifically about independence as an advantage to using the scooter, whereas only four

out of seven of the men did. In terms of specifically using the word "*inde-pendence*" "or "*independently*", five of the six to use the term were female.

Effort associated with a wheelchair

Six of the scooter users interviewed also used a wheelchair. All these users, or their partners, mentioned that an advantage to the scooter is it does not take the effort to use that the wheelchair does.

> "*But what I could do on it was actually very limited. It didn't afford me any independence, really, because I don't have the upper body strength to be able to get about a lot and so on.*" **Agnes**

> "*A manual wheelchair is an effort to do very much or go any great distance.*" **Belinda**

The partners of two of the interviewees were present during the interviews. In both cases, the users also used a manual wheelchair. Both partners stated that there was an advantage to the mobility scooter for them in that they no longer needed to struggle with the force and energy needed to push the wheelchair.

> "*Pushing the wheelchair that can be quite tiring for me if I'm having a bad day, then it can be a distinct problem to do wheelchair pushing whereas if Annie's got the scooter going then she can whizz off on her own as and when she needs.*" **Tim**, **partner of Annie**

Being Housebound

Great importance was placed on the ability of being able to get out of the house. All those interviewed were asked to rate how important to their quality of life was their ability to travel outside their home. A five-point scale was given to them, from "Not Important" to "Very Important". Almost everyone, rather than simply use the scale, justified his or her answer in terms of the impact the scooter has had and the exact importance of not being house-bound.

"I think it's helped me quite a lot, in a lot of ways. Because I get out and it, and you have to make yourself go out sometimes. It would be very easy to sit at home and sort of just do crosswords and get bored and sit at the computer and not bother, but means that I have out into the fresh air which is good." **Camilla**

"*It's not the active life we used to lead. I played football and cricket all my life and [partner of Edward] has always been active as well and it's come hard to us the past two years. Really hard. But the scooter, I've got to admit, that scooter's livened my life up a little bit. It's easy to drive, not too fast and very stable.*" **Edward**

"Very important. My quality of life at the moment with being able to get around is great. If I was confined to the house and not being able to get around and do what I do now I think I would go downhill pretty quickly I think." **Herbert**

4.3.2.3   Drawbacks

In order to answer research question1, 2 and 3, scooter users were asked for both the disadvantages of using a scooter as well as the barriers to using a scooter. The following drawbacks given help to answer these questions.

Interactions with pedestrians

Comments regarding interactions with other pedestrians or scooter users were negative. Scooter users reported that 'other' scooter users travelled too fast and were concerned that this negatively affects pedestrians' perspective of them. Three of the scooter users talked about using fast speeds or wishing to travel faster. Some users got annoyed when people did not move out of their way and said they would honk if they were approaching to get someone to move so they do not have to slow down, as illustrated by both Annie and Sophy in the quotes below. One user expressed both views that scooter users should not speed and that they liked to travel fast on their scooter, without seeing the anomaly [Molly]. Only one scooter user felt that some other scooter users did not need a scooter and might be giving users with a "real need" a bad name.

"And sometimes I just blench at seeing old people round here who, you know, are riding at such a speed. It's not fair on pedestrians. And unfortunately they're the sort of people that – it's a bit like sort of rogue cyclists, they give everyone a bad name." **Agnes**

"When I'm on the chair they don't notice you, they'll walk into you because they look over your head. At least the scooter I can run them down [laughter]." **Annie**

"It added a degree of interest because normally standing at five foot seven I'm now eye-balling 10-year-old kids and telling them that, 'Ee-ee, it's me coming, get out the way!'" **Sophy**

Accidents

Two scooter users admitted to having accidents where they had hit pedestrians. One user admitted hitting people on more than one occasion, although these were described as minor incidents.

"Occasionally I run over people's feet." **Annie**

"And people are a bit silly as well, so like I was reversing out of a shop a couple of weeks ago and it was clear the shop assistant was seeing me out and suddenly she said, "Stop! Stop! Stop!" A man had put his foot right behind the scooter and was just standing there and I think the thing is large, I'm large, you can't miss us! And it beeps when you're reversing so unless he was completely deaf and had no aids of any kind, I don't know – he couldn't have missed us and he just stood there." **Molly**

4.3.2.4 Barriers

Built Environment

The most commonly mentioned disadvantage to using a scooter was difficulties with the footway. Footway width, footway crossfall and lack of or steepness of dropped kerbs were cited.

"Some of the pavements, well the one behind the house in that street behind us, the pavement is actually at such an angle that it's really frightening if you're driving along it because you're sideways." **Annie**

"There are challenges with the condition of the roads and pavements and particularly with the drop kerbs which are not always terribly scooter friendly." **Tim, partner of Annie**

"It doesn't take kindly to drops of more than two or three inches." **Herbert**

"If you haven't got the wheel base, you know, to, coming off a pavement can be difficult.[…] I'll come back up the [...] it's a B road, but the pavements aren't wide enough so I have to stick to the road then." **Edward**

"I need to go round further than I would do sometimes because I know where all the pavement levels are and things. And I've been, I've also, certainly get to be very aware because some of the pavements are quite narrow and the drop is quite, well, it's too much for a scooter, shall we put it that way? It would be nice if some pavements were wider, if there was more places where you could go down from the pavement and across the road." **Camilla**

Distance capable on a scooter

A few users mentioned that the distance the scooter was capable of travelling was a disadvantage. They could not use the scooter to get to some of the places they wanted to, as they felt they were too far for the scooter to travel. The distances mentioned in these cases ranged from 16 kilometres to over 80 kilometres.

"I mean down here and going home again would probably use over half of the battery and this is not half as far as it would be to my father's home. So it might make it, it might not; I wouldn't like to risk it to be honest!" **Molly**

Storage

Only one user said they found storage to be a problem (Molly), while two users had had to make space in their accommodation. Six users said that they thought storage would be a barrier for other people wishing to have a scooter.

> "*Modern accommodation doesn't allow for things like parking for scooters. So people do have problems, I think. And mostly all the accommodation round here that's a new build are all tiny. They're all rabbit hutches and they don't have any cupboards, let alone anywhere to store a scooter. So, you know, people have problems actually finding somewhere to park it.*" **Agnes**

> "*Difficult to store; I don't have any outbuildings so I have to lock it to a hand rail outside my flat using that kind of bicycle lock.*" **Molly**

Battery

A barrier that scooter users were aware of is the need to charge the battery frequently. This is not only a barrier for potential users in terms of charging, but the risk of running out of battery is a drawback for users.

> "*But people who live up flights of stairs, obviously it's difficult to keep a scooter, and that's the main problem, and because you've got to be able to charge them, so you can hardly charge them in the road overnight. So here, I'm okay, but I can see it's a problem for others, how they keep them and charge them.*" **Belinda**

> "*I wouldn't go out if it hadn't at least half a charge or three quarters of a charge. "* **Oliver**

Fear of breakdown

Fear of breakdown was mentioned by seven of the scooter users. Some users worried about their scooter breaking down and limited their travel so if they did get stranded they would not be unable to seek help.

> *"I am afraid of it breaking down and having nobody around to assist me. It hasn't happened but there is always a possibility, I have electric batteries you haven't a lot of charging mechanism on the vehicle."*
> **Philip**

However, fear of breakdown was not a problem for the user who hires their scooter, or for those with breakdown insurance; users were not asked whether they had insurance so it is not clear how common this is.

> *"If, by any chance, it broke down while I was out, he* [mechanic] *would come and bring me another scooter, or get me back okay, so I've got no worries about looking after it or anything."*
> **Belinda**

> *"Well I've got – the insurance has a – what do they call it? A pick up service so if you break down for some reason you can ring them and they'll come and pick you up and take you home with the scooter and if necessary provide a replacement while yours is being fixed, but – so I could use that if necessary."*
> **Molly**

Weather

Four users mentioned the weather as a disadvantage in that the scooter is limited as they cannot use the scooter when it is raining or snowing.

> *"Rain, ice…snow… I've specifically been instructed not to take it out – I mean if I'm out and there's a light shower, no problem. If I'm out and there's a sudden downpour I try and get under cover somewhere but don't ride it if you look out the door and it's pouring with rain, don't take it out, because obviously the mix of the electricity it runs on and the water might cause problems and you'll end up with a nice perm! Or worse!"*
> **Molly**

Unable to use on public transport

Two users specifically mentioned that they wanted to take their scooters on public transport but were not aware this was possible. Many users were choosing not to travel more than a few miles, despite wanting to, possibly because they were not aware that they could access public transport with their scooter. For example, Molly was quite unhappy with her scooter and felt

depressed because she believed she could not take her scooter on public transport and therefore felt trapped in her local neighbourhood.

> *"A scooter is for short trips, really. It's not for going up to Trafalgar Square or Charing Cross Road and places like that – I don't think so, anyhow. You don't see many buggies on London Transport buses, do you?"* **Molly**

Two other users did take their scooters on public transport but found that the transport they could use was more limited than they would like.

Expense

Most of the scooter users interviewed had bought second-hand scooters as opposed to new ones. With one exception, all users felt that scooters were expensive to buy but most felt their scooter was value for money.

> *"They are quite expensive decent ones aren't they? They're not cheap; you're looking at £2,000 to £3,000 I understand."* **Oliver**

> *"The basic is money; I mean the cost of a scooter new is unbelievable…I'm conscious that there are some more sort of ruggedised* [offroad] *scooters available but they are prohibitively expensive."* **Annie**

Two users pointed out the additional cost of servicing a scooter was expensive.

> *"They are expensive. And you have the dilemma of…you know, you can get cut price mobility scooters and you can get them from Amazon or eBay, but what happens when they need servicing? You've actually got to have someone that you really trust…they're all £2,000 or something, and so you have to decide whether you get a cut price one with no back up or you pay the price that you need to pay and get the back up."* **Agnes**

> *"The maintenance is shocking. I think a friend of mine got a new one last year and he has his serviced, I don't have mine serviced I do one when it needs doing myself. But he paid £280."* **Philip**

4.3.2.5   Consideration

The reasons for starting to use a scooter varied. Most people made the choice for themselves, however, one had the choice made by family members, one had a scooter recommended to them by their GP, and two users took the opportunity to use a scooter when they were offered one in the initial longitudinal study. Some people stated that disability made it either difficult or near to impossible to walk (botched operations, arthritis, "bad knee"). Two people mentioned traffic accidents had left them unable to walk more than a few steps. One person stated that the death of their spouse, who did all the driving, necessitated the need to find their own form of transport. Three people had given up driving by the time they took up the scooter and one had never driven. For one of these people (David), this was the catalyst to get a scooter. For the remainder, not being able to drive may have been a factor but was not the key cited reason.

Who should consider using a scooter?

The emphasis by scooter users is that a scooter is for anyone who cannot walk and who wants to get about outside the home. This was the answer from almost all the users. Those who did not give the same answer answered solely about the capabilities needed to drive the scooter.

> *"Anyone who is frustrated by their ability to move around as much as they would like to do…Anyone who wants really to lead the kind of life that they could lead if they were not disabled in some way."* ***Agnes***

> *"I think when their walking proves to be too much of a problem for them, either they get tired out or, as in my case, I would end up tripping over."* ***Herbert***

One user gave an answer unique to these interviews but one that has been raised in other studies, about the benefit of starting a scooter earlier (May et al., 2010).

> *"I was given some very good advice and it was to consider using a scooter before you've got to the stage where you're really struggling. In other words, I can still walk about in the house and everything, and get out and across the road and things. I think, someone said to me, you need them a bit sooner than perhaps you really realise, but people who leave it too late never get* [sic]*, come to terms with them and they're just a waste."* **Camilla**

4.3.2.6   Capabilities

Although no one was asked explicitly what capabilities people need to use a scooter, this was brought up by both scooter users and non-scooter users. Five of the scooter users raised the point that scooter users should have certain capabilities in order to consider using a scooter. Both mental and physical capabilities were mentioned; as well as balance, temperament, sight, hearing, mental control, and intelligence. When talking about the need for capabilities, two users justified their capabilities by mentioning that they were or had been car drivers.

> *"Yes. Can I make one proviso? I think you've still got to really be able to hear and see quite well and be aware of what you're doing, and your balance needs to be there still I think…I've discovered because in my* [scooter]*, you do have to balance a little bit so if you struggle with that I think you would struggle with it."* **Camilla**

4.3.2.7   Exercise

Only a few scooter users mentioned exercise; two users to say they exercised, and one to say they had enjoyed exercise when they had been physically able.

> *"I need exercise and I'm obese and I used to be able to walk fast enough in winter to keep myself warm."* **Sophy**

4.3.2.8   Regulation

Training

Training was only raised by two scooter users. One scooter user mentioned that they had not been trained to use their scooter but made no comment about whether they felt it was needed. The second user found a lack of available training and was frustrated by this.

> *"I was told initially to contact my local Council because it was their responsibility, so I did, 'No, we don't do anything like that' they said, 'Contact your police station'. So I did, 'No we don't know of anything…' so then I started ringing around different places and I got in touch with a disabled charity and they said the nearest place that provided any training was out somewhere near [regional city], which is far too far. The next nearest place was somewhere up north but eventually I'd exhausted everything I could find on the internet that was to do with the disabled and I contacted my MP and I said, in an email, 'I have contacted all these…this, this, this list of people, nothing's available, I think – I'd like you to either tell me what I can do or where I can go that I haven't contacted before, that I can't find myself or can you lobby for something because I think that from my point of view training is necessary and obviously from other people's points of views I think it should be mandatory' and he wrote back saying, 'Contact your Council – I've never heard of this before and I don't want to know about it' more or less. Not in those words – and I was shocked. I contacted the Government Department for the disabled and they weren't interested. I got an email back saying, 'Nothing to do with us, can't do anything about it', no suggestions on who to go to. There is nothing or nobody that wants to be helpful."* **Molly**

4.3.2.9   Changes to Activities

Where activities had changed since the uptake of a scooter, some users had added destinations and others had reduced activities.

> *"I don't do any less; I was being pushed around before we had the scooter."* **Annie**

> *"I couldn't have walked to some of the places and therefore I hadn't been there for a long time."* **Camilla**

"What I am doing in fact is maintaining my routine from before but using the scooter to do it more…I like exercise. I do try to keep as fit as I can." **Philip**

"It makes a difference between basically being able to do what I would normally take for granted to do; getting about." **Herbert**

These four scooter users took up using a scooter to cover distances they previously had difficulty covering either by foot or by a combination of foot and public transport. Philip, Edward, Camilla and Oliver all predominantly used the scooter to go shopping, a trip they had previously made by foot and using benches along the way to rest. Camilla and Oliver also used the scooter to make regular trips purely for leisure – something they would not have done previously. It is not clear whether any of these users continued to make trips by foot once they started to use the scooter.

4.3.2.10 Destinations travelled by Scooter

The most commonly mentioned place to travel to by scooter was to the shops, including supermarkets, small shops, village shops and chemists. The shops as a destination was mentioned by 10 of the 14 scooter users interviewed. The next most commonly mentioned destination was to go to the park or for a ride (six users mentioned this). Other destinations were: to the doctor or hospital, to a church or mosque, to a place of work to volunteer, to meet friends, to exhibitions or the theatre.

4.3.2.11 Changes to Trips

During each interview, participants were asked to recall the trips and trip modes from the previous seven days. Scooter users appeared to make fewer trips each week than non-scooter users. Table 4.12 and 4.13 shows the figures for the trips made by scooter and non-scooter users respectively.

Table 4.12: Trips made by each mode in the last 7 days prior to interview, according to the scooter user interview participants.

Scooter Users	Car	Public Transport	Walk	Scooter	Total Trips
Abel	2	0	0	5	7
Agnes	3	5	0	5	13
Annie	2	0	0	4	6
Belinda	7	0	0	4	11
Camilla	0	0	1	4	5
David	0	0	2	4	6
Edward	0	0	0	1	1
Emily	0	6	0	7	13
Herbert	7	0	1	7	15
Molly	0	0	0	1	1
Oliver	3	2	5	0	10
Rasheed	0	0	0	3	3
Sophy	1	6	6	0	13
Mean Trips	**1.9**	**1.5**	**1.2**	**3.5**	**8.0**

Table 4.13: Trips made by each mode in the last 7 days prior to interview, according to the non-scooter user interview participants.

Non-Scooter Users	Car	Public Transport	Walk	Total Trips
Betsey	0	4	6	10
Bill	0	3	3	6
Carla	1	2	4	7
Daniel	0	4	6	10
Estella	1	3	6	10
Esther	2	3	4	9
Harriett	1	3	4	8
James	1	7	7	15
Janet	1	7	7	15
Martha	0	6	0	6
Mathew	7	0	0	7
Rosa	4	3	7	14
Sally	0	7	7	14
Mean Trips	**1.4**	**4.0**	**4.7**	**10.1**

Overall, mobility scooter users view their scooter positively, allowing them to travel independently. The main drawback was cost of the scooter and the lack of accessibility within the built environment.

4.3.3 Stakeholders

Four different stakeholders were interviewed. Stakeholder 1 was a researcher in a charity that provides guidance for older and disabled consumers. Stakeholder 2 was the scheme manager for a local service that hired scooters. Stakeholder 3 was the manager of the local council accessibility service that had, as part of its remit, a scooter service for daily and long-term hire. Stakeholder 4 was the manager of a local charity that ran a scooter and taxi-hire service. Three of the stakeholders were based in London and one was based

in Northern England. One stakeholder worked nationally, whilst the other three worked locally.

4.3.3.1 Perceptions of Scooters

Stakeholder 3 and Stakeholder 4, who both hire out scooters, said that the majority of their scooters were not used for long periods of time, typically a few hours, and their users did not travel very far on them. All stakeholders felt that scooters were an advantage to those who used them. Stakeholder 1 had carried out research and found that scooter users relied heavily on their scooter for independence.

> "*Because of their lack of mobility. It's usually too painful for them to be walking round town and doing their shopping or doing their visiting or whatever they're doing. It's just too much for them. But they still want to get out and about and it stops them being depressed and isolated and a number of things. They've found them very beneficial.*" [**Stakeholder 2**]

Stakeholders who spoke of distance mentioned it positively, stating that scooters could travel up to 35 miles on a single charge. However, there was acknowledgement that this depended on the type of scooter that was being used.

> "*They've maybe bought the wrong scooter for what they want. They maybe want to do longer distances than the scooter itself will accommodate and things like that.*" **Stakeholder 2**

Scooter ownership was acknowledged to be low. Stakeholder 4 thought this was due to difficulties with storing a scooter, charging the battery and servicing the scooter. Stakeholder 1 also acknowledged storage as a problem. Stakeholder 1 was aware that in areas of high density housing, there are restrictions in place on scooters by landlords due to concerns about keeping scooters in communal hallways and breaking fire regulations.

Stakeholders perceived that scooters and their users "*still have negative press*" [Stakeholder 4]. Scooters were not seen as empowering and non-users saw them as giving in to ageing.

4.3.3.2   Can governmental policy aide scooters users?

Price regulation

Two of the stakeholders raised concerns over the price of scooters[17]. Both were aware of scooter companies selling scooters at inflated prices. Scooters are expensive, yet when a scooter has broken down companies either do not help or provide services at very high prices. Stakeholder 1 was aware that some organisations, for example Pride Mobility Products Limited had been price fixing (Competition Markets Authority, 2014). The two stakeholders who raised the issue felt that there should be more regulation on sales and on companies that service scooters, in order to stop older and disabled people being taken advantage of.

Training

Stakeholders felt it was important for users to receive training. However, one of the stakeholders believed this was not of interest to the government, who perceived it to be the responsibilities of local councils and the individuals using them.

> *"I think it's important that people get the right scooter for them…I think maybe more open advice and training."* **Stakeholder 4**

Registration of scooters

The registration of class three scooters by the DVLA was raised by one stakeholder (Stakeholder 1). They found that anecdotal evidence from users and the industry was that registration of class three scooters was pointless and should be scrapped. Dealers appeared to have a lot of trouble with registration and users who bought them second-hand had trouble registering them. They could not register their scooter unless they had certain documents, for example vehicle registration documents, signed off, which they may not have. The system can be circular, with some scooter sales dealers playing by the rules but knowing others are not. The stakeholder also per-

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[17] New mobility scooters cost upwards of £450 and often cost over £2000.

ceived that no one was policing the system or fining users without licences. They also found an additional problem with the registration system of scrapping the scooters. Under the registration system, scooters have to be scrapped officially through an official scrap dealer. Stakeholder 1 had found that scrap dealers were only interested in cars and not scooters and would turn scooters away. This makes it very difficult for users to be able to scrap their old scooters.

4.4   Themes

As described in section 3.4.2, all the codes that emerged from the interviews were examined, looking at frequency of reference and relationships to other codes. These were listed and mapped. Through this process, it was found that the codes fitted under four key themes: benefits of scooter use; drawbacks of scooter use; barriers to scooter use; and consideration of scooter use. Figures 4.3 to 4.6 show the themes and how the codes relate to each other within them.

Each oval contains a code. The arrows between the codes indicate which direction the relationship between the codes lies. For example, in figure 4.3 the code "ease of use" is linked to "scooter user advantages". The arrow between the two codes flows from "ease of use" to "scooter user advantages". This means that how easy-to-use a scooter is affects how much people view a scooter to be advantageous. Some codes have bold ovals around them. This indicates the frequency of which the code is mentioned in the interviews. A bolded code has the highest frequency of mention by the interviewees.

Figure 4.3: Benefits of scooter use
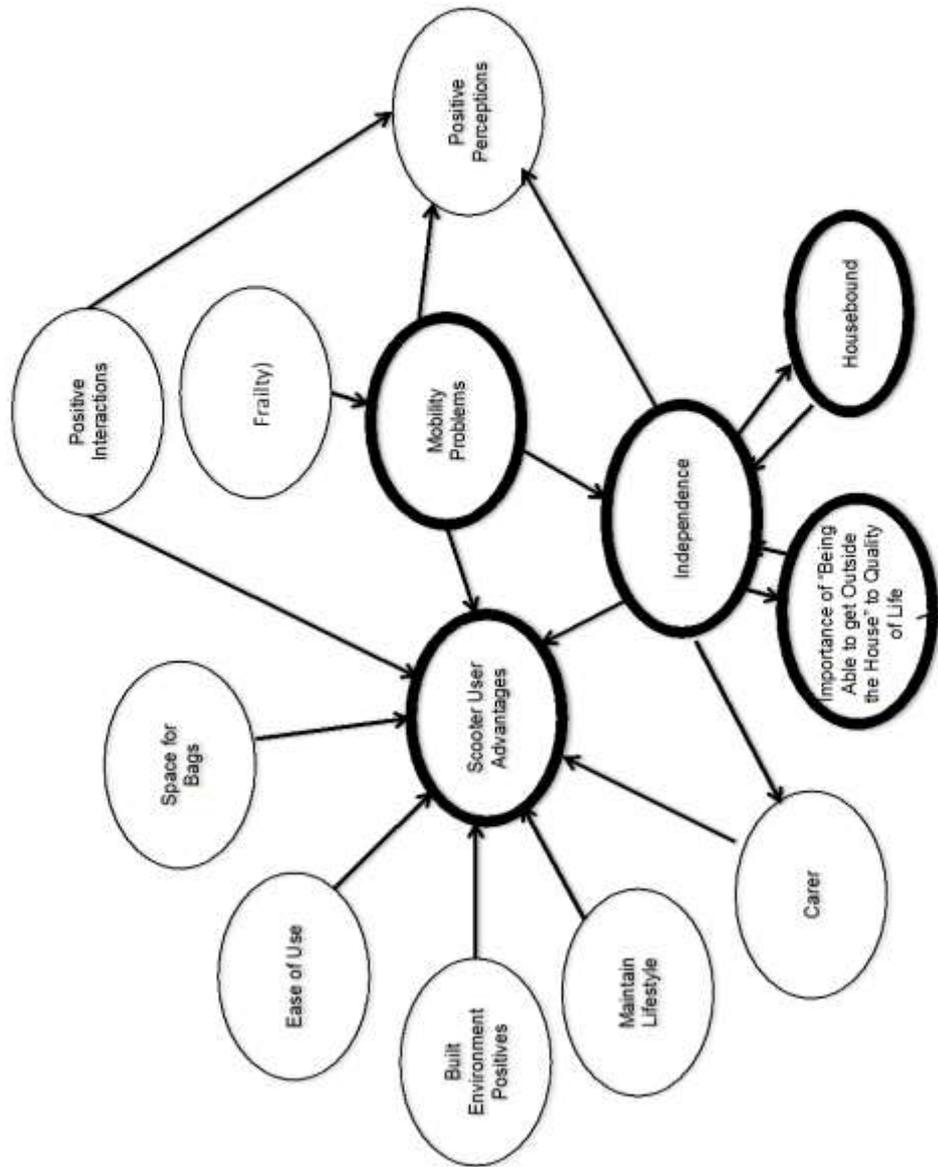
Mapping the cited benefits that emerged from the interviews particularly illustrated the strength of "independence". Not only was "independence" mentioned frequently by the interviewees, but it also affected more other codes than any other code. The links between the strongest benefits provided additional illustration of the importance of the scooter as a means to compensate for the effect a decline in mobility had on independence, reducing the likelihood of becoming housebound.

Figure 4.4: Drawbacks of scooter use
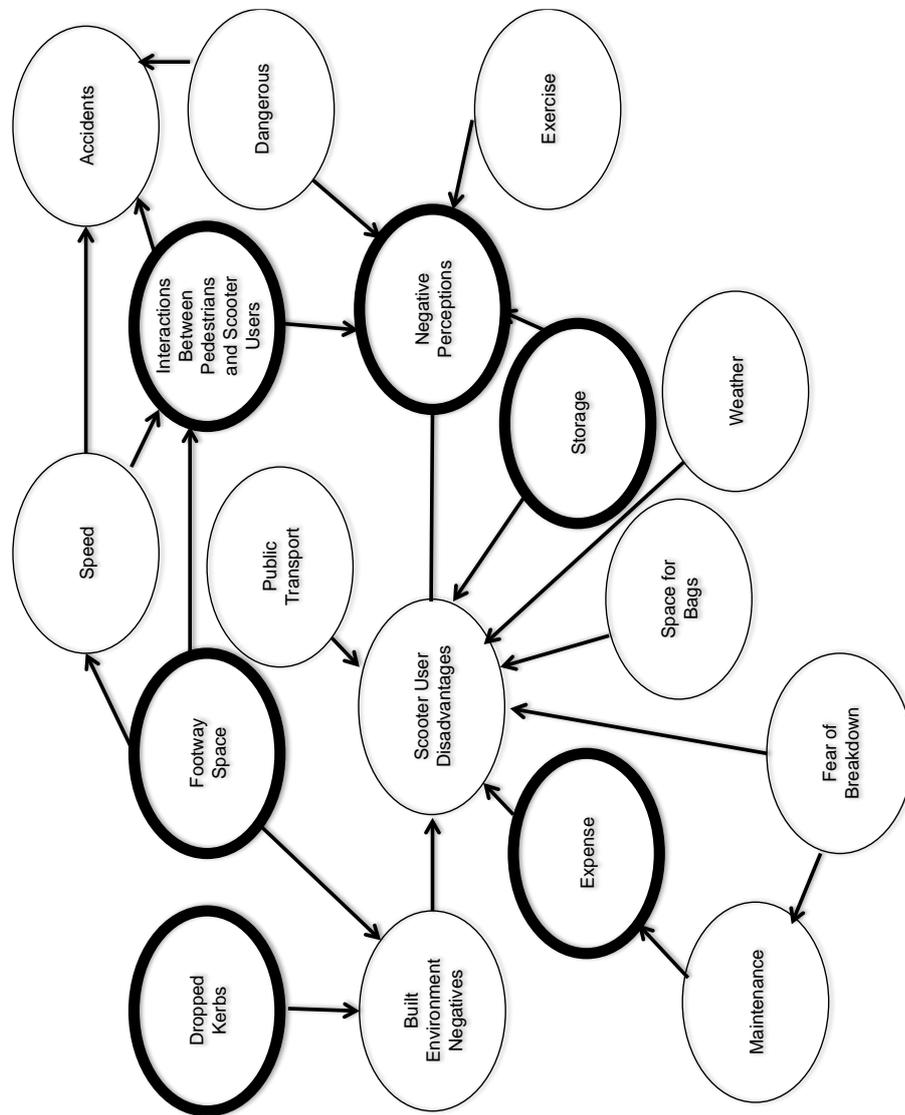
Mapping the cited drawbacks highlighted the number of disadvantages of using the scooter. The map illustrated that "footway space" was a key issue. If footways were wider then the perception of mobility scooter users travelling too fast would reduce, which in turn would reduce the amount of negative interactions between mobility scooter users and other pedestrians.

It is noteworthy that the code "Space for Bags" appears in both Figure 4.3 for benefits and Figure 4.4 for drawbacks. This is due to different scooter users identifying the room for bags on a mobility scooter either as plenty or as limited. This difference of opinion could be due to either the type of scooter used (different scooters have different capacity for bags) or the users' original perceptions, before they started to use one, of how much could be carried on a scooter.

Figure 4.5: Barriers to scooter use
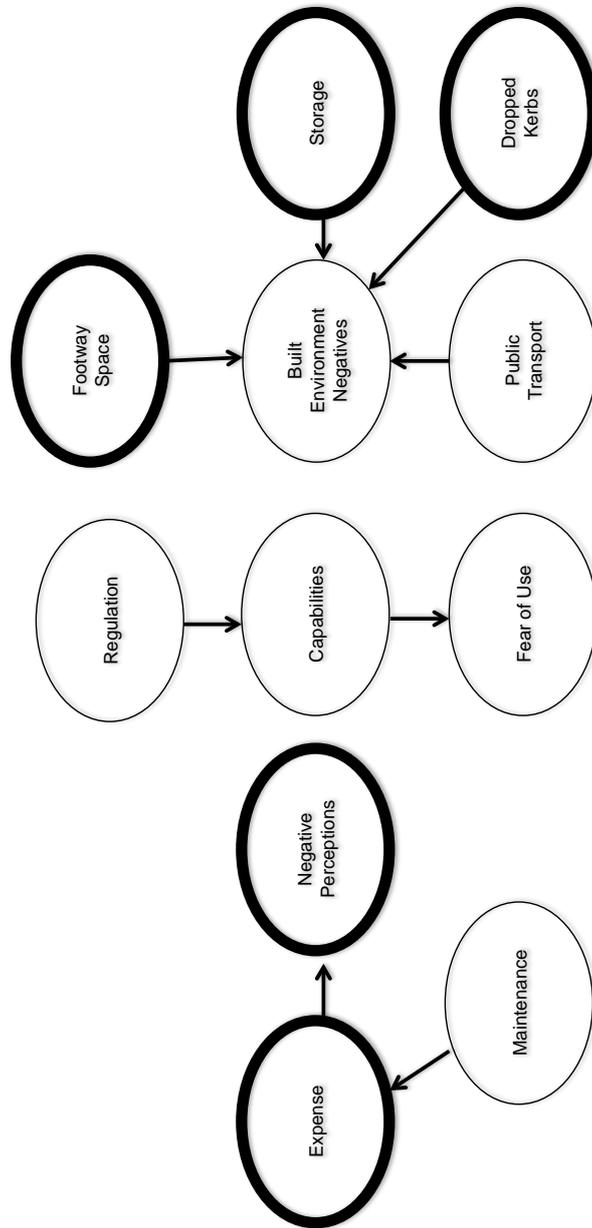
Mapping the barriers to scooter use showed three unlinked main barriers. Firstly, the expense of scooters meant non-scooter users perceived scooters as unaffordable. Secondly, the capabilities (visual, audial, and cognitive) needed to operate a scooter were seen as a barrier by scooter users. Stakeholders were aware that if the capabilities required to operate a scooter were tested (e.g. via licensing regulations) then the number of people who considered using scooters would greatly decrease. Finally, numerous barriers are created by the built environment that altered where scooter users could travel and who could own scooters.

Figure 4.6: Consideration of scooters use
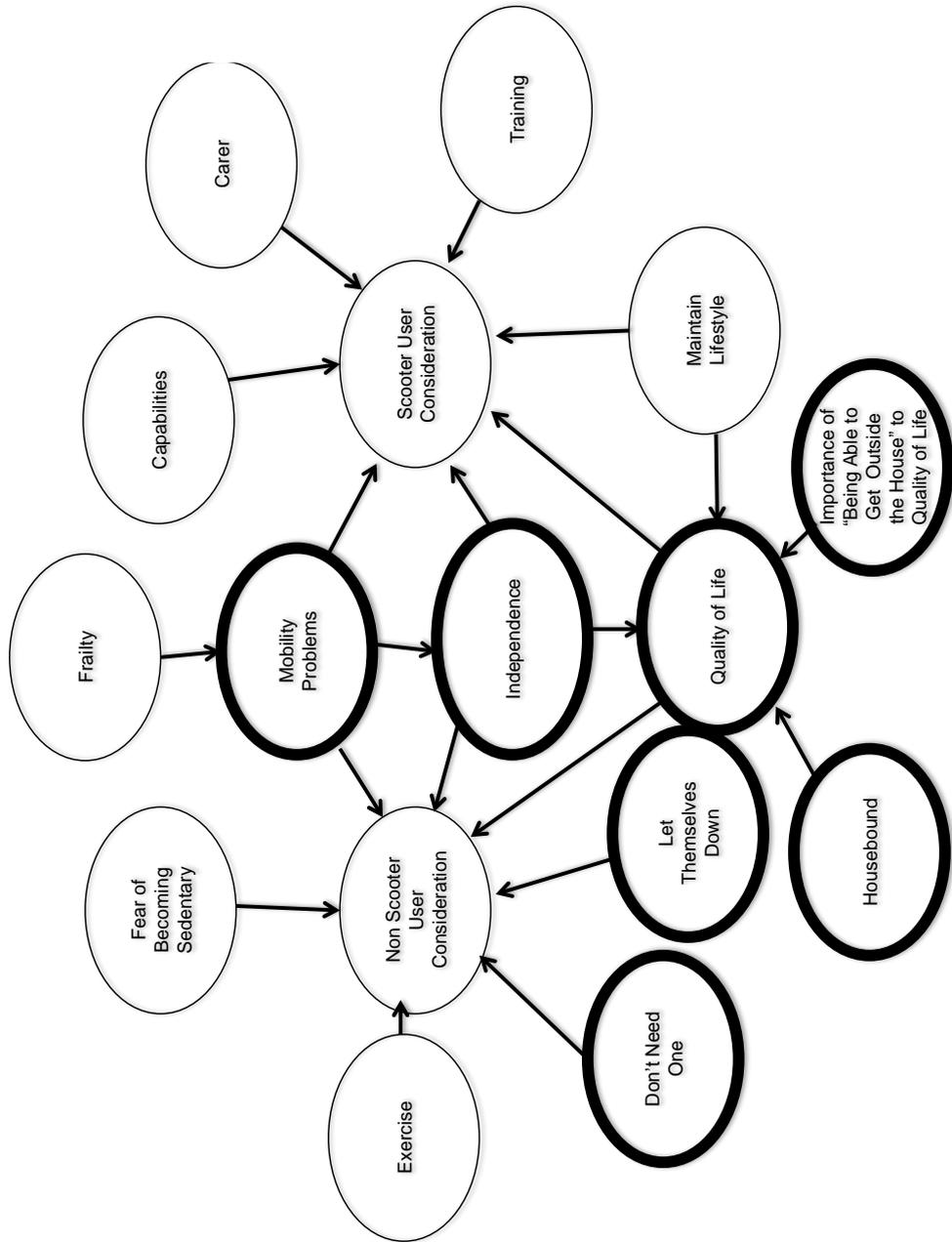
Mapping the issues non-scooter and scooter users thought about when considering a scooter showed that mobility problems, independence and quality of life were key issues for both groups. The map illustrates evidence from the interviews that non-scooter users were concerned about the implications on physical function and the psychological implications of reduced physical function, issues that were not a concern for scooter users. This highlighted that scooter users had greater mobility problems than non-scooter users and that non-scooter users perceived scooter users to have more mobility issues.

4.5 Results Summary

The results showed that mobility scooters were viewed as having the same benefits by both mobility scooter users and non-users. Scooters were perceived as a device that allowed people the ability to get out of the house and travel independently if they were otherwise unable to do so. Scooter users focused on independence, whereas non-scooters focused on disability.

Whilst scooter users felt very positive about their mobility scooters and the importance of them in their lives, there were a number of issues that were drawbacks or barriers to their use. The main drawbacks were the cost of buying the scooters and difficulties with accessibility within the built environment, with particular emphasis on a lack of or too steep dropped kerbs, fear of breakdown, and issues when interacting with other pedestrians.

The results of the interviews highlighted some negative aspects of interaction between older mobility scooter users and other older pedestrians. Both groups found that footways were often too narrow to allow comfortable space for other scooters and other pedestrians. Non-scooter users were more likely to cite negative perceptions of scooter user behaviour.

Both scooter users and non-scooter users cited the cost of a scooter as a barrier to ownership. However, the biggest barriers identified by scooter users was accessibility within the built environment, followed by the possibility of

breakdown; whereas non-scooter users felt storing a scooter and the perceived difficulty in handling one were the biggest barriers.

Although all the participants in the research were older adults with difficulties with their mobility, their consideration of using a mobility scooter differed. Mobility scooter users and non-users perceived that people should consider using a scooter if they had difficulty with their mobility. However, non-scooter users felt that reaching the point of necessitating a scooter by their own definition would be a failure on their part.

Stakeholders identified problems with price regulation, training of users and registration of users.

5. Discussion

Chapter 4 reported the results of the interviews, the questionnaire and the ELSA analysis. These results are discussed in this chapter. Firstly, the trends within scooter usage are discussed and the potential impacts of these trends are examined. Secondly, the impacts on physical functioning reported in Chapter 4 are discussed in terms of how the results support existing theories and what the findings mean for users. Thirdly, the discussion moves to examining the key themes (benefits, drawbacks, barriers, consideration, regulation) raised within the interviews and the questionnaire responses. The findings under each theme are discussed in light of the relevant literature and the implications for the users.

The aim of the research undertaken is laid out in Chapter 1 (section 1.6.1). The key aim being to understand how older people with mobility difficulties viewed mobility scooters. To broaden the limited knowledge of mobility scooter use in the United Kingdom, the following research questions have been outlined in Section 2.6.

5.1 Research Idea Origins

As discussed in Section 1.1, the origin of this research came from an interest in how older people dealt with barriers to travelling and the desire to ensure information to assist them is available.

5.2 Prevalence of Mobility Scooter Users in Older Adults

The seventh research question in this thesis sought to discover how many older adults used scooters, whether that number was changing and in what direction. The proportion of older adults using mobility scooters is increasing. The results from the ELSA analysis showed that the proportion of adults over

65 using scooters has doubled in the space of eight years (from 1.4% to 2.8%). Although slightly lower, the proportion of older adults over 50 using scooters has also doubled in the past eight years (0.9% to 1.8%). This is in line with the previous literature (Keynote Ltd, 2014; Barton et al., 2014).

Using the ELSA data, the proportion of scooter users increases at every data collection wave with the exception of the 2011 wave (Wave 5). Within the ELSA database, some waves contained "refreshed data" with fresh participants to create a more representative sample of the UK where people have dropped out or died. As a consequence, the only waves currently available with a representative sample of older people were waves 1, 3 and 4. The lack of refreshed data may explain the lack of increase in the number of scooter users in 2011. Wave 6 has refreshed data but the full data set for this has not been released.

Despite the growing number of people using mobility scooters, the actual proportion of users is very low. However, the proportion has been used in conjunction with the population data from the ONS to calculate the number of scooter users. The estimate made in this study, using the ELSA database, is that there are 240,000 scooter users in England who are over the age of 65. This is lower than the Jacobs et al (2014) estimate of 300-350,000. However the sample of the two estimates differs. The Jacobs et al estimate is for the whole of the UK, across every age, and is about scooter ownership; whereas the ELSA sample can only examine the number of older adult users (whether they own or rent a scooter), and only looks at England.

Jacobs et al (2014) found that 47% of scooter owners were over 65 years old, which, using ONS statistics to find the UK population over 65, suggests that 1.57% of people in the UK over 65 are scooter users. This is similar to the number found in the 2003 wave of the ELSA data, but not to the more recent 2011 wave of 2.76%. This equates to 164,5000 people over 65 in the UK being scooter users, only 68% of the estimate using ELSA figures. Using the ELSA percentage of 1.83% of over 50-year-olds using scooters, it can be

estimated that 399,000 people over 50 in the UK are scooter users, a higher figure than Jacobs et al had estimated.

If the percentage of scooter users continues to double every eight years then 22% of adults over 65 will be using mobility scooters by 2035. If the percentage only rises by 1.4% every eight years, then 7% of adults over 65 will be using scooters by 2035. Market saturation is not accounted for by either figure, of course, but they do make an interesting point. Using ONS population estimates for 2035, this means that there will be between 1 million and 3.5 million scooter users in the UK. Even the more modest estimate would lead to a large number of scooters; that figure does not account for younger users or for the potential users who could benefit from using scooters if barriers to their use were removed or reduced.

This large number of users would have numerous effects. Not only would it create more pressure on how space is shared but it would mean users themselves would have a large enough population to have a voice to demand better access. In terms of shared space, footways as they are now would be much denser and scooters (for the case of Class 3 scooters) would be more prevalent on the roads. More pressure would be put on transport services to fully allow scooters to use them, and pressure would be put on shops to make their premises more accessible. All these issues will be raised regardless of whether any progress is made to understand scooters and their users. However, if further research is carried out to understand scooters as a vehicle, as well as scooter user behaviour, these issues can start to be addressed so that in the long term they are better integrated as a transport mode. Some of the questions that need to be addressed will include the speed capacity of scooters, the impact of scooter training, and the design of the street layout.

Table 5.1: General Population Estimates and Scooter Population Estimates for 2011

	Population (ONS)		Scooter population estimates	
	England	**UK**	**ELSA**	**Jacobs et al**
All ages	53,356,400	63,705,000		300-350,000 (0.5%)
50+	18,318,000	21,786,000	335,200 (1.83%)*	398,575*
65+	8,730,000	10,448,000	240,000 (2.76%)*	164,500 (1.57%)**

A calculated figure using the ELSA estimate and the ONS UK population figures for 2011

**A calculated figure using the Jacobs et al % of scooter users over 65+ and the ONS UK population figures for 2011*

5.3 Changes in Physical Function

The final research question in this thesis sought to examine if any changes in behaviour and physical function occurred before using a scooter and after regular scooter usage was occurring. Previous theorists have contended either that scooter use would decrease physical activity as users reduced the amount they walked (Hoenig et al., 2007; Steyn and Chan, 2008; Weiss et al., 2007), or that scooter users would increase the amount of physical activity as the scooter removed the walking barriers of being able to access the activity (Brandt et al., 2004; May et al., 2010; Ordonez, 2006; Woods and Watson, 2003). Until now, neither theory has garnered any evidence in either direction. The results found as part of this research offer evidence for both theories. This was completed by analysing ELSA and the questionnaire data. The ELSA scooter user data was analysed by comparing before and after scooter uptake, as well as comparing a matched sample of scooter users and non-scooter users over time (see Sections 4.1.2-3 and 4.2). The results showed that, for this sample, many scooter users said their levels of physical activity[18] did not change. However, some scooter users increased their mild levels of physical activity whilst reducing their levels of moderate and vigorous physical

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[18] ELSA uses activity type, duration, frequency and whether person was out of breath or sweaty to differentiate between mild, moderate and vigorous activity levels.

activity. The changes to physical activity may be linked to the increase in difficulty or inability to perform physical tasks experienced by most scooter users in the sample.

These findings meant that scooter users should take care not to use a scooter to replace any physical activity that they were able to achieve comfortably. However, given that the interviewed scooter users were not able to walk more than a few steps, using a scooter would not be replacing physical activity they could achieve. Rather, this caution has more relevance for any new scooters users who are less disabled than the sample studied here.

5.4 Research Themes

5.4.1 Benefits

5.4.1.1 Independence

The results show that older people perceived independence to be of high importance to them. Independence was the biggest cited advantage of using a mobility scooter by mobility scooter users, and this was recognised by the majority of non-scooter users and stakeholders as well. This finding was strengthened by the fact that "independence" was not a term raised by the interviewer, but one that was raised by the participants themselves. This is particularly important as "independence" is often used differently by different groups even when talking about one population. "Independence" of people with disabilities refers to "self reliance" when used by policymakers, "capability of self care activities" when used by professionals and "personal autonomy" when used by disabled people (Oliver, 1990). It must be noted that amongst older people "independence" has a range of meanings. However, it commonly includes autonomy, social interdependencies, spatial and social independence (Hillcoat-Nalletamby, 2014).

Independence was connected to multiple other codes (see Section 4.4), illustrating that it was the key benefit to using a scooter and the key reason to choose to use one. The finding that independence was the biggest benefit for

scooter users was also highlighted by the studies that have examined the psychological benefits of scooters (Formiatti et al., 2014; Johnson, 2015; May et al., 2010; Zagol and Krasuski, 2010). This reinforces that scooters provided a crucial benefit to their users. The findings from this research showed that this was recognised by non-users, showing that the perception of the advantages and need for a scooter matched between users and non-users. It is important that older non-scooter users recognised that scooters could help achieve independence, as it means they would consider it as a method of regaining independence should they start to lose it at a later stage in their life. Previous literature suggested that people should start using scooters earlier (May et al., 2010) so as not to lose the benefits associated with engagement and participation in activities outside the home. However, acceptance of a scooter earlier in the progression of mobility decline is unlikely given the perception by non-users of having *"given up"* (see Section 4.3.1.4.).

5.4.1.2   Housebound

As shown in Chapter 4 (see Section 4.4), the issues surrounding being housebound were similar to that of independence. This is because the ability to get out of the house was associated with the ability to participate in tasks and to travel. Being housebound was associated with not being able to leave the house by oneself. Becoming housebound was a fear of both mobility scooter users and non-users. For non-users it was a hypothetical concern, whereas scooter users felt that they would be housebound if they did not have a scooter. Both scooter users and non-scooter users recognised that a benefit of using a scooter would be to avoid becoming housebound. The findings on being housebound were echoed in the literature of Johnson (2015) and May et al (2010), who both found that many scooter users stated they would be housebound without their scooter.

5.4.1.3 Quality of Life

As defined in the Glossary of Terms and discussed in Section 2.2.3, the term quality of life means different things to different individuals. No definition was given to participants, rather they were free to use their own personal definition and requirements to answer questions related to their quality of life. That being clear, quality of life was important to all, scooter users and non-users, and independent travel was key to their perception of their quality of life. For both scooter users and non-users', quality of life was affected by their ability to move around outside their home. The difference between the two groups was that for scooter users this ability might depend on using a scooter, where for the non-users interviewed this was an ability that they still had.

5.4.2 Drawbacks

5.4.2.1 Interactions on the Footway

Interaction between scooter users and non-users is an issue that affected both users and non-users, although this occurred in different ways. For scooter users, their interactions with pedestrians indicated how they were perceived by others. Interactions and therefore perceptions of how they were viewed were mixed. For those who use(d) wheelchairs, it was a positive experience as they felt more included. Others had experienced abuse. Scooter users were generally more concerned with the behaviour of other scooter users, as they saw this as negatively influencing how non-users interacted with them. For non-users, their interactions with mobility scooters were concerned with negotiating around them and the potential of contact resulting in injury.

Interaction with pedestrians was a theme raised by scooter users in Formiatti et al (2014), Johnson (2015) and in May et al (2010) (see 2.4.3). In these studies, scooter users raised negative interactions as a theme. The present research reinforces the finding that it is an area of contention amongst scoot-

er users, and additionally shows that it is also an area of contention amongst non-scooter users.

It is possible that the reason for negative perceptions of mobility scooters and their users is the result of pedestrians feeling threatened. Perhaps a scooter is viewed as a vehicle rather than an assistive technology aiding a pedestrian, and as a vehicle it is perceived as encroaching on the space that is typically the preserve of the pedestrian. Vehicles (cars, trucks, buses etc.) occupy the majority of space on roads, with pedestrians side-lined to narrow footways to the outer edges of the highway (Jones, Roberts & Morris, 2007). This dominance of the car has led pedestrians to feel neglected and whilst there is movement to protect and promote pedestrian interests (in the form of pedestrianized and mixed use streets) it may be that pedestrians feel that scooters on footways are once more threatening their already limited space and power.

One possible limitation of this research that could have occurred was because all experiences between scooter users and non-users were coded together under the code of "Interactions Between Scooter Users and Other Pedestrians". It was used as a code when the initial coding phases identified that there were frequent references to experiences between the two groups, but coding them separately would result in a lot of separate, singular codes. This was potentially limiting as the common experiences could have been lost. In order to avoid this limitation, all references in the code were examined to look for common experiences. In addition to fitting under the interaction code, some interview text fitted under other codes, for example "Speed" or "Accidents".

Scooters Take Up Too Much Space

The results showed that both scooter users and non-users found footway space to be too narrow for mobility scooters, but for different reasons. This is unsurprising given that most footways (with, perhaps, the exception of more recently designed shared spaces in shopping districts) were not designed for persons on mobility scooters to be included within their capacity. Narrow footways are an issue of accessibility for scooter users but an issue of density

and vulnerability for non-users. For scooter users, this means having to use alternative routes to reach places, whereas for non-users it means negotiating the space and concerns of contact resulting in injury.

Sharing space was an issue raised in both the previous scooter studies, but the focus in them was different. As discussed in section 2.4.3, Johnson (2015) found that a common negative perception for scooter users was the perception of being invisible on a scooter; this was only cited by one user in this study [Sophy, see Section 4.3.2.3]. May et al (2010) found that scooter users raised sharing space as a theme. They found a mixed attitude to sharing space, in that some users perceived pedestrians as not being aware of the rights of scooter users to equal access to space, whilst others felt users needed to share the space better and give way to pedestrians more. The emergence of space as an issue across all research indicates there are some problems here to be resolved in relation to narrow footways. The variance in reasoning behind the issue shows that the issues varies possibly according to the exact width of footway, capacity of pedestrians, as well as local norms and etiquette.

When the most optimal time (physically and psychologically) is for people to start using a scooter is an important question for the quality of life of users that has not been answered. Some scooter users advocated starting using a scooter before they give up driving or before their mobility had declined to the point they were unable to travel independently, arguing this would ensure a smoother transition and reducing any activity participation dropout (May et al., 2010). However, there was a level of reluctance by many older people who saw using a scooter as physically giving up (see Section 4.3.1.4). This divide of uptake was evident through the initial study by participants who were offered scooters – two who took up the opportunity and three who rejected the offer. Understanding when the optimal uptake time is would ensure that users get the most benefits from scooters, but has not been investigated to date.

Speed

Both scooter users and non-scooter users were interested in the speed travelled by mobility scooters. With similarity to the above discussion on footway space, the speed of scooters means different things to scooter users than to non-scooter users. To a non-scooter user, scooter speed is associated with dangerous behaviour by scooter users and the increased potential for accidents that may result in injury. For scooter users, the meaning of scooter speed is associated either with concern over non-user perception or a desire to be able to travel faster. From these attitudes, it can be surmised that whilst scooter users feel comfortable, confident and safe travelling at their current speeds, this viewpoint is not shared by other, especially older, pedestrians.

The concern of scooter speed was not raised in previous literature. This is likely to be because the group whom most often raised speed as an issue were the non-users, who have not been researched elsewhere.

The present research is unable to clarify whether the importance of scooter speed is the same in the general population as it is in the sample examined here. This research examined older pre-clinically disabled people, who, by definition were likely to be less likely to be able react to a moving scooter quickly and were more vulnerable to injury as a result of contact than a younger, more able-bodied group. However, a cursory glance at media publications about scooters revealed that scooter speed and accidents was a common theme. Stowe and Mulley (2010) suggested an over-reporting of scooter accidents, and therefore the perception of scooter users as dangerous, occurred in the media between 1992 and 2008 in the UK media. A content analysis into attitudes towards mobility scooters in the more recent UK media is currently being undertaken (Johnson, 2015a) and its results may be able to answer this question.

Perception of speed will differ between pedestrians and scooter users for numerous reasons. Firstly, pedestrians will find the speed of scooters fast

because it is likely that scooter users are travelling at a faster speed. Scooters are legally allowed to travel at 4mph on footways, which is a walking speed that is not achieved by many pedestrians[19]. In addition, it is thought that scooters are able to and do travel faster than 4mph, although this has not be researched to obtain evidence. Secondly, whilst scooter users are aware of pedestrians, pedestrians may not be aware of scooters within their environment. A scooter is electric and makes very little sound. Therefore if a scooter is approaching a pedestrian from behind the pedestrian will not become aware of the scooter until it passes them. This means the pedestrian is shocked by the appearance of the scooter, whereas the scooter user has been visually aware of the pedestrian for a much greater period. Thirdly, those who use scooters regularly become accustomed to the speed that they are travelling and may even come to view it as slow. However, pedestrians are used to their own, often slower speed, and as a result perceive the scooter speed as too fast. In order to untangle the impact of scooter speed, some research needs to be carried out to investigate (a) the speed scooter users actually travel, and (b) the speed scooters users and non-scooter users perceive scooters to be travelling.

Aggressive Users

Like speed, the issue of aggression means different things to scooter users than it does to non-scooter users, namely safety as opposed to others' perceptions.

To non-scooter users, aggressive scooter behaviour is associated with the increased potential for accidents that could result in injury. For scooter users, the aggressive scooter behaviour is associated with concern over non-user perception of scooter users rather than the safety impacts. It is interesting to note that scooter users did not perceive themselves to be behaving aggressively, despite comments that indicated that they do expect pedestrians to yield to them (see quotes in section 4.3.2.3).

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[19] Pedestrians typically walk at around 3miles per hour (Kang and Dingwell, 2008)

The issue of aggressive scooter user behaviour as a concern was reinforced in the literature. May et al. (2010) found that scooter users expressed concern that the actions of other scooter users had a negative effect on the perception of all scooter users. Like the research carried out for this thesis, the participants from May et al did not associate themselves with potentially aggressive behaviour.

Accidents

The perception of accident occurrence is likely to be related to the concern shown for space on footways, aggression and speed. Despite the concern for safety, relatively few people had experienced accidents involving scooters. As shown in Chapter 2, scooter accident levels were only counted in a single study, which showed that 18% of scooter users had had an accident on their scooter but none involved another person (Hoenig et al., 2007). Johnson (2015) also found that accidents were rarely mentioned. Whilst the incidence of being hit by a scooter appears in the statistical evidence to be rare, it is still a concern for non-users. As mentioned above, this may be due to over-reporting of scooter accidents in the media and to non-users interpreting scooter behaviour as aggressive and too fast within a narrow space.

5.4.3 Consideration

In the characteristic descriptions of the scooter users in the previous chapter (see Section 4.3.2.1), it was shown that scooters were acquired in different ways, with five of the scooter users interviewed having originally obtained their scooter through opportunity. For example, they were either given a scooter free of charge or were given the opportunity to buy a scooter cheaply. In these cases, people have taken up using scooters without detailed consideration of what their requirements from a scooter are. It is unclear whether they had considered themselves as requiring a scooter at the time of acquisition, but they all retrospectively identified themselves as needing a scooter, even though the idea and impetus to use one did not originate with them.

In the original longitudinal study, several participants were offered scooters but did not choose to use them (Rosa, Daniel, James). These participants were interviewed as non-scooter users. The three non-users all stated that they "*did not need*" a scooter. One stated that he refused the scooter because, despite wanting the scooter himself, he was convinced by his family that if he did take one then he would become less mobile. The other two users viewed using a scooter as a sign of giving up.

The research carried out is limited in that it reflects little dissatisfaction with scooters as a means of the key benefit, independence. This may be because the overwhelming majority of scooter owners are happy with their scooters. This could also be sampling bias in that only users who felt positively about their scooter were drawn to participating or because overall satisfaction with scooters was directly related to the high cost of scooters, which manifests as an emotional investment[20]. However, given the difficulty and time taken to find scooter users to interview, finding former scooters users to interview would have been beyond the scope, in time and resources, of the PhD.

5.4.3.1   Scooter Users Given Up

Some of the non-scooter users perceived that they would feel using a scooter would be disheartening and as though they had allowed their bodies to decline in health through neglect, as though a decline in health was something they could have stopped. The non-scooter users' answer here was in relation to themselves, if they felt, in the future, that they needed a scooter. It is not clear whether this sense of personal responsibility for their level of mobility is also indicative of their perception of the level of mobility of other people, i.e. those who already user scooters. This is perhaps the reason

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[20] This is known as the Sunk Cost Fallacy whereby people often choose to invest more into a situation where a previous investment has been made (Garland and Newport, 1991).

Harriett (see Chapter 4, section 4.3.1.4 for an extract of Harriett's interview which illustrates this) has not considered a scooter despite the fact that she is no longer able to walk very far and misses the activities she can no longer manage.

As perhaps could be expected, none of the scooter users perceived themselves as having given up on their physical functioning. Instead, scooter users focused on the benefits, chiefly that the scooter had allowed them to maintain or regain their independence. The stakeholders that were interviewed were aware of this mismatch in perceptions and that whilst for users scooters were seen as empowering, for non-users they were a symbol of having given in to ageing. This reinforces the findings of May et al (2010) and Johnson (2015), who both found that some people felt reluctant to use scooters as it made them feel old or disabled.

5.4.3.2   Stigma

As shown in Sections 4.3.1, non-scooter users had more negative perceptions of scooters and their users than they did positive ones. Non-scooter users considered scooters dangerous and difficult to use, and their users aggressive. Given these viewpoints, it is understandable that non-scooter users did not wish to become part of this group, both because they could not identify with the behaviour they perceived to be exhibited and they did not wish to be perceived like this by others. Previous research has shown that scooter users were also aware of the negative perceptions around scooters and the behaviours of people on scooters (Formiatti et al., 2014; Korotchenk and Hurd Clarke, 2014; Steyn and Chan, 2008). The research carried out here also found this. However, as discussed in the drawback section (4.3.2.3), all scooter users who had negative perceptions of scooter user behaviour were able to dissociate themselves from this behaviour.

Previous research had suggested that a decrease in the stigma of using a mobility scooter had made scooters more attractive for people to use (La Plante, 2003). The research suggested that people felt they would not look

disabled by using a mobility scooter. However, neither the interviews nor the questionnaire uncovered any evidence that the scooter users used the scooter because they felt it had less stigma associated with it.

It was made clear from the interviews of non-users, that they perceived a scooter as something that only very disabled people should use. By scooter users not looking disabled, people may assume they are not disabled and would attribute negative connotations to their usage of a scooter. Indeed, a few of the scooter users interviewed and some of the scooter users who responded to the questionnaire had experienced abuse whilst on their scooter, as did previous research (Johnson, 2015; May et al., 2010).

The assertation of a decline in stigma in using a scooter use is also a deterrent for non-scooter users. It may put people off using a scooter because they perceive that the same judgments they make as non-users to non-visibly disabled users of scooters would be made by others towards them if they were to use a scooter.

5.4.3.3 Exercise

Exercise was deemed as an issue by non-scooter users, but less so by scooter users. Overall it was not an issue raised by many of either group and not an issue raised by stakeholders. Where raised by non-scooter users, it was of concern that using a scooter could reduce the opportunities for exercise and that a manual self-propelled wheelchair would be a more appropriate choice of mobility aid. In Section 4.3.2.2, it was shown that mobility scooter users who also used wheelchairs all mentioned the associated physical difficulty with using a wheelchair by themselves and for their attendants. The suggestion, made by some non-scooter users, of people using manual wheelchairs instead of mobility scooters to increase exercise levels shows a lack of experience or understanding of the excess of physical effort involved in using a wheelchair, as well as its resulting declines in independence.

5.5.3.4   Level of Mobility

In the previous chapter, a disparity in the level of mobility between the scooter users and the non-scooter users was shown. For scooter users, mobility was limited, with most users being unable to walk more than a few steps, and no one was able to walk any steps at all without some kind of assistance. For the non-scooter users, all were able to walk at least a quarter of a mile, although this was often with the help of a walking stick (though never with the need of a wheelchair or walker) and often cost them considerable effort. It is possible that non-scooter users' levels of mobility will change to be closer to that of the scooter users. This is to be expected, as the sample of non-scooter users was chosen to be pre-clinically disabled, that is (as described in Chapter 2), those whose mobility is declining and is likely to continue declining. There is an additional disparity in the perceived level of mobility of scooter users by non-scooter users versus the actual level of mobility of scooter users.

The results showed that for this sample, the need to be able to move around was a crucial aspect to perceiving oneself to have a good quality of life. Although non-scooter users perceived a psychological benefit from being physically mobile, scooter users appeared to derive no mental benefit from being able to physically move themselves. More important to them was the ability to travel independently, which is not dependent on physical capabilities. It might be true that the ability to travel is more important than the method of travel, but this may be because scooter users have accepted their physical limitations and have instead chosen to focus on their current abilities. However, this could be because the interviewees who chose to participate in this study reflected a pro-scooter sample of users and had sought to highlight the benefits of scooter use. Certainly, it is true that scooter users gained a sense of benefit, mentally, that their scooter provided them with improved mobility. Scooter users saw their scooter as offering them independence in terms of mobility to travel on their own, which they perceive they could not have gained otherwise. The ELSA analysis indicated that scooter user mobility continues to decline, and literature indicates the number of older people with mobility difficulties will increase (see sections 2.1 and 4.1), so for those whose physical mobility capacity is or will be limited, the idea that personal

mobility is less important than the ability to travel independently (which can be achieved by using a scooter) is very encouraging.

Many scooter users (as shown in the sources of data gathered in this study) used a wheelchair in addition to a scooter. Rather than being a transitionary period between a long-term move from one device to the other, the results shown in Chapter 4 indicated that individuals choose to use the device that best suited each situation. In terms of accessibility enabling travel, a wheelchair was often able to access more places, for example some bus or train services will allow a wheelchair entry but not a scooter. In addition, a scooter is not as agile as a wheelchair, it has a longer length and requires a greater area to run around. In terms of carer effort and capacity, a wheelchair can require high levels of force by the attendant pushing the chair (Holloway, 2011; Holloway, Thoreau, Petit & Tyler, 2015). A scooter requires no attendant and removes the effort placed on the capacity needed by the carer.

5.4.4   Barriers

5.4.4.1   Difficult to Use

Only a few non-users thought operating a scooter would be difficult, with most non-users and all users not feeling the skill required to operate a scooter to be a barrier to use. However, the only piece of literature to examine this issue, May et al (2010), found that whilst learning to use a scooter was difficult for only a few users, current users were concerned that the perceived difficulty in mastering a scooter could deter people from trying one. It could be theorised that the perception of complex operation would diminish in time as the numbers of older adults who hold (or held) a driving licence increases, particularly the proportion of women (Department for Transport 2010). It can be noted that all the non-users concerned with operating a scooter were women, at least one of whom had not held a drivers licence, and two who, if they did drive, no longer did so.

5.4.4.2   Built Environment

Difficulties with negotiating the built environment with a scooter was a common theme in the interviews, particularly for scooter users. It was a barrier for participation and independence for scooter users and often meant the difference between accessing locations and participating in activities or not reaching them or participating in them at all. Whilst a couple of non-scooter users were aware of this barrier, most were not. No interview question asked specifically about the built environment so it is possible that more non-users were aware that the built environment might pose challenges for people on scooters. It is more likely that non-users were not aware of the extent that road infrastructure can become a barrier to travelling and not just an obstacle. This may mean that new scooter users do not use a scooter for the long term, as the barriers to where they can travel are too extensive. This finding echoes that of Johnson (2015), Formiatti et al., (2014), Korotchenko and Hurd Clarke (2014) and May et al (2010), discussed in section 2.4.3, who all mentioned it as a raised theme. The lack of dropped kerbs was the most mentioned barrier in the built environment in this study and in the other studies.

5.4.4.3   Distance Travelled

The distance their mobility scooter was capable of travelling on a single charge was a barrier to the level of independence that some scooter users desired. The distance limitations of their scooter's battery reduced their life to the local neighbourhood. Some scooter users felt they could not travel the distances they would like to on a scooter. In some cases, this was because the distances were great, over 50 kilometres (30 miles). However, in some cases, the distance mentioned as impossible were distances that the scooters should have been capable of. This could be for three reasons. Firstly, it could be that scooters are simply uncomfortable to travel on for long periods of time. This was not cited by the interviewees, but was mentioned in previous research on mobility scooter and electric wheelchair users (Korotchenko and Hurd Clarke, 2014). Secondly, it could be that the scooter manufacturers' estimate of distance capable on the scooter's battery is less than the distance that is actually achievable. Two stakeholders felt that scooters were capable

of long distances, up to 22 miles (35 kilometres), however, one user had found that their scooter was only capable of 5.5 miles (9 kilometres). Mobility scooters are also sensitive to differences in terrain and negotiating lots of hills would consume more battery than flat terrain. Thirdly, users were conservative with the distance they travelled as they were afraid of becoming stranded with their scooter if it was to break down, although this was not the case with those users who were insured for breakdowns. Fear of becoming stranded was mentioned by a number of users and is supported in previous literature (Formiatti et al., 2014; Korotchenko and Hurd Clarke, 2014).

Some scooter users avoided this difficulty by owning a folding scooter that could be placed in the boot of a car to be used in distant locations. However, those that did this often owned an additional, larger, scooter that was deemed more stable and comfortable for long periods of time. This created a larger cost barrier than already exists (as will be discussed later in this chapter) with buying one scooter.

5.4.4.4   Using Public Transport

The barrier of distance could be reduced if scooter users took their scooters on public transport to enable them to travel outside their local area. It would give them a wider geographical area that they could reach on their scooter and therefore widen their independent travel. However, most scooter users were unaware what public transport they were or were not allowed onto with their scooter. Scooters are allowed on buses and trains in all regions across the UK, although this access is dependent on the size of the scooter and varies between service providers (Department for Transport, 2015). This information needs to be known in advance and it is clear that this information is not reaching users. This barrier can also be addressed by understanding what kinds of activities and distances a user aims to achieve. This would allow the user to buy or rent the right type of scooter to enable public transport to be accessed.

5.4.4.5 Expense

The high price of a scooter and the additional maintenance costs associated were mentioned by users, non-users and stakeholders. Scooter users thought mobility scooters were expensive, although they considered their own to be value for money. Non-scooter users were not specifically questioned about the cost of mobility scooters but three non-users did mention that they thought scooters were expensive. It is possible that non-scooters users think mobility scooters are cheap and therefore an "easy" option to choose to use, whereas mobility scooter users think scooters are expensive and therefore justify theirs to be a necessary purchase. Stakeholders recognised that some of the issue of expense is related to the unregulated sales of scooters and of servicing. Stakeholders felt that there should be more regulation on companies that either sell or service scooters to stop people being taken advantage of.

5.4.4.6 Storage

Although the scooter users did not have difficulty storing their scooter, they recognised that many people would have difficulty. This is reflected by non-scooter users, most of whom said they would not be able store a scooter at their home. Some scooter users had to make space within their homes for their scooters, including by altering the size of a room in their house. Stake-holders also recognised that storage was a major barrier to the uptake of mobility scooters. Although storage was a problem for many, few of the non-scooters users were aware of scooter loan schemes. Loan schemes, such as Shopmobility, may remove this as a barrier, if the schemes were more widely known about. However, given that shopping is the most popular activity to carry out on a mobility scooter, loan schemes may not solve this barrier as, if they have to be returned to the lender, the user would still have to be content to carry their shopping home.

5.4.4.7   Weather

Rain, ice and snow mean scooter users cannot travel as scooters are not equipped to handle such weather conditions. This limits users' activities outside the house, particularly in winter. Non-scooter users appeared unaware of weather conditions limiting scooter use.

5.4.5 Regulation

5.4.5.1   Training

Whilst training was seldom raised by either users or non-users, it was raised directly by the stakeholders and indirectly by users and non-users talking about user behaviour, as well as some non-users' perceptions of driving a scooter being difficult. Molly's comments (see Section 4.3.2.8), alongside the concerns of the stakeholders, indicated a dearth of training and a need for more training to be available.

5.4.5.2   Guidance and Information

Neither scooter users nor non-scooter users mentioned a lack of information about mobility scooters. However, from the interviews it was clear that many users were not aware of the policies around mobility scooters, for example, policies around public transport use (see Section 4.3.2.4) or the capabilities of the scooter, for example distance capabilities (see Section 4.3.2.4). The lack of information on mobility scooters was evident through the stakeholder interviews (see Section 4.3.3) and through the available literature (Edwards & McCluskey, 2010; Formiatti et al., 2014; Jacobs et al., 2013; May et al., 2010). Information is very scarce on where to buy and sell them, the differences between models, the differences in prices, where to get training and where to scrap them. Whilst participants in the sample may not have been concerned or aware of this lack of information, it is likely that future potential users will be.

5.5. Changes to the Number of Trips Made

The quantitative data gathered from the interviews and from the questionnaire responses are too minimal to make any statistically robust claims. However, it gives an indication that scooter use did change the habits of the users in the sample. Data shows a mixed pattern, but indicates that the scooter users made fewer walking trips than the non-users, and made fewer trips than they did before they started using their scooter. It is possible that the decline in scooter user trips is because they had supplemented small manageable walking trips with longer trips by scooter. No research to date has examined trip changes between scooter users and non-scooter users or examined the changes of scooter users over time; therefore it is impossible to ascertain if these initial indications are correct. Both the questionnaire dissemination and the interviews occurred across all seasons, which means that a lower number of trips were not made by scooter users because they could not use their scooter in bad weather.

5.6   Trips, Physical Activity, and Physical Functioning: The Impact of the Scooter on Mobility

The ELSA data indicated that the amount of physical activity undertaken either stays at the same level or declines once a person starts using a scooter. The ELSA data also indicated that ease or ability to perform physical activities reduced once a person started using a scooter. However, the conclusion cannot be drawn that scooter use reduces the physical functioning of its user.

Firstly, of course, such a conclusion would only be a correlation, which would not equal causation. Secondly, the differences between the ELSA database participants and the questionnaire and interview participants are not known. There is no way to tell what the frequency of scooter use is amongst the ELSA scooter participants to compare it to the questionnaire and interview participants. There is also no way to compare the health of the ELSA scooter

participants and the participants of the questionnaire and interviews. Do the scooter users sampled in the questionnaire and interviews have less physical functioning than those of the ELSA database? If they do have less physical functioning, in particular their mobility, then there is less room for their physical functioning to decline. Certainly the mobility scooter users interviewed did not have a high enough level of mobility before they started using a scooter where a decline would make a difference to their ability to move around on their own.

6. Conclusion

6.1 Research Aims

The aim of this research (as stated in Chapter 1) was to understand how older adults with mobility difficulties perceived and experienced mobility scooters. In addition, the research aimed to learn about the prevalence of mobility scooters in the UK population of older people. This knowledge plays a crucial role in enabling the independent travel and therefore increased quality of life of older people who face limitations to their mobility. By high-lighting the benefits of scooter use, reducing the barriers to uptake and by providing this information to users and potential users, older adults with mobility difficulties will be able to make an informed decision about whether a mobility scooter would improve health and/or their quality of life. As shown in Chapter 2, the literature on this topic is sparse and where it does exist is often undifferentiated from other forms of vastly different assistive technologies. Therefore, in order to reduce this knowledge gap, this thesis posed eight research questions:

Research Question 1: Why do some people (with similar health/capabilities) choose to use a mobility scooter and others do not?

Research Question 2: Do non-scooters users' perceptions of using mobility scooters match the experiences of mobility scooter users?

Research Question 3: What are the barriers to using a mobility scooter and what can be done to overcome them?

Research Question 4: If the reason for not using a scooter is "I do not need one",
…what do they consider "needing" a scooter to mean?
…would they choose to use one if they did need it (why not if "no")?
…when would they perceive themselves needing one?

Research Question 5: Does using a mobility scooter change the number of trips made outside the house?

Research Question 6: Does using a mobility scooter change a person's perception of their quality of life?

Research Question 7: What is the prevalence of mobility scooter use in older adults?

Research Question 8: What changes in scooter users occur pre and post mobility scooter uptake?

6.1.1 Contribution to Theory

This thesis worked from a capability approach framework by expanding what is known about how individual capability is enhanced through the use of mobility scooters by older adults facing increasing mobility impairment. It aimed to help people "age in place", i.e. to enable people to continue to live where they wish to by ensuring they have the support and services that they need to do so. It is hoped the research here will help carers, primary care professionals, families and other stakeholders understand how mobility scooters are important to many older adults independence (as they define it). The results of this thesis provide further evidence of the importance of independent transport for social participation and social exclusion (as discussed in sections 2.1 and 2.2). Mobility scooters offer older adults whose mobility has begun decline a method of independent transport that enables them to engage in social activities as well as to access the services they need.

6.2 Conclusions to the Research Questions

The findings from this research have been summarised and discussed in chapters 4 and 5. The following section will synthesise the findings to answer the research questions.

> Research Question 1: Why do some people (with similar health/capabilities) choose to use a mobility scooter and others do not?

Research that combines the disciplines of ageing and transport seeks to understand how best to utilise transport modes whilst promoting healthy ageing. However, scant attention has been paid to how assistive technologies that enable independent travel are chosen or utilised. As described in Chapter 2, this knowledge would give an understanding of how potential beneficiaries of scooters could be encouraged to use them, as well as help predict the reasons behind the trends of use and the effect these trends will have.

Scooter users use their scooters to gain independence by enabling them to travel independently. Non-scooter users perceive that they would use a scooter if they lost their independence through a decline in mobility and had become housebound.

The question suggests that people using mobility scooters have a similar capacity for mobility to that of pre-clinically disabled older adults. However, the research showed that mobility scooter users had less mobility than pre-clinically disabled adults. People chose to use a scooter because they perceived that they would be housebound without it. Although non-users stated they would use a scooter if they became housebound, none of the non-scooter users were housebound at the time of interview.

The mobility scooter is more often used in place of a manual wheelchair because it (a) enables its user independent travel that an attendant propelled wheelchair does not, (b) enables its user to have greater independent travel without the fatigue that a self-propelled wheelchair creates, and (c) it enables

the user to be perceived (by both themselves and others) as less disabled than if they were using a wheelchair.

Where users and non-users do have similar levels of mobility, the scooter users chose to use a scooter because they were given an opportunity to use one or own one without a high financial cost.

The findings gathered in the process of answering this question have created an understanding of the reasons behind mobility scooter uptake and the characteristics of mobility scooter users. This was not available in any of the previous research carried out. In addition, for the first time, the findings provide evidence that scooters are being used in place of wheelchairs.

Research Question 2: Do non-scooters users perceptions of using mobility scooters match the experiences of mobility scooter users?

Research on satisfaction of mobility devices is carried out across the disciplines of transport and psychology. However, no studies examine how non-users of these devices perceive them. Without this information, it is impossible to tell whether non-users are likely to want to use these devices in the future and impossible to understand and change the interactions between scooter users and other pedestrians on the footways. Knowledge of perceptions of mobility scooters by both groups enables an understanding of the interactions between the groups, allowing transport and town planners to design shared spaces that remove or reduce the opportunities for tension.

Scooter user and non-user perceptions matched on the reasoning behind needing a scooter (a lack of mobility), but differed on the reasons for actual use. There is juxtaposition by non-users that scooter users should be disabled in order to use a scooter, alongside the opinion that users of scooters are not disabled. This juxtaposition occurs because mobility scooters reduce the signs and symptoms of disability.

The mobility scooter is advantageous to its user in that it does not outwardly show its user to be disabled. By giving its user the capacity to independently travel, it allows the user to appear to be less disabled and perhaps attract less stigma than they would using other assistive technologies, such as walking frames or wheelchairs. However, this advantage is also a detriment. Because scooter users do not appear disabled, many non-users assume that scooter users are misusing a scooter due to their lack of need.

Scooter users are much more positive about mobility scooters compared to non-users. Whilst scooter users are capable of viewing scooters and their use of a scooter from multiple angles, their conclusions of device are positive. Their experiences with the scooter can be negative, with problems of accessibility in the built environment, poor battery performance, negative interactions with pedestrians and negative attitudes towards them by non-users. However, ultimately, scooter users used their scooter because they perceived it to improve their life, principally by giving them the ability to travel independently and get them out of their home. Non-users did not experience these benefits of scooters and therefore their perceptions were based on their experiences of scooter users in their local neighbourhood.

Interactions between scooter users and non-scooter pedestrians illustrated how the mismatch between the two groups causes friction. Space on a typical non-commercial street was not designed to accommodate scooters, and the lack of space causes discomfort on both sides. Negative perceptions of scooter users would likely decrease if the space in which scooter users and other pedestrians interacted was wider. Widening footways would be a solution, especially given the likely rise in scooter users (see Section 5.2) and would benefit all pedestrians, particularly those who are more vulnerable. This suggestion is not to say that all footways must be widened with immediate effect, which is clearly too expensive and disruptive to be feasible. However, where new designs are being planned it would be beneficial for the planners to consider current and future use of the area by mobility scooter users and to take their use into consideration when designing the pedestrian space.

Research Question 3: What are the barriers to using a mobility scooter and what can be done to overcome them?

Until now no research has examined what barriers exist for scooter users and potential scooter users. Barriers mean that scooter users are not achieving the levels of independence and independent travel desired, which links (as shown in Chapter 2) to social exclusion, social isolation, reduced physical health, and quality of life. Without acknowledging and defining the existing barriers, no work can be made to remove them or to work around them.

The barriers scooter users acknowledged and those non-users perceived to exist overlapped but were not identical. The barriers scooter users perceived that non-users were unaware of, were the barriers that restricted travel rather than stop it. The barriers users identified of limited distance capable on a single battery charge and the inability to use scooters on public transport were perhaps barriers of uncertainty rather than genuine limitations. Better access to information would reduce these obstacles and allow users to travel independently outside their own neighbourhood.

Inaccessibility of the built environment is a problem faced by all scooter users as well as by any wheeled assistive technology. Scooter users tailored their routes and destinations to avoid inaccessible areas. For the most part, non-users were unaware of accessibility as a barrier to scooter use. This begs the question of how many people have given up using scooters because the built environment has provided too many obstacles.

Storage and expense were the biggest barriers to using mobility scooters. These are recognised barriers and schemes such as Shopmobility and local council loan schemes (mentioned in Section 1.2) have been founded to combat these. However, there are problems with these schemes. Firstly, scooter users said they were housebound without their scooter, however, the most common scooter lending services do not deliver to residences. There-fore, lending services are inaccessible to those that would derive the most

benefit. Secondly, schemes that do lend and deliver to residences tend to be loans for longer than a day, which requires storage space.

Loans of scooters are still the most effective solutions to the barriers of storage and cost, however, the delivery methods need to change. Scooters need to be available in residential locations rather than just in shopping districts. This could be hosted, in a similar manner to the bicycle hire schemes seen in many large cities, in communal areas of social housing that house older people. As housing that is designed for older people is commissioned, space for scooters could be accommodated into the design, allowing better access to scooters for older people in the long term.

These findings create a body of evidence on the barriers that scooter users and potential beneficiaries of scooters face, and the first suggestions of how to address them.

> Research Question 4: If the reason for not using a scooter is "I do not need one",
>> …what do they consider "needing" a scooter to mean?
>> …would they choose to use one if they did need it (why not if "no")?
>> …when would they perceive themselves needing one?

This question addressed the psychological barrier that older adults with declining mobility often face. It seeks to understand the reluctance of some older adults to engage with assistive technology. However, the lack of research in ageing and transport on mobility scooters means there is a gap in knowledge around this. The findings from this research contribute an understanding of the importance of mobility and acceptance of declines in physical function.

There is a psychological barrier to using a scooter, which is accepting that one's physical functioning has declined. The non-users interviewed had all

experienced declines to their mobility but still could not accept that a scooter might be beneficial. Non-users said they would accept using a scooter if it stopped them becoming housebound. However, when non-users become housebound and are willing to accept the need for a scooter, they will still need to be able to afford the cost of buying a scooter and the space to store one for them to be able to access one.

Research Question 5: Does using a mobility scooter change the number of trips made outside the house?

As shown in Chapter 2, transport psychology and transport engineering research are clear that making trips outside the house is important for health, quality of life and social inclusion. Therefore, in order for mobility scooters to be beneficial, the number of trips older people make needs to be either increased or maintained. The findings from this research, as shown in Chapters 4 and 5, indicate that mobility scooter users make fewer trips outside the house than their non-user counterparts, but more trips than they themselves previously made before they started using a scooter. This finding contributes to these two fields the knowledge that mobility scooters are an assistive technology that does enable its user to travel more.

Research Question 6: Does using a mobility scooter change a person's perception of their quality of life?

As shown in Chapter 2, mobility is linked to quality of life, including feelings of isolation, social exclusion and depression. Engineers have designed assistive mobility technologies as a way of improving independent travel, and psychologists within the fields of transport, as well as gerontologists, have assumed that these technologies meet this need. This research contributes to the knowledge about the benefits of assistive technology, in particular the mobility scooter. The findings in this research indicate that quality of life does improve with scooter use. The term "indicate" is used here as, without a

comprehensive quality of life measure used across time, prior and post uptake, a more objective conclusion cannot be reached. Certainly with hindsight, scooter users perceived their quality of life had improved. This research provides some initial evidence that overall mobility scooters do improve quality of life.

Research Question 7: What is the prevalence of mobility scooter use in older adults?

To design and provide for both current and future footway users, an understanding of the numbers of mobility scooters and predictions of the future numbers of scooter users is vital. Until Barton et al., (2014) no estimates of scooters within the UK was known. The research carried out in order to answer this question provided a fuller estimate not of scooter ownership, but of scooter use within the UK.

As shown in Chapters 4 and 5, the proportion of older people using scooters in the UK is low, but has increased and will continue to do so. Given that the "baby boomer" generation is just reaching their 70s, the number of scooter users is likely to continue to rise.

There are a lot of older people who could benefit from using a scooter, particularly those who have little or no mobility and are housebound. Allowing this group independent travel would improve both their quality of life, reduce the likelihood of social isolation, social exclusion and depression. However this group of people face the expense of buying a scooter and/or the barrier of being able to store it. The current lending schemes cannot fully overcome these barriers for these individuals, and a practical solution is needed to provide a better quality of life for this group.

Research Question 8: What changes in scooter users occur pre and post mobility scooter uptake?

The debate between mobility scooter users' positive experiences and perceptions, and the possibility that using scooters causes functional decline, is of great interest and importance. Until now, these topics have had scant quantification and there was value in amassing evidence for both theories and how they interact. The results of the research show that while for many scooter users activity levels do not change, it is plausible that some scooter users participate in less physical activity and sacrifice physical functioning for maintained activity participation and independence.

6.3 Limitations

As with any research participation, response bias is a possibility. Participants completing the questionnaire or agreeing to be interviewed are self-selecting and may have stronger opinions about the topic than the target population in general. The method of the research tried to reduce this potential bias by (a) ensuring questions in the interviews and questionnaire were not leading and (b) not recruiting through scooter support groups or scooter clubs.

In order to balance a positive bias of scooter use, it would have been interesting to interview former scooter users to learn why they gave up their scooter. However, no former scooter users were found during the recruitment process from the original longitudinal study recruitment, the questionnaire recruitment or the interview recruitment. This is unsurprising given the difficultly finding current scooter users. A possible method of locating former users would be to contact people selling second-hand scooters to see why they are being sold. However, this was outside the time and scope available for a PhD project.

Both the questionnaire and interviews involved respondents remembering their behaviour and perceptions from a time before they used a scooter. For most scooter users, this was more than two years ago, therefore it is difficult to know whether their recollection of events and feelings is accurate.

The sample of stakeholders interviewed is small and the number does not reach saturation levels recommended for interviews (as discussed in Section 3.3.2). This was unavoidable. There are very few people in the UK with knowledge about scooter users. For example, at the beginning of this research, enquiries with the Department for Transport found that no one in the present staff had knowledge of scooters. During the interview stage, the staff member under whose jurisdiction mobility scooters resides in the department was contacted but they stated they had just started in post and had no knowledge of scooters. Only one other researcher within the UK was found to have undertaken research on scooters. They were contacted and provided separate information (Johnson, 2015). An attempt was made to interview more Shopmobility managers but none responded to requests. Attempts were also made to interview mobility scooter manufacturers but none responded to requests.

6.4 Future Research

The attitudes towards scooter users by non-users is detrimental. These negative perceptions are likely to discourage potential users from becoming users and benefiting from increased independence. Given these perceptions, in combination with the increase in scooter users, the number of interactions between pedestrians and scooter users is likely to increase as well, as will the demand on space on the footway. The perceptions of scooter users by non-users, combined with rise in scooter use, means it is important to educate non-users on the types of people who use scooters and the reasons they use them. In 2014 the charity Scope ran a campaign showing to raise awareness of how to interact with people with a disability (Scope, 2014). Their videos, which on social media went viral, link to their website which contains additional tips and information. A similar campaign for mobility scooter use, either by scooter manufacturers, a disability charity or the Department for Transport may reduce any abuse that scooter users receive.

The experiences of interactions between pedestrians and scooter users is often perceived as negative by both groups. This is often because the two groups are unsure of their rights within shared spaces and the rules governing the space. In order to improve these interactions, the rules, rights and etiquette of shared spaces needs to be promoted. Recent additions to the Highway Code include rules on how mobility scooters should be used on pavements and on the road (Department for Transport, 2015b). If these were promoted to both users and non-users (perhaps via public information posters in high density pedestrian traffic areas as well as in information leaflets with every purchase of a mobility scooter) then interactions may improve.

It is important to note that this research only studied non-users who were both over 65 and pre-clinically disabled. The attitude of non-scooter users who are younger than 65 and suffer from no mobility impairments has not been investigated. Their attitudes towards mobility scooters may be completely different, especially as they are often less vulnerable.

The increases in scooter users predicted by this research alongside further increases if some of the barriers to use are improved, mean it is critical for scooter users and other pedestrians to be able to occupy the same spaces in harmony. As discussed in Section 5.2, the impact an increased scooter population will have on shared spaces and shared facilities must be understood. In addition, scooter user behaviour and scooter capability must be understood (see Section 5.4.2.1).

6.5 Final Conclusions

The number of scooter users in the UK, whilst proportionally small, is rising and will continue to rise. In order to meet the challenges increased prevalence of scooter users will create, to optimise the value of scooter use to current users and to optimise the value of use to future users, it is crucial to learn what the effects of mobility scooters are and will be.

A lack of mobility and subsequent a lack of ability to travel independently is what draws older adults to use a mobility scooter. As long as older adults are able to travel independently, a mobility scooter will not appeal to them. Both scooter users and non-users believed that mobility scooters enabled their users to gain independence. Scooter users perceived their quality of life to have increased as a result of access to their scooter. However, non-scooter users were more likely to view scooters negatively. This is the result of the perception of dangerous and aggressive behaviour, combined with perception of users having given up their physical functioning. The biggest barriers to scooter use were accessibility within the built environment, storage of the scooter, and the cost of the scooter. The lack of good information on scooter types and lack of training were additional barriers to optimal use and device-person match.

Whilst it is feasible that users experience a slight decline in physical function due to their use of a scooter, they gain much more: independent mobility; avoiding becoming housebound; and feeling they are perceived by others as less disabled. However, there are many older adults whose mobility is restricted that could benefit from using a scooter. However, for this group the barriers of expense, storage, and access deny them of this possibility.

Reducing the barriers by changing the provision of scooter hiring and loans to be available in more residential locations, alongside a long-term goal of creating housing with the room for scooter storage, would give more housebound and mobility-restricted older people access to reap benefits of independent travel that a mobility scooter provides. However, by reducing the barriers and allowing more people to access and utilise scooters more mobility scooters will be present on the footways and on the road, even more than the current trend of increased scooter prevalence. This means that the footways will be ever more crowded and that more interactions are likely to be negative. For the benefit of all footway users, footways should increase in width wherever possible. It is acknowledged that the increase in footway width would be a long-term prospect rather than a solution that can occur in the short term.

There is a stigma held by non-scooter users that people who use scooters are giving up on their physical capabilities and letting their bodies age prematurely. By examining the characteristics of current scooters users, this research provided evidence that this stigma is incorrect. Scooter users are disabled, typically relying on more than one piece of assistive technology to allow them independent travel. Those who used scooters were gaining exactly what non-scooter users hoped that scooter users would be gaining: the ability to leave the house and travel independently.

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Appendix A: Initial Research Eligibility Questionnaire

Older people and mobility: the long-term health impacts

We want to understand how older adult's mobility changes over time and how this affects their overall health. The results of the study will help inform doctors, carers, other health professionals as well as the general population about how to maintain mobility for longer.

We are recruiting people aged 65 and above who live in the London area. The study will take place over a two-year period where we will ask you attend five sessions at our laboratory in Tufnell Park. We will pay for your travel costs at each visit and compensate you for your time at the end of the study.

If you would like to take part, please answer the following questionnaire. Those who are eligible will be contacted and invited to participate.

1. **For health or physical reasons do have any difficulty in walking 800 metres (half a mile)?**

   □ *No*
   □ *Yes*
   □ *No longer do this due to difficulty doing it*
   □ *Could do it but do not for health reasons*

2. **Have you changed how frequently you walk 800 metres (half a mile) due to underlying health problems?**
   For example, have you cut down from walking every day to walking 3-4 times a week because you tire more easily?

   □ *No*
   □ *Yes – do it more frequently*
   □ *Yes – do it less frequently*
   □ *Yes – don't do it anymore*

3. **Have you changed the method that you use to walk 800 metres (half a mile)?**
   For example, do you walk more slowly or more carefully, use a different stance or gait, use a walking stick, frame or other aid, take more frequent rest stops?

   □ *Yes*
   □ *No*

4. For health or physical reasons, do you have any difficulty in climbing 10 steps?

☐   *No*
☐   *Yes*
☐   *No longer do this due to difficulty doing it*
☐   *Could do it but don't for health reasons*

5. Have you changed how frequently you climb 10 steps due to under-lying health problems?
For example, do you take the elevator more often whenever possible because of pain in your joints?

☐   *No*
☐   *Yes – do it more frequently*
☐   *Yes – do it less frequently*
☐   *Yes – don't do it anymore*

6. Have you changed the method that you use to climb 10 steps?
For example, do you use the handrail more often, reduce the number of steps you take at a time, walk slowly or more carefully, make frequent rest stops?

☐   *Yes*
☐   *No*

7. For health or physical reasons, do have any difficulty in getting in or out of a car or bus?

☐   *No*
☐   *Yes*
☐   *No longer do this due to difficulty doing it*
☐   *Could do it but don't for health reasons*

8. Have you changed how frequently you get in or out of a car or bus?
For example, you decrease the number of car/bus trips you take because it is difficult to get yourself out of the seat?

☐   *No*
☐   *Yes – do it more frequently*
☐   *Yes – do it less frequently*
☐   *Yes – don't do it anymore*

9. Have you changed the method that you get in or out of a car or bus?
For example, you use the door or seat to steady you, you rely more on your arms to help you, you enter or exit more slowly, you require help from others?

☐   *Yes*
☐   *No*

10. Do you regularly use any kind of walking aid (a wheelchair, walking frame, cane, etc.)?

☐   *Yes*
☐   *No*

If yes, please say what device? _____

11. Do you or have you owned a mobility scooter?
Pick which applies most to you

☐   *I own a scooter or I use one regularly*
☐   *I used to own a scooter*
☐   *I have never owned a scooter*

12. Have you ever considered owning a mobility scooter/using a mobility scooter on a regular basis?

☐   *Yes*
☐   *No*

13. Could you store a scooter at your home?
A mobility scooter needs a secure place to be parked

☐   *Yes*
☐   *No*

14. Gender

☐   *Male*
☐   *Female*

15. Age

[   ]

16. Are you retired?

☐   *Yes*
☐   *No*

If you meet the required criteria, we will contact you to participate in the study. The study will involve five visits to the UCL pedestrian movement laboratory in Tufnell Park. The visits will take one hour and will occur every six months..

Contact details:

      Name_____

      Phone number_____

      Email Address_____

      Preferred method of contact_____

      Postcode:_____

Please return your questionnaire via email to r.thoreau@ucl.ac.uk or to Roselle Thoreau, using the FREEPOST envelope provided.

Appendix B: Mobility Scooter Review Paper

The impact of mobility scooters on their users. Does their usage help or hinder?: A state of the art review

Roselle Thoreau

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Abstract

As older people start to have difficulty in walking many choose to use a mobility scooter to help them move around. Benefitting from improved design, mobility scooters are becoming an increasingly popular mobility device and are a common sight on many streets. However, very little is known about their usage or their impact in terms of either quality of life or functional health. Whilst mobility scooters may help to improve the quality of life of their users, it is also possible that the sedentary nature of their usage results in a decline of physical function and therefore reduced capabilities. Before any substantial research can be carried out it is crucial to understand the importance of a mobility scooter on the lives of the people that use them and to review the initial research published on the effect of scooter use on physical health. This paper is a state-of-the-art review. It describes the current research knowledge on mobility scooters, shows where gaps in knowledge exist and where future research needs to focus.

1. Introduction

Every year every person in England makes an average of 923 journeys, 22% of these are by foot (National Travel Survey, 2014). The health outcomes of active transport, such as walking are widely acknowledged (Carsperson and Fulton, 2008; Hamer and Chida, 2007; Lee and Buchner, 2008; Murtagh et al., 2010). Many older people have difficulty in walking and the percentage of people in this group rises with age (Mindell and Craig, 2005). Depending on the reasons behind the difficulty, as people begin to struggle to walk they have a range of options open to them which can be used alone or in combination. They can; walk less often, walk less far, take more frequent rest breaks while walking, use public or private transport, use a mobility aid for stability

such as a walker or a cane, or use a mobility device instead of walking such as a wheelchair or a mobility scooter.

Mobility scooters are becoming an increasingly common sight on many streets. Benefitting from improved design and image as well as a decrease in usage stigma, mobility scooters have become an increasingly popular mobility aid. They can be hired in large supermarkets, in shopping centres, at some tourist attractions and visitor centres and are widely available for purchase including on the high street. However, despite their prevalence little is known about their impact upon their users physical health and physical capabilities.

From a health literature perspective a mobility scooter can be seen as a walking and physical activity replacement. It enables its user to travel distances they previously would have made by foot (or short distance vehicle trips) without any physical effort (Hoenig et al., 2007; Steyn and Chan, 2008; Zagol and Krasuski, 2010). For some older people a mobility scooter can be a replacement for a car and for the types of trips they would have made with a car. However a mobility scooter also has the potential to replace shorter trips that car drivers might previously have considered too short to drive, and therefore would have walked. For an older adult with difficultly maintaining their previous levels of walking, using a mobility scooter allows them to participate in activities they previously could not access, to participate in activities without discomfort or to extend the duration of participation.

The evidence supporting the health benefits of physical activity for older adults is well documented (Ferrucci et al., 2004; Guralnik et al., 1993; Grossman and Stewart, 2007; Manson et al., 2002; Taylor et al., 2004). On the one hand, the mobility scooter, as a sedentary mobility device may plays a detrimental role in the health of its user. On the other hand, the popularity of the device suggests that there are great benefits to its use. It is important to understand the role mobility scooters plays in older people physical health so that we can ensure older people who use scooters get the greatest benefits without risking their future physical function. Before any substantial research can be carried out to untangle the complexity of the impact mobility scooter usage has on physical health it is crucial to understand the importance of a mobility scooter on the lives of the people that use them and to review the initial research published on the effect of scooter use on physical health.

This paper is a state-of-the-art review of the current literature available. It examines where knowledge gaps lie and where future research is and should be focussed.

2. Background

Mobility scooters are a single occupant electronic transport vehicle and are used as a mobility aid. A solely battery operated device; it usually has between three and five wheels and is steered using a handlebar. Different scooters can be ridden either on the pavement or the road depending on speed capability and they may include a horn, lights and space for storage. They are often referred to as power- operated vehicle/scooters or electric scooters (May et al., 2010; Steyn and Chan, 2008). Mobility scooters are

designed for and used by individuals who are able to walk and manipulate themselves on and off a seated object. Unlike wheelchairs, mobility scooters are generally treated as vehicles in the sense that they do not have to be guaranteed access into buildings. This means that in order to access services and activities users must be able to walk.

In the United Kingdom (UK) there are numerous ways to access mobility scooters. Many retail outlets sell them, including a major high street seller, specialist retails stores and multiple online providers. Additionally, they are bought second-hand. Many loan schemes for mobility scooters exist. Although the National Health Service (NHS) does not provide patients with scooters some local councils, for example Camden Council (2014) operates a long-term loan scheme and short-term hire schemes. Some large supermarkets loan scooters to shoppers free of charge while they are on the premises. The largest scheme giving access to mobility scooters in the UK is Shopmobility. Shopmobility is a lending scheme based in shopping areas who lend mobility scooters, powered wheelchairs and manual wheelchairs to people whilst they are in the shopping district (Gant, 2002). Charging for use varies but most schemes are free. The service is offered to anyone who is permanently or temporarily disabled though no proof is required making the scheme essentially available to be used by anyone. Users must become members of the scheme and training on usage is offered at this stage. Once a member bookings can be made in advance of arrival.

Laws regarding scooters in the UK are set out by the Department for Transport (2012). Scooters are defined as class two or class three vehicles. No driving licence is required to operate them. Both classes of vehicle must be driven by people who are disabled and are 14 or older. However it is not clear whether these rules are being enforced in class two mobility scooters (Barton et al., 2014). Class three vehicles must be registered with the Driver and Vehicle Licensing Agency (DVLA), although they do not pay road tax they do have to display a NIL tax disk. Class two scooters are those that cannot exceed 6.44 km/h (4 mph), can be used on the pavement and cannot be used in the road except where crossing it. Class three scooters can travel up to 12.9 km/h (8 miles). They are allowed by law on the road if they are travelling at greater than 6.44 km/h but must not travel on motorways. Class three vehicles must have lights, mirrors and a horn.

The mobility scooter is considered to be an assistive technology. Assistive technology is defined by the World Health Organisation (2004) as any device or system that allows individuals to perform tasks that they would otherwise be unable to do or increases the ease and safety with which tasks can be performed. In order to carry out the desired activities, for example visiting family or going shopping, users need the physical function mentioned above. Safe operation of the scooter also requires the user to be able to turn their head to look behind them, although class three scooters, and some class two scooters include rear view mirrors. Safe operation also requires the ability to balance when the scooter is driving on a slope, on rough grounds or on and off pavements. Despite the necessary physical function when moving on and off the mobility scooter, the actual operation is a mainly passive task, requiring only a minimal amount of grip strength to engage the accelerator. In this

sense the scooter does not assist the user to walk but removes the necessity of the task (at least while on the scooter).

In the United Kingdom, mobility scooters are an entirely optional device. A mobility scooter has not been designed, nor has built the environment infrastructure been altered to allow for mobility scooters to access most buildings. Therefore, a person using a mobility scooter needs to be able to walk albeit for short distances and/or with assistance. Whereas wheelchairs, electric or manual, are provided by the National Health Service (2014) (NHS), the choice to use a mobility scooter is made by the individual. Mobility scooters are bought privately, although a registered disabled person can apply for a small subsidy (Motability, 2014).

3. Methodology

This review examines the current knowledge of mobility scooters in relation to the effects they have on the user, in particular the user perspective of their device and any changes to the physical health of the user. In this case physical health is referring more specifically to physical function of mobility in the users over time, i.e., the maintenance of their capabilities of walking at the level they could before they began to use a scooter. Emphasis has been placed on older people, as one of the most visible users (Barton et al., 2014) and the group of people more likely to become frail (Rockwood et al., 1999). Older people is a term which can range in meaning from all those above 60 years old to an older subset of this group or simply those of pensionable age (Gilleard and Higgs, 2011; Roebuck, 1979; United Nations, 2002; Victor, 2010). Some studies make no mention of age, where the focus is on the injury, disability or capability of the user.

In gathering the evidence this paper includes papers and reports with a variety of research designs, including both larger controlled trials and smaller case studies, using either qualitative or quantitative methods. Literature was identified by searching electronic databases, SCOPUS, PubMed, PsychINFO, EMBASE and AMED. The search terms used were: mobility scooters, electric scooters, motoris(z) ed scooters, and powered mobility devices. The reference lists of relevant papers were examined to locate any secondary sources not gathered through the original search. Government websites (Department for Transport, Office for National Statistics and Department of Health) were searched for relevant statistics, reports or policy documents. The criteria for inclusion was (1) primary source studies, (2) studies involving adults (3) studies which included outcomes for mobility scooter users as separate from other personal mobility devices and (4) studies presented in English. The articles were then filtered to remove irrelevant papers (for example, papers on childrens push scooters and mopeds). No papers were found on accidents involving scooters with the exception of media publications which were not included as they recounted singular accidents with little objective evidence.

Literature on mobility scooters can be divided into three categories, (1) prevalence within the population, (2) user perspectives and (3) physical function and physical capability impact.

4. Discussion

There is a dearth of literature on mobility scooters. Where it does exist it is often research in combination with and undifferentiated from electric wheelchairs. Like scooter users, many manual wheelchair users have some physical function that allows them some mobility (Hoenig et al., 2002). However, whilst a useful starting point the evidence from these studies will not always be relevant to scooter users. In the UK electric wheelchairs are only provided on the NHS to those people who need wheelchairs fulltime and are unable to propel themselves in a manual wheelchair (Standards for Better Health, 2005) unlike a mobility scooter, which is a private purchase. To gain a wider understanding of what may be relevant to mobility scooter users, some evidence on wheelchairs have been included here. Where evidence relates only to scooters this has been made apparent.

4.1. Prevalence

There have been many attempts to quantify the number of mobility devices, particularly wheelchairs, in different countries. This data would be useful to help to understand the population who use them and to follow any trends in prevalence and their impact. Due to limited registration requirements and a lack of clear differentiation between mobility scooters and wheelchairs, accurate numbers are not available (Barton et al., 2014). However, some estimates of numbers and evidence of trends do exist.

4.1.1. Wheelchairs

The number of wheelchair users in the UK has increased. Evidence has been found that between 1986 and 1996 the number of wheelchair users doubled (Manty et al., 2007). Current figures for wheelchair use in England are estimated at 1.2 million, with 825,000 of those being regular, long term users (Huonker et al., 1998; Papworth Trust, 2010).

4.1.2. Mobility scooters

Mobility scooter numbers are less well documented than wheelchair numbers (Barton et al., 2014). Where documented they reflect wheelchairs in their increasing numbers. In 2009 the sales of mobility scooters in the UK totalled £83 million but this had increased to £96 million in 2013 (Keynote Ltd, 2014). This rise is reflected in global figures of £182 million in 2009 rising to an estimated £245 million in 2013. Projected estimates for 2017 global sales reaches £335 million (Global Industry Analysts, 2012). In 2006 it was estimated that around 25,000 mobility scooters were bought each year in the UK (Barham et al., 2006) and it is now estimated that approximately 80,000 are being bought each year (Barton et al., 2014). An estimated 350,000 are currently being used in the UK (Barton et al., 2014). Ricability's survey found that 47% of their mobility scooter respondents were over 65 (Barton et al.,

2014), lower than the estimated 74% of wheelchair users over 60 (Sapey et al., 2004). Using the estimate by Barton et al. and ONS (2013) population data, percentages of users can be calculated. 1.5% of the population over 65 uses scooters compared with 0.5% in the general population. This percentage is similar to Thoreau (2011) who used the English Longitudinal Study of Ageing database (ELSA) to discover the proportion of over 65 year olds who use mobility scooters. ELSA included a question on mobility scooter use (rather than ownership). Thoreau (2011) examined a subset of ELSA and found 1.4% of those aged over 65 used a mobility scooter.

Whilst the use of mobility devices including mobility scooters is increasing there is no evidence that the number of people with difficulty walking has increased. For example, US research shows that the number of people unable to walk 400 m (quarter of a mile) has not changed over time (Auger et al., 2008; LaPlante, 2003). LaPlantes data is from across all ages and they state that the data does not shown clearly whether increases in mobility device use is down to older people or non older people. It has been suggested that the growth in usage is down to a decrease in usage stigma and improved device image and design (LaPlante, 2003).

4.2. User perspectives

Studies on user perspective or user experiences are crucial to ensuring mobility scooters meet their users requirements and highlight where improvements can be made. Whilst studies on different aspects of user perspective exist on assistive technology devices only two studies have focussed solely on mobility scooters and their users (Barton et al., 2014; May et al., 2010).

4.2.1. Person-device match

The unregulated access to assistive mobility devices including mobility scooters, while giving potential users freedom of choice, does have a disadvantage. It means a lack of good advice to assess the suitability of a device to a person and vice versa. There is a great need for an assistive technology device to match an individual's capability/mobility needs (National Health Service, 2011). When a device is matched correctly the device is seen by the individual as empowering and giving them more freedom. When the device does not suit them users lack confidence and are at higher risk to their own safety (Bergen, 1997).

4.2.2. Training and guidance

The amount of training given to users influences their likelihood to use the device (National Institute of Health and Clinical Excellence, 2006). Whilst there is support for training for safe use (Mortenson et al., 2014; Townsend and Watson, 2013) training does not always occur. Estimates of the number of scooter users who receive training vary widely. An international survey of scooter users found only 25% had received training (Mortenson et al., 2014). However, a UK study found that a majority of users, 59%, received training, with 42% of users receiving the training from the organisation they bought

their scooter from (Barton et al., 2014). A focus group of scooter users and stakeholders recognised that there were safety risks involved in using scooters but there is no data to prove this (Barton et al., 2014). Training does occur but is not available at a national level. Local schemes are often run by the police (for example Norfolk Police (2014) run training events), or mobility centres (for example Parkgate Mobility (2014), run a scheme in Yorkshire).

Only a third of wheelchair and mobility scooter users ask for guidance from a health professional before buying their device (Bowling and Stenner 2011). In the UK some advice is available. Disability Rights UK, a disability network, provides an online guide to the range of scooters available and some guidance on how to choose the right one for individual needs (Campbell, 2014). Ricability, a consumer research charity, creates independent reports for older and disabled people on various assistive technology goods. They have a guide on using mobility scooters on public transport and choosing the right scooter (Ricability, 2014; Jacobs et al., 2013). The Department for Transport (2012) also offers some advice on choosing a suitable mobility scooter as well as explanations on legal rules and requirements.

4.2.3. Satisfaction, independence and wellbeing

Research around user satisfaction, independence and wellbeing specifically of mobility scooters is sparse. With the exceptions of two papers (May et al., 2010 and Barton et al., 2014), any research on mobility scooters in these areas is combined and undifferentiated with electric wheelchairs.

Studies of a range of assistive mobility devices for mobility found that users felt their device enabled them to participate in more activities, gave them greater independence and increased their sense of security (Brandt et al., 2004; Evans et al., 2007; National Health Service, 2010; Ordonez, 2006; Woods and Watson, 2003; Wressle and Samuelsson, 2004). Evidence specifically from mobility scooters show that users generally view their devices positively, associating them with the freedom to move independently outside the house, in some cases being housebound without them (May et al., 2010).

A small study of powered wheelchair and scooter users (Sammuelsson and Wressle, 2014) found a high level of satisfaction and ease in activity participation after uptake of their devices. Users found that their ability to socialise, be mobile and their sense of safety, independence and self-esteem all raised as a result of device uptake. The studies findings are limited by its small sample size (20 mobility scooter users and 4 electric wheelchair users) and its lack of differentiation in its results between the different types of user by device. However, given that 80% of the sample are scooter users it can be concluded that scooter users do gain satisfaction, security and independence from using their scooter.

Barton et al. (2014) surveyed a total of 480 mobility scooter users of all ages in the UK. It is the first large survey of scooter users in the UK. The survey gives some useful insight into scooter user satisfaction and travel behaviour. This was a self-selecting sample of users, the majority of whom, 88%, owned their own scooter. Respondents were asked why they chose to use a mobility

scooter, instead of a wheelchair. The two most common responses were that scooters were easier to use (61%) and that scooters were more comfortable (52%). In addition they found that users relied on their scooter to get around, with 74% of respondents saying they would not make the same trips without their scooter. Of those who felt they could make the same trips without the mobility scooter only 10% felt they could make the trip by walking.

May et al. (2010) surveyed a total of 66 scooter users and held focus groups with an additional 15 users. The research focussed on users experiences with their scooters and gathered data only from users over 65. Users started using scooters to maintain their levels of mobility either as a result of losing physical capabilities or when they stopped driving. Users satisfaction with scooter comes from users enhanced mobility. Respondents felt that using a scooter meant they were able to travel to more destinations, achieve more daily tasks, maintain more independence and increase their sense of wellbeing.

Both these two studies provide insight into the experiences of scooter usage. May et al. is particularly useful in understanding the experiences of older users. Both studies show that users view their scooters as a very positive part of their lifestyle. The main negative aspects to their experience are from a lack of accessibility from the built environment. By using current scooter users the data gathered is likely to be positively skewed. For a more rounded understanding it would be illuminating to talk to people who potentially could use scooters but do not and people who have used scooters in the past but no longer do.

Negative views of devices stem from accessibility and from interaction with pedestrians (Brandt et al., 2004; Evans et al., 2007; Steyn and Chan, 2008; May et al., 2010). In a study of different mobility devices, dissatisfaction was recorded where users found their device limited where they could access (Evans et al., 2007). In their study of mobility scooter users and powered wheelchair users, Brandt et al. (2004) also noted that some users had encountered difficulties in carrying out their activities and that the older the users were the less they felt their device was suitable for the activities they wanted to complete. These findings are echoed by mobility scooter users who found that accessibility into buildings, along pavements and on sloped surfaces was limited (Barton et al., 2014; May et al., 2010; Edwards and McCluskey, 2010).

4.2.4. Activity

Common activities carried out using mobility scooters were: going for a ride, shopping, daytrips and social visits to family or friends (Barton et al., 2014; Brandt et al., 2004; Edwards and McCluskey, 2010; May et al., 2010). Scooter trips are typically made by users between three to five times per week (May et al., 2010) and the most common activity to carry out using a scooter was shopping, followed by visiting local places (Barton et al., 2014).

Two studies (Brandt et al., 2004; May et al., 2010) found evidence suggesting that use of both powered wheelchairs and mobility scooters should be taken up earlier and be used by people who were less impaired than the study sample so as to delay activity dropout levels as a result of immobility (the

Brandt et al. study covered mobility scooters and powered wheelchairs whereas May et al. study only looked at mobility scooters). This conclusion fits well with satisfaction literature, but its advice works against the literature on physical functioning and sedentary lifestyles.

4.3. Physical health

The bulk of the research in this area has been carried out on wheelchair users, their physical activity levels and their physical function and physical capabilities. This research is based on those who use their wheelchairs on a full time basis (generally Spinal Cord Injury patients, e.g., Haisma et al., 2006). There are two reasons that these findings cannot be generalised to scooter users. Firstly, scooter users are able to walk, albeit often for only a limited distance. Secondly, manually propelled wheelchairs require physical effort to propel their chairs forward whereas scooter users do not (Suzuki et al., 2012). The research in this section is focused only on those studies that separately examine mobility scooters.

There are opposing views regarding the use of assistive technology which is physically passive and their impact upon physical function that can apply to mobility devices such as mobility scooters (Hoenig et al., 2007; Steyn and Chan, 2008; Weiss et al., 2007). On the one hand it is possible that mobility device use, including mobility scooter use, increases participation in both physical and social activities outside the home that users would have been unable to participate in without using such a mobility aid (Brandt et al., 2004; May et al., 2010; Ordonez, 2006; Woods and Watson, 2003). Access to these activities, via mobility aid use, may increase aspects of quality of life and wellbeing in users (Steyn and Chan, 2008; May et al., 2010). On the other hand assistive technology devices that are completely passive when the user does have some physical function, run the risk of de-conditioning the users physical function and their mobile capabilities at a faster rate than if they had used a more physically active assistive technology (Weiss et al. 2007). It has been argued that scooters are a lifestyle choice rather than a medical necessity (Hendry and McVittie, 2004) and therefore there is value in considering whether this lifestyle choice could be harming long term physical capabilities. Aside from theorising only two studies, Hoenig et al., 2007 and Zagol and Krasuski, 2010, have focused on objective functional physical health measures and mobility scooter use.

Hoenig et al. (2007) study aimed to understand the effect of scooter use on the walking ability of people with knee osteoarthritis or rheumatoid arthritis. This randomised control study involved participants with either condition, who were able to walk 15m independently. Participants were randomly either given scooters or maintained their usual care (control group). Participants walking abilities were tested, using a 6-min walk test, one month and three months after the scooter group began to use mobility scooters. Participants were questioned on the type of activities they participated in during the time period. The study found no significant differences in scooter users walking abilities when compared to the control group. However, scooters users were found to participate in a wider range of activities when they used the mobility

scooters. The study concluded that, in terms of walking ability, mobility scooter use creates no adverse effects.

The randomised control methodology means the results will be accurate despite the small sample size (n=16). However, this study has a number of limitations. First, the study revisits the participants after 3 months and can only provide evidence for short term effects. This evidence cannot be used to understand or predict the effect over a longer period of time. It can be surmised that most scooter users will use their scooters for a longer time period than 3 months (Barton et al. found that most users have owned their scooters for at least two years) and this length of time might be too short to pick up evidence of a change in locomotory capabilities. It would have been more interesting had the group been studied over a longer period to determine the existence, timing, and persistence of any such change. Secondly, the study examines individuals with a specific condition known to affect mobility. From this viewpoint the study can make no comment on those who take up scooters for other reasons (for example as a result of pre-clinical disability). Thirdly, the scooter group were more likely to already be using wheelchairs at baseline. If these users are merely substituting time spent in the wheelchair with time spent in the scooter then no extra sedentary behaviour is occurring and therefore minimising the effects.

Zagol and Krasuski (2010) aimed to understand whether providing patients with mobility scooters increased their cardiovascular risk. The study was a retrospective analysis of data of patients from an army medical centre in the United States. Patients who had received a mobility scooter within a six-year period (1998–2004) were included and their medical data one-year prior and one year post receiving their scooter was extracted (n=102). Once selected, this group was sent a questionnaire on usage of the mobility scooter, as well as perceived wellbeing and quality of life post and prior to receiving a scooter.

From the data available, BMI, weight, cholesterol, blood pressure, fasting glucose level and medication was included. This enabled a cardiovascular risk to be created for each individual. Cardiovascular risk was measured for 12 months before a mobility scooter was prescribed, as a baseline, and 12 months after a mobility scooter was prescribed.

The study found a statistically significant increase in fasting glucose level (from 119–133 mg/dl), in haemoglobin Alc (6.3 to 6.8) and in the incidence of diabetes. BMI did not change and nor did systolic blood pressure. However, 20% of patients had their blood pressure medication increased or had additional blood pressure medication prescribed during this time. At odds with the medical data, the questionnaire data found that patients felt their mental wellbeing, their perceived physical function and their overall quality of life had improved between pre and post mobility scooter uptake. The results of this study provide some evidence that mobility scooter use may have negative impacts on physical function.

The study had a couple of limitations. Firstly, no control group was studied and it is therefore it is not known whether a similar population without scooters would have similar changes in cardiovascular risk. A matched control

group from the same database would have shown whether or not this was the case. In response to this criticism from Hoenig et al. (2010), Zagol and Krasuski stated that the incidence of diabetes in their sample was much higher than expected in an age-adjusted population (9.1 in 1000 individuals in the United States versus 301.6 per 1000 individuals in the sample). Secondly, as it is impossible to isolate all the overlaying factors the changes must be acknowledged as a correlation and causality cannot be assumed.

4.4. Policy

In the UK there has been some policy interest in mobility scooters. The governments House of Commons Transport Committee (2009– 2010) focussed their attention on safety regulations and reports of accidents, noting anecdotal evidence of increases in numbers of users. It was recommended that any future legislations must carefully worded so not to deprive users of their only independent transport mode. The Department for Transport commissioned Ricability to carry out a study on the practices and policies related to scooter use on public transport (Jacobs et al., 2013). The study identified a lack of information about mobility scooter specifications and recommended that more information needed to be made available to allow transport operators to know which scooter types would fit on their vehicles and for users to know which operators allowed scooters on-board and what dimensions and permits were required.

5. Current and future research

There are many aspects of mobility scooter use that would be useful to explore. Given the evident upward trend of the use of mobility scooters this is crucial to understanding the role mobility scooters can play in individuals' lives. Currently the impact of mobility scooters on their users could be detrimental or beneficial in a variety of different ways. Could and should they be medically prescribed (they can be claimed on medical insurance in America but not in the UK)? Should they be guaranteed to be accommodated in public transport or in public buildings? Without a comprehensive body of research neither individual users, carers, health professionals or policy makers are able to make informed decisions on their use in a way that would be beneficial.

Older people are the group most likely to develop mobility difficulties and the most likely to start using a mobility scooter. Research, undertaken by the Accessibility Research Group at University College London is currently investigating the impact that mobility scooter use has on long term health in older people. This research is a longitudinal study using quantitative and qualitative data from mobility scooter users and non-mobility scooter users. Prior to mobility scooter uptake both groups had similar levels of physical capabilities. A scoping study using ELSA data of scooter users over 65years old has concluded that mobility scooters users perform worse at physical functioning tasks than other old people (Thoreau, 2011). Additionally, mobility scooter users have the highest rates of non-completion of physical tasks due to incapacity. The reasons behind the low scores and declines in capability are unclear and cannot be unearthed using the currently available data. However, scooter users poor record shown here indicates the need for it to be

investigated, something which the follow up research will achieve. To balance the research on physical function further investigation into the psychological gains such as on independence and wellbeing is being undertaken. Results from these studies is expected in late 2015.

6. Conclusions

Research literature and empirical studies surrounding mobility scooters are sparse. In terms of user experience most users felt their scooter has had a positive impact upon their lives and perceive their scooter in a positive light. Their scooter meets their needs by enabling them to independently achieve their desired activities. It is clear that matching the mobility device to the individual and training the individual to use their mobility device is important. However, neither of these occur regularly.

The impacts of scooter usage on functional health is less clear. The relationships between frequency/length of use to physical function and capabilities has not been investigated. Where mobility scooter data does exist it is most often inseparable from wheelchair data, particularly electronic wheelchair data. Given the different physical capabilities of their users this is unhelpful. The two works that focus solely on mobility scooters and physical health impacts investigate different aspects of physical health (physical and functional), have different limitations and reach different conclusions.

Health research into mobility scooters is underexplored. Physical health literature is clear that a lack of physical exercise leads to a loss of functional capabilities including mobility in older adults. Also known is that the use of wheelchairs and scooters is increasing in the population despite no increases in levels of people with mobility difficulties (Aijanseppa et al., 2005; Auger, 2008; LaPlante, 2003). What is not clear is the role that mobility devices, particularly those where no physical effort is required, play. Whilst there is a wealth of data on the relationships between physical activity, health and ageing there is a lack of evidence on the role mobility devices play in promoting physical functioning and physical capabilities. The debate between mobility scooter users positive experiences and perceptions and the possibility that using scooters causes functional decline is of great interest and importance. As these topics have had such little quantification there is value in amassing evidence for both topics and how they interact. It is plausible that some scooter users sacrifice physical functioning for improved activity participation and independence. Empirical evidence showing the benefits and disadvantages of scooter usage is needed to allow those prescribing, recommending or choosing to use a scooter to make a fully informed choice.

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Appendix C: First Iteration of Interview Questions

Interview Questions: Scooter Users

Individual Characteristics
Age:
Gender:
Mobility Aids used:
Incidence of falls in last 18 months:
Transport modes used:
Illness:
How long have you had a scooter?

Research Question 1: Why do some people choose to use a mobility scooter while others do not?

- *Tell me about why you got a scooter? (Topic 1 & 7)*

- *How much do you use your scooter? (Topic 6)*
  - *How far?*
  - *How often?*

Research Question 2: Do non-scooters users' perceptions of using mobility scooters match the experiences of mobility scooter users?

- *Before you got your scooter, did you use anything (like a walking stick or a wheelchair) to help you get around? (Topic 6)*
  How often?

Research Question 3: If the barriers are physical (storage/expense) and could be overcome (by a scheme or policy) would mobility scooters then be used?

- *Where do you store your scooter? (Topic 4)*
  Did you have to move or create space?
  If in flats – store in communal space?

- *People come by their scooter in different ways. Some people are loaned a scooter from a local scheme, others get a grant to help them buy one, others pay for their outright. How did you acquire yours? (Topic 8)*
  Did you think it was expensive?
  Is it value for money?

Research Question 5: Does using a mobility scooter change the number of trips made outside the house?

- *Where do you go on your scooter? (Topic 6)*
- *Did you go to these places before you got your scooter? (Topic 5)*

- *Is there anywhere you would like to go but currently can't? Why not? (Topic 4)*

Research Question 6: Does using a mobility scooter change a person's perception of their quality of life?

- *If you did not have your scooter how would you get to these places? (Topic 6)*

- *What, for you, are the advantages of having a scooter? (Topic 3)*

- *What, for you, are the disadvantages of having a scooter? (Topic 3)*

Research Question 8: What changes in scooter users occur pre and post mobility scooter uptake?

- *How much did you think you'd use your scooter before you got it? Do you use it more, less or the same amount you expected to? (Topic 5)*

Interview Questions: Non-Scooter Users

Individual Characteristics (from previous notes)
Age:
Gender:
Mobility Aid:
Incidence of falls in last 18 months:
Transport modes used:
Illness:

Research Question 1: Why do some people choose to use a mobility scooter while others do not?

- *You have told me previously that you travel by foot/PT/car and that you do/do not use a walking stick. Is this still the case? (Topic 6)*

- *Do you have any difficulty travelling around? (Topic 6)*

- *Have you ever considered using a mobility scooter? (Topic 2)*

- *What are the reasons that you do not use one?* (Topic 2)

Research Question 2: Do non-scooters users perceptions of using mobility scooters match the experiences of mobility scooter users?

- *What do you think of mobility scooters?* (Topic 2 & 3)

- *Do you think there would be any advantages, for you personally, of using a scooter?* (Topic 1)

- *Do you think there would be any disadvantages, for you personally, of using a scooter?* (Topic 2 & 3)

- *If you had a scooter today, how much did you think you'd use it?* (Topic 1, 2, 4 & 6)

Research Question 3: What are the barriers to using a mobility scooter and what can be done to overcome them?

- *If storage is a barrier…. If you didn't have to store your scooter at home but could be lent one or if storage space could be found for you, would you use a scooter?* (Topic 4)

- *If expense is a barrier… If you a scooter was made available to you for a low price or for free, would you use a scooter?* (Topic 4)

- *If storage is a barrier and there is a local scheme in place… Did you know Scootability/Shopmobility run a scheme where you can borrow a scooter? (Topic 4)*
    - *Have you used?*
    - *Would you consider using?*
    - *If not, why not?*

Research Question 4: If the reason for not using a scooter is "I do not need one",

… What do they consider "needing" a scooter to mean?
…would they choose to use one if they did need it (why not if "no")?
…when would they perceive themselves needing one (what factors)?

- *When do you think you would need a scooter? What characteristics would you have to have to need one? (Topic 1)*

- *If you meet these criteria, would you consider using a scooter? Why/Why not? (Topic 2, 3 & 4)*

Research Question 5: Does using a mobility scooter change the number of trips made outside the house?

- *What trips do you make when you leave your home? Where do you go? (Topic 6)*

- *Is there anywhere you would like to go but currently do not or can't?*
    - ♣ *Why not? (Topic 6)*

Appendix D: Second Iteration of Interview Questions

Interview Scooter Users: Interview questions

Individual Characteristics
Age:
Gender:
Mobility Aids used (and frequency):
Incidence of falls in last 18 months:
Transport modes used:
Illness:
How long have you had a scooter?

A. Views on Scooters *(RQ1, 2, 4 & 6)*

Tell me about why you decided to get a scooter?

What, for you, are the advantages of having a scooter?

What, for you, are the disadvantages of having a scooter?

Has having a scooter met your expectations?

What do you think would encourage older people to use a scooter?

What difference has using a scooter made to your life?

What impact do you feel this has had on your quality of life?

In what circumstances should someone consider using a scooter?

B. Travelling around *(RQ 3, 5, 6 & 8)*
Thinking about last week what sorts of trips did you make using your scooter? Where did you go?

Is there anywhere you would like to go but currently can't?
    Why not?

Think about the amount of physical activity (any exercise incl. walking) that you do now. How does this compare to the amount you were doing before you got the scooter.
    If changed – why?

C. Access to Scooters *(RQ 1, 2 & 3)*

Where do you store your scooter?

People come by their scooter in different ways. Some people are loaned a scooter from a local scheme, other get a grant to help them buy one, others pay for their outright. How did you acquire yours?

Interview Non-scooter Users: Interview questions

Individual Characteristics (from previous notes)
Age:
Gender:
Mobility Aid:
Incidence of falls in last 18 months:
Transport modes used:
Illness:

A. Level of mobility (RQ 5)
- *You have told me previously that you travel by foot/PT/car and that you do/do not use a walking stick. Is this still the case?*
    - *If not, what has changed since then?*

B. Travelling around (RQ 5, 6)
- *Thinking about last week, what sort of trips do you make from home?*
    - *Where do you go?*
    - *How do you normally get there?*
- *What sort of difficulties do you have travelling around?*
- *Is there anywhere you would like to go but currently do not or can't?*
    - *Why not?*
    - *How does this make you feel about your quality of life?*

C. Views on mobility scooters (RQ 1, 2, 3 &4)
- *What do you think of mobility scooters?*
- *Have you ever considered using a mobility scooter?*
- *What are the main reasons that you do not use one?*
- *In what circumstances do you think you would consider using one?*
- *Do you think there would be any advantages, for you personally of using a scooter?*
- *Do you think there would be any disadvantages, for you personally of using a scooter?*
- *If you had a scooter today, how much did you think you'd use it?*

D. Barriers to use (RQ 1, 2, 3 & 4)
- *What do you think are/would be the main barriers to using a mobility scooter?*
- *What do you think would help overcome barriers to using a mobility scooter?*
- *If storage is a barrier…. If you didn't have to store your scooter at home but could be lent one or if storage space could be found for you, would you use a scooter?*
- *If expense is a barrier… If you a scooter was made available to you for a low price or for free, would you use a scooter?*

- *If storage is a barrier and there is a local scheme in place… Did you know Scootability/Shopmobility run a scheme where you can borrow a scooter?*
  - *Have you used?*
  - *Would you consider using?*
    - *If not, why not?*

Interview Stakeholders: Interview questions

Individual Characteristics
Type of Organisation:
Role:

A. Scooter Users *(RQ 1, 3 & 5)*
- *What criteria do people have to meet to get a scooter from you?*
- *What reasons do people give for wanting a scooter?*
- *Are there people who get offered a scooter but refuse?*
    - *Why?*

- *What feedback do you get from scooter users about*
    - *Where they go on their scooter*
    - *What difficulties they experience*
    - *What benefits they experience*

- *To what extent do clients say that storage is problem?*
    - *Is this a problem that you are aware of?*
    - *Do you offer any schemes that alleviate this problem?*
    - *If not, is this a possibility?*

- *To what extent do you think affordability is a problem for older people? This makes scooters unaffordable for many older people.*
    - *Is this a problem that you are aware of?*
    - *Do you offer any schemes that alleviate this problem?*
    - *If not, is this a possibility?*

Appendix E: COREQ Checklist

	Item		Comment
Domain 1: Research Team and Reflexivity			
Personal Characteristics			
1	Interviewer	Which author conducted the interviews	PhD student conducted all interviews. In the interviews (2) where the student was not comfortable alone with the interviewee, a second PhD student observed.
2	Credentials	What were the re-searcher's credentials? E.g. PhD, MD	PhD student has MA in psychology and has been a researcher for 11 years.
3	Occupation	What was their occupa-tion at the time of the study?	Researcher
4	Gender	Was the researcher male or female?	Female
5	Experience and Training	What experience or training did the research have?	Training and over 10 years experience in facilitation, interviewing and qualitative analysis. The student ob-server has experience in facilitation, interviews and non-verbal communication.
Relationship with participants			
6	Relationship Estab-lished?	Was a relationship established prior to study commencement?	Relationship was present with non-scooter participants and two scooter participants. This relationship was as a result of them being participants of previous longitudinal study. No relationship with others.
7	Participant knowledge of the interviewer	What did the partici-pants know about the researcher? E.g. per-sonal goals, reasons for doing the research.	Personal interest and rea-sons for doing research were described prior to interviews.
8	Interviewer Characteris-tics	What characteristics were reported about the interviewer? E.g. Bias, assumptions, interests in the research topic	N/A

Domain 2: Study Design			
Theoretical Framework			
9	Methodological orientation and theory	What methodological orientation was stated to underpin the study?	Content Analysis
Participant Selection			
10	Sampling	How were participants selected? E.g. purposive, convenience, consecutive snowball	Purposive
11	Method of approach	How were participants approached?	Telephone and email
12	Sample size	How many participants were in the study	26
13	Non-participation	How many people refused to participate or dropped out?	None
Setting			
14	Setting of data collection	Where was the data collected. E.g. Home, clinic, workplace	In a place selected by participants. This included; laboratory, university meeting room, telephone
15	Presence of non-participants	Was anyone else present besides the participants and the researchers	No
16	Description of Sample	What are the important characteristics of the sample? E.g. demographic data, date	Demographic data as well as participants' mobility capabilities and mobility scooter usage.
Data Collection			
17	Interview Guide	Were questions, prompts guides provided by the authors? Was it pilot tested?	Questions were constructed using method described in methods section. Pilot testing was used.
18	Repeat Interviews	Were repeat interviews carried out?	No
19	Audio/visual recording	Did the research use audio or visual recording to collect the data?	Data was audio recorded.
20	Field Notes	Were field notes made during and/or after the interview?	Field notes were made after the interview
21	Duration	What was the duration of the interviews?	Variable: from 25 minutes to 80 minutes
22	Data saturation	Was data saturation discussed?	No

23	Transcripts returned	Were transcripts returned to participants for comment and/or correction?	No
Domain 3: Analysis and Findings			
Data Analysis			
24	Number of data coders	How many data coders coded the data?	One
25	Description of the coding tree	Did the authors provide a description of the coding tree?	A coding framework was created
26	Derivation of themes	Were themes identified in advance or derived from the data?	Both
27	Software	What software, if applicable, was used to manage the data?	Nvivo
28	Participant checking	Did participants provide feedback on the findings?	No
Reporting			
29	Quotations presented	Were participant quotations presented to illustrate themes/finds? If yes, was each quotation identified?	Yes but under a pseudonym in order to keep participant confidentiality.
30	Data and findings consistent	Was there consistency between the data presented and the findings?	Yes
31	Clarity of major themes	Were major themes clearly presented in the findings?	Yes
32	Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	Yes

Appendix F: Interview Analysis Code List

First interview codes	NVIVO first codes	Research Question Codes
Aggressive scooter users	Active outside the house	Accessibility
Barriers - scooters can't get inside shops	Barriers to use	Can't walk far
Can't walk fast	Carer	Cost
Can't walk very far	Convenience	Dangerous
Consider if can't walk very far	Dangerous	Declined
Consider if frail	Difficult walking	Dropped kerbs
Consider if heart problems	Do not need one	Exercise
Cost	Doesn't want a scooter	Fear of use
Difficult accessibility in building	Dropped kerbs	Helpful/useful
Difficult accessibility on footways and roads	Frequent encounters	Housebound
Difficult to walk up hills	Health in general importance of getting around outside the house	Improved
Difficulty with steps	Help people not helping people	Independence
Discomfort walking	Ice	Maintained
Do not like to be stuck inside the house all the time	Importance of exercise	Need
Do not need one	Inaccessible buses	Negative
Do not need one	Independence	Not competent
Environment not accessible for use	Infrequent encounters	Not important
Fear becoming sedentary	Interaction between pedestrians and scooter users	Positive
Fear of operating	Need for training	Possibility of becoming stranded
If need it would feel they'd let themselves down / old	Negative scooter perspective	Rude
Important to get outside the home on quality of life	Nowhere I can't go	Space on footway
Independence	Out and about	Storage
Lost strength	Take up too much space	Take up space
Lost use of legs	Positive consider using one	Use of public transport

Make sure to travel to where you want	Positive scooter experiences	Very important
No advantages	QoL joined to others QoL	Wanted one
No driving experience - nervous	Safe	
Perception of use: first sign of letting go of your physical health	Space for bags	
Prefer to own scooter if had to have on. Status - like a car	Take up too much space	
Scooter inconvenient	Travel anxiety	
Scooters are a good idea	Travel is manageable	
See scooters frequently	Travel is not difficult	
See scooters infrequently	Use buses a lot	
Storage	Uses transport instead of walking	
To be used if you could only walk a little way		
To be used if you couldn't walk		
To be used if you had difficulty standing about		
Transport instead of walking		
Unnecessary		
Use the bus a lot		
Very good for people that need them		
Would reluctantly accept usage if had to use		

Appendix G: Interview Analysis Combined Code List

Codes from all forms of analysis

Accessibility	Maintained
Accidents	Make sure to travel to where you want
Active outside the house	Need
Aggressive scooter users	Need for training
Barriers - scooters can't get inside shops	Negative scooter perspective
Can't walk far	No driving experience - nervous
Can't walk fast	Not competent
Carer transport difficulties	Not important
Consider if can't walk very far	Nowhere I can't go
Consider if frail	Out and about
Consider if heart problems	Perceived disadvantages
Convenience	Perception of use: first sign of letting go of your physical health
Cost	Positive consider using one
Dangerous	Positive scooter experiences
Declined	Possibility of becoming stranded
Difficult accessibility in building	Prefer to own scooter if had to have on. Status - like a car
Difficult accessibility on footways and roads	Quality of life joined to others Quality of life
Difficult to walk up hills	Rude
Difficult walking	Safe
Difficulty with steps	Scooter inconvenient
Discomfort walking	Scooters are a good idea
Do not like to be stuck inside the house all the time	See scooters frequently
Do not need one	See scooters infrequently
Doesn't want a scooter	Space for bags
Dropped kerbs	Space on footway
Environment not accessible for use	Speed

Exercise	Storage
Fear of becoming sedentary	Take up too much space
Fear of operating	To be used if you could only walk a little way
Fear of use	To be used if you couldn't walk
Frequent encounters	To be used if you had difficulty standing about
Health in general importance of getting around outside the house	Transport instead of walking
Help people not helping people	Travel anxiety
Helpful/useful	Travel is manageable
Housebound	Travel is not difficult
If need it would feel they'd let themselves down	Unnecessary
Importance of exercise	Use of public transport
Important to get outside the home on quality of life	Use the bus a lot
Improved	Uses transport instead of walking
Inaccessible buses	Very good for people that need them
Independence	Very important
Infrequent encounters	Wanted one
Interaction between pedestrians and scooter users	Weather
Lost strength	Would reluctantly accept usage if had to use
Lost use of legs	

Appendix H: Interview Analysis Final Code List

Final Codes	All codes
Accidents	Accidents
Bad Health	Consider if heart problems
Breakdown	Possibility of becoming stranded
Built Environment Negatives	Barriers - scooters can't get inside shops
	Difficult accessibility in building
	Difficult accessibility on footways and roads
	Environment not accessible for use
Built Environment Positives	
Capabilities	Not competent
	Training
Carer	Carer transport difficulties
Dangerous	Dangerous
	No driving experience - nervous
Do Not Need One	Declined
	Do not need one
	Doesn't want a scooter
	Need
	Unnecessary
Dropped Kerbs	Dropped kerbs
Ease of Use	Improved
Exercise	Exercise
	Importance of exercise
Expense	Cost
Fear of Becoming Sedentary	Fear of becoming sedentary
Fear of Use	Fear of operating
	Fear of use
Footway Space	Space on footway
	Take up too much space
Frailty	Consider if frail
Good Health	
Housebound	Active outside the house
	Do not like to be stuck inside the house all the time
	Health in general, importance of getting around outside the house
	Housebound
Important to Get Outside the Home on Quality of Life	Activities, shopping, visiting family, leisure etc.
	Important to get outside the home on quality of life
	Out and about

Independence	Independence
	Make sure to travel to where you want
	Nowhere I can't go
Interaction Between Pedestrians and Scooter Users	Rude
Let Themselves Down	If need it would feel they'd let themselves down / old
	Perception of use: first sign of letting go of your physical health
	Would reluctantly accept usage if had to use
Maintain lifestyle	Help people not helping people
Maintenance	Maintained
Mobility problems	Can't walk far
	Can't walk fast
	Consider if can't walk very far
	Difficult to walk up hills
	Difficult walking
	Difficulty with steps
	Discomfort walking
	Lost strength
	Lost use of legs
Negative Perceptions	Aggressive scooter users
	Negative scooter perspective
	Perceived disadvantages
Non-scooter User Scooter Consideration	Prefer own scooter if had to have one
	To be used if you could only walk a little way
	To be used if you couldn't walk
	To be used if you had difficulty standing about
Positive Interactions	
Positive Perceptions	Convenience
	Positive consider using one
	Prefer to own scooter if had to have one.
	Scooters are a good idea
	Status - like a car
	Very good for people that need them
Prevalence	Frequent encounters
	Infrequent encounters
	See scooters frequently
	See scooters infrequently
Public transport	Inaccessible buses
	Transport instead of walking
	Use of public transport
	Use the bus a lot
	Uses transport instead of walking

Quality of Life	Not important
	QoL joined to others' QoL
	Very important
Scooter User advantages	Helpful/useful
	Positive scooter experiences
	Safe
	Wanted one
Scooter User disadvantages	Scooter inconvenient
Space for bags	Space for bags
Speed	Speed
Storage	Storage
Training	Need for training
Travel	Travel is not difficult
	Travel anxiety
	Travel is manageable
Weather	Ice
	Rain
	Weather

Appendix I: Interview Analysis Codes and their Definitions

Code	Definition
Accidents	Mention of interaction between scooters and non-scooters where contact occurs that is not deliberate.
Bad health	Answers around general bad health that don't involve mobility or the legs, lower back or hips. Generalised negative mentions of health (bad, sick, ill). Include arthritis if not in the legs or knees.
Breakdown	Discussion on the possibility/what happens when a scooter stops working
Built Environment Negatives	Discussion of negative experiences, opinions or perceptions of accessibility of the built environment
Built Environment Positives	Discussion of positive experiences, opinions or perceptions of accessibility of the built environment
Capabilities	Abilities and capacities needed to operate a scooter. Perceptions and Experiences.
Carer	Discussion of the impacts on a carer
Dangerous	This relates to scooters being dangerous to use or being used dangerously.
Do Not Need One	This relates to statements that the use of a scooter is perceived as not required
Dropped kerbs	Discussions around the gradual slopes between footway and road
Ease of Use	Positive mention of experience or perception of a scooter being simple to operate
Exercise	This relates to discussions around exercise or being physically active.
Expense	The price of a mobility scooter where the connotation is the cost was high.
Fear of Becoming Sedentary	This discussions around anxiety of not doing any exercise or not being able to do any exercise and its consequences
Fear of Use	Anxiety or fear around using a scooter. Includes from users and non-users contemplating or considering use
Frailty	Use of the word frail, frailty.
Good Health	Positive mentions of general health or specific health situations
Housebound	Include references to being unable to get out of the house.
Important to get Outside the Home on Quality of Life	Include references to being outside AND QoL or being inside AND QoL.
Independence	Relates to any discussion about freedom, independence or explicit statements about moving around/travelling without help

Interaction between Pedestrians and Scooter Users	Discussions of interactions between scooter users and non-scooters users where the scooter is present.
Let Them-selves Down	This relates to the perception that non-scooter users feel they (or their bodies) would have disappointed them if they started to use or felt they should consider using a mobility scooter
Maintain Lifestyle	This relates to being physically able to do the same tasks and activities over time (includes not being too fatigued).
Maintenance	This refers to upkeep of mechanical elements of mobility scooter, includes general servicing and problem servicing.
Mobility Prob-lems	Any problems related to difficulty with mobility. Negative experiences, diagnoses with legs, hips, back and knees that create walking, stepping or climbing difficult. Include arthritis if in legs or knees.
Negative Perceptions	Negative perceptions, opinions and experiences of mobility scooters and their users.
Non-scooter User who Consider	This relates to non-scooter users answers to the question "Who should consider using a mobility scooter?"
Positive Inter-actions	Positive interactions between scooter users and non-scooter users where the scooter is present
Positive per-ceptions	Positive perceptions of mobility scooters and people who use mobility scooters.
Prevalence	The frequency of scooters, encountered or perceived
Public Transport	Discussion on personal use of public transport, includes statements as well as positive or negative perceptions
Quality of Life	Discussions related to quality of life or wellbeing
Scooter User Advantages	Discussion of scooter use advantages from scooter users only.
Scooter User Disadvantages	Discussion of scooter use disadvantages or negative experi-ences by scooter users only
Space for Bags	Room to carry bags or objects on a mobility scooter
Space on Footway	Discussion of footway size
Speed	This refers to any mention of the speed of which a scooter is travelling
Storage	Storage of a mobility scooter, at home or in the built environ-ment (including outside shops and in vehicles)
Training	This relates to training sessions for how to use a mobility scooter
Travel	This relates to answers around travel (positive or negative) not to do with using scooters.
Weather	Any mention of weather or weather related issues (such as icy footways)

Appendix J: First Draft Version of the Questionnaire

Interview Questions: Scooter Users

Individual Characteristics

Age:

Gender:

Mobility Aids Used:

Incidence of falls in last 18 months:

Transport modes used:

Illness:

How long have you had a scooter?

Research Question 1: Why do some people choose to use a mobility scooter and others do not?
- Tell me about why you got a scooter?

- How much do you use your scooter?

Research Question 2: Do non-scooters users perceptions of using mobility scooters match the experiences of mobility scooter users?
- What, for you, are the advantages of having a scooter?

- What, for you, are the disadvantages of having a scooter?

- How much did you think you'd use your scooter before you got it? Do you use it more, less or the same amount you expected to?

- Before you got your scooter did you use anything (like a walking stick or a wheelchair) to help you get around?

Research Question 3: What are the barriers to using a mobility scooter and what can be done to overcome them?
- Where do you store your scooter?

- People come by their scooter in different ways. Some people are loaned a scooter from a local scheme, other get a grant to help them buy one, others pay for their outright. How did you acquire yours?

  - o **Research Question 5: Does using a mobility scooter change the number of trips made outside the house?**
- Where do you go on your scooter?

- Did you go to these places before you got your scooter?
  - ♣ Change in frequency

- If you did not have your scooter how would you get to these places?
  - ♣ Alternative mode, reduce frequency, drop out

- Is there anywhere you would like to go but currently can't?
  - ♣ Why not?

Interview Questions: Non-scooter Users

Individual Characteristics

Age:

Gender:

Mobility Aid:

Incidence of falls in last 18 months:

Transport modes used:

Illness:

Research Question 1: Why do some people choose to use a mobility scooter while others do not?
- You have told me previously that you travel by foot/PT/car and that you do/do not use a walking stick. Is this still the case?

- Do you have any difficulty travelling around?

Research Question 5: Does using a mobility scooter change the number of trips made outside the house?

- What trips do you make when you leave your home? Where do you go?

- Is there anywhere you would like to go but currently do not or can't?
  - Why not?

Research Question 1: Why do some people choose to use a mobility scooter and others do not?
- Have you ever considered using a mobility scooter?

- What are the reasons that you do not use one?

Research Question 3: What are the barriers to using a mobility scooter and what can be done to overcome them?
- *If storage is a barrier….* If you didn't have to store your scooter at home but could be lent one or if storage space could be found for you, would you use a scooter?

- *If expense is a barrier…* If you a scooter was made available to you for a low price or for free, would you use a scooter?

- *If storage is a barrier and there is a local scheme in place…* Did you know Scootability/Shopmobility run a scheme where you can borrow a scooter?
  - Have you used?
  - Would you consider using?
    - If not, why not?

Research Question 4: If the reason for not using a scooter is "I do not need one"…

- When do you think you would need a scooter? What characteristics would you have to have to need one?

- If you meet these criteria, would you consider using a scooter? Why/Why not?

Research Question 2: Do non-scooters users' perceptions of using mobility scooters match the experiences of mobility scooter users?

- What do you think of mobility scooters?

- Do you think there would be any advantages, for you personally of using a scooter?

- Do you think there would be any disadvantages, for you personally of using a scooter?

- If you had a scooter today, how much did you think you'd use a scooter it?

Appendix K: Second Draft Version of the Questionnaire

Advantages and Disadvantages

1. What are the advantages of using a mobility scooter?
2. What are the disadvantages of using a mobility scooter?

Trip Number

3. How often do you use your mobility scooter?

4. How many of the trips you make do you use your scooter for?

5. Do you use your scooter instead of travelling by (tick all that apply)
   car ⌐bus ⌐train ⌐walking

6. Since you started using a mobility scooter do you
   a. walk the same amount
   b. ⌐walk the same amount but with shorter distances
   c. ⌐walk the same amount but with longer distances
   d. ⌐walk more often but with shorter distances
   e. ⌐walk less often but with shorter distances
   f. ⌐walk more often but with longer distances
   g. ⌐walk less often but with longer distances

7. Where do you go on your mobility scooter?

Changes after taking up a mobility scooter?

8. Do you now participate in different activities since you started using your scooter?

9. Before you started to use a mobility scooter did you use a different mobility device to help you get around?

	a cane or walking stick
	a wheelchair
	a walking frame
	a mobility scooter that I hired
	other_____

10. Do you currently use an additional mobility device, apart from your mobility scooter, to help you get around?

	a cane or walking stick
	a wheelchair
	a walking frame
	other_____

Personal Factual Questions

11. Are you male or female?

12. How old are you?

13. How did you get your scooter? Did you rent it, buy it yourself, or buy it yourself with a subsidy?

14. How long have you regularly used a mobility scooter?

	less than 6 months
	less than a year
	between 1 year and 2 years
	more than 2 years (please state how long)_____

15. Why do you use a mobility scooter?

Appendix L: Final Version of the Questionnaire

Mobility Scooter Usage

This questionnaire is for people who own (or use on a long term loan) a mobility scooter. The questionnaire is investigating why and how people use their mobility scooters. Please complete it and either hand it back to the researcher present or return it using the post-paid envelope attached.

1. How long have you regularly used a mobility scooter?
   - [ ] less than 6 months
   - [ ] less than a year
   - [ ] between 1 year and 2 years
   - [ ] more than 2 years (please state how long)_____

2. Why did you originally start to use a mobility scooter?

3. For you personally what are the advantages of using a mobility scooter?

4. For you personally, what are the disadvantages of using a mobility scooter?

5. Before you started to use a mobility scooter did you use a different mobility device to help you get around? (tick all that apply)
   - [ ] a cane or walking stick
   - [ ] a wheelchair
   - [ ] a walking frame
   - [ ] a mobility scooter that I hired
   - [ ] other_____

6. Do you currently use an additional mobility device, apart from your mobility scooter, to help you get around? (tick all that apply)

- [ ] a cane or walking stick
- [ ] a wheelchair
- [ ] a walking frame
- [ ] other_____

7. Please answer the following question by circling the word that best describes how frequently you now walk and how far you travel on foot since you started using your scooter.

   I make **the same number/ fewer/ more trips** by foot since I started using my scooter.

   These trips are approximately **the same distance/ less far/ further** than those I took before I started using my scooter.

8. How often do you use your mobility scooter? (tick the box which describes you best)

- [ ] every day
- [ ] most days
- [ ] once a week
- [ ] a few times a month
- [ ] monthly
- [ ] occasionally

9. Think about the trips you make outside your house. Do you use your scooter for:

- [ ] all trips you make
- [ ] most trips you make
- [ ] only a few trips you make

10.   How often do you walk 250 yards (1/4 mile) or more?

☐	every day
☐	most days
☐	once a week
☐	a few times a month
☐	monthly
☐	occasionally
☐	never

11.   Think of a typical trip you make on your scooter. Before you started using your scooter how would you have made the trip? (tick the box that fits best)

☐	by bus
☐	by train
☐	by another forms of public transport
☐	by taxi
☐	by car
☐	by foot
☐	other (please specify)
☐	I would not have made the trip

12.   Where do you go on your mobility scooter? (tick all that apply)

	visit friends/family
☐	local shops
☐	social activities
☐	doctor/hospital
☐	church
☐	other (please specify)___

13.   Do you now participate in different activities since you started using your scooter?

☐	No
☐	Yes If yes, what activities _____

14. If you own your scooter, how did you pay for it?

- [ ] Local authority assessment
- [ ] Motability Scheme
- [ ] Grant from Charitable Source. If yes, what proportion of the full cost _
- [ ] Privately funded (i.e. bought)
- [ ] Other

15. I am

- [ ] Male
- [ ] Female

16. I am aged

- [ ] Under 65
- [ ] between 65 and 69
- [ ] between 70 and 74
- [ ] between 75 and 79
- [ ] between 80 and 84
- [ ] between 85 and 89
- [ ] Between 90 and 94
- [ ] 95 and over

17. Are there any other comments you would like to make regarding your use of your mobility scooter?

Thank you for taking the time to complete this questionnaire.

This questionnaire is part of a research project in the Department of Civil, Environmental and Geomatic Engineering at University College London (UCL). This questionnaire is anonymous and no individual is able to be personally identified. All data collected will be treated in accordance with the Data Protection Act 1998.