

2012

## The impact of powered mobility devices on occupational performance : a systematic review ; and, The experience of being a motorised mobility scooter user

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The impact of powered mobility devices on occupational performance:

A systematic review

&

The experience of being a motorised mobility scooter user

Ryan Fomiatti

A Report Submitted in Partial Fulfilment of the Requirements for the award of Bachelor of Occupational Therapy Honours, Faculty of Computing, Health and Science, Edith Cowan University.

Submitted August, 2012

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### **Acknowledgements**

I would like to thank all the people who participated in this research and gave up their time to share with me their stories, insights and experiences of being a scooter user.

Furthermore I would like to acknowledge and thank Dr Sonya Girdler, the honour students and staff within the occupational therapy department at Edith Cowan University.

I would like to extend my thanks and appreciation to Lois Moir, Janet Richmond and Jeannine Millstead for their guidance, support and patience with assisting me in completing this research, without their help this project would not have been made possible. I am sincerely grateful for having worked with three such esteemed professionals and the knowledge I have gained is invaluable, thank you.

Finally I would like thank my family and friends for guiding and supporting me throughout this process.

**Table of Contents**

## Article One: Systematic review

Title page	1
Abstract	2
Introduction	4
Methods	5
Assessment of methodological quality	6
Data extraction	7
Results	7
Description of included studies	8
Quality assessment of studies	8
Outcome measures	9
Engagement in occupations	10
Discussion	12
Limitations	14
Future research	15
Clinical Implications	15
Declaration of interest	16
References	17
Figure One	19
Table One	20



**Table of Contents**

## Article Two: Research report

Title page	27
Abstract	28
Introduction	30
Methods	31
<i>Research design</i>	31
<i>Recruitment of participants</i>	32
<i>Data collection</i>	32
<i>Data analysis</i>	32
<i>Trustworthiness</i>	33
Findings	33
<i>Theme one: Knowledge</i>	33
<i>Theme two: Engagement</i>	36
<i>Theme three: Environments</i>	38
Discussion	40
Limitations	42
Recommendations	43
Clinical implications	43
Declaration of interest	44
References	45
Appendix One	47

# **The impact of powered mobility devices on occupational performance:**

## **A systematic review**

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**The impact of powered mobility devices on occupational performance:  
A systematic review**

Ryan Fomiatti

## **Abstract**

Purpose: To systematically review the impact powered mobility devices have on engagement in independent occupations for adults with acquired mobility limitations.

Method: The following databases were searched electronically: CINAHL Plus, Medline, PsychInfo, OT Seeker, Joanna Briggs Institute and Physiotherapy Evidence Database. The search terms used a combination of words to encompass all terms which are used for powered mobility. Studies were included if they evaluated adults' use of a motorised mobility device, and if individuals used a powered mobility device due to acquired mobility limitation.

Results: Eleven studies were eligible for inclusion. Studies varied in methodological quality and research design. One study was a true experimental design; four studies were pre-experimental, and six used non-experimental designs. Positive improvements in occupational engagement were reported in five studies and increased independence was highlighted in four of these. Environmental barriers were described as being negatively associated with powered mobility use, with reports of accidents and injury closely associated with use of device when mobilising in the community.

Conclusions: Due to differences in study focus, sample characteristics, outcome measures and varying methodological quality of each research study, drawing conclusions from the results is problematic. What can be suggested from the results is that environmental barriers generate difficulties and challenges for the user, which can subsequently result in accident or injury. In contrast these negative aspects, the use of a powered mobility is shown to provide positive impacts on the individual in the areas of independence, quality of life, mobility and engagement.

Ryan Fomiatti,

Lois Moir,

Janet Richmond,

Jeannine Millstead

August, 2012

## **Abstract**

Purpose: To systematically review the literature about the impact powered mobility devices have on engagement in independent occupations for adults with acquired mobility limitations.

Method: Electronic searched of CINAHL Plus, Medline, PsychInfo, OT Seeker, Joanna Briggs Institute and Physiotherapy Evidence Database. Search terms used a combination of words to encompass all terms which can be used for powered mobility.

Results: Eleven studies were eligible for inclusion. One study was a true experimental design; four studies were pre-experimental, with six being non-experimental in their design. Positive improvements to occupational engagement and independence occurred with powered mobility use, while environmental barriers were identified as negatively impacting occupation and increasing risk of injury or accident

Conclusions: Drawing conclusions from research is problematic due to varying methodological quality. What can be suggested is that environmental barriers generate difficulties and challenges, which can subsequently result in accident or injury. Powered mobility is suggested to also positively impact on areas of independence, quality of life, mobility and engagement. This systematic review found the need for higher quality research to facilitate better knowledge and choices by professionals and consumers.

keywords: powered mobility device, occupational engagement , independence, adults, mobility limitations.

## **Introduction**

The ability to walk independently and complete activities is accomplished by many people without thought. Mobility allows participation in many activities of daily living, fulfilment of social desires and enablement of independence (Radomski & Trombly Latham, 2008). This can lead to improvements in one's self-esteem and self-efficacy, which often occur as a result of engagement in activities which are meaningful and positive (Radomski & Trombly Latham, 2008). Individuals who have difficulty or limitations with mobility may require simple or advanced assistance to complete desired tasks; either in the form of a personal carer, or from assistive technology devices.

Assistive technology can be defined as "Any piece of equipment or device used to maintain or promote function in someone with a disability" (Stedman's Medical Dictionary, 2008, p. 138). One type of assistive technology that is useful for people who are unable to propel in a manual wheelchair, due to lack of physical strength or abilities, are powered mobility devices such as powered wheelchairs and motorised scooters. Powered mobility devices allow for conservation of energy for utilisation in other activities, increased mobility and for the user to determine route, destination and time of travel (E. May, Garrett, & Ballantyne, 2010).

Theory about disability and its management has changed within the last two decades, shifting from a medical to a social model. Under a medical model disability was viewed as residing within the person and treatment was focussed on finding a cause and cure. With the recent shift towards a social model, disability is considered as a collection of problems which are influenced by the physical and social environment (World Health Organization, 2001). The changing, modifying and adapting of environments is viewed as a way to cater for inclusion of all individuals (Murphy, Cooney, Shea, & Casey, 2009).

Currently there is an increasing population of people living with disability, coupled with an ageing population. As of 2006 it was reported that one in five people require varying levels of assistance due to disability, with the need for assistance significantly increasing after 70 years of age (Australian Bureau of Statistics, 2006).

The objective of this systematic review was to research and describe how powered mobility devices, specifically powered wheelchairs and motorised scooters impact on engagement in independent occupations for adults with acquired mobility limitations.

## **Methods**

This review and assessment of articles was completed in accordance with the guidelines set by the Standard Quality Assessment Criteria for Evaluating Primary Research Papers (Kmet, Lee, & Cook, 2004). To locate relevant studies to include, appropriate databases were identified and electronic searches were conducted. The following databases; CINAHL Plus, Medline, PsychInfo, OT Seeker, Joanna Briggs Institute and Physiotherapy Evidence Database were identified and searched. Each database was searched from their earliest record through to April 2012 (CINAHL Plus 1982 -2011, Medline 1966 – 2012, PsychInfo 1685-2011, Pedro 1929-2012, Joanna Briggs Institute 1998-2012, Physiotherapy Evidence Database (Pedro) 1929-2012). The main search term was motorised mobility using a combination of terms which can be used to define motorised mobility: motorised, electric, powered, mobility, scooter, wheelchair and device. Terms were combined in different sequences to create several combinations to encompass all terms which can be applied to motorised mobility. To improve search outcomes all terms were truncated to match specific databases being searched. All reference lists were manually searched to identify any secondary sources which may be relevant to the objective of this systematic review.

A priori criteria were created to identify articles for inclusion. Articles were included if they investigated the use of a motorised mobility device (powered wheelchair, motorised scooter), included adults, requiring the use of a powered mobility device due to acquired mobility limitation. Articles which included individuals with both acquired and congenital conditions resulting in mobility limitations were included, while articles focusing solely on individuals with congenital conditions were excluded. Titles and abstracts of all searched articles were reviewed according to criteria. If sufficient detail was not identified from titles and abstracts full texts were retrieved for review. Full text versions of articles were retrieved upon acceptance after screening of title and abstracts was complete. Due to the limited research within the area both quantitative and qualitative papers were included. The outcomes of interest were the effect upon independent engagement in occupations and increased mobility or participation in occupations from using powered mobility devices. Studies researching other forms of mobility devices which are not motorised were excluded from this review.

[Insert Figure One here]

### **Assessment of methodological quality**

Four assessors reviewed the 15 selected articles; judgements were then made on suitability for rejection or acceptance into the systematic review. Four articles were rejected, resulting in eleven articles (Figure 1) being accepted into the systematic review. Any discrepancies with accepting articles were resolved through discussion. The methodological qualities of the accepted articles were assessed using two methods of assessment, the Standard Quality Assessment Criteria for Evaluating Primary Research Papers (SQACEPRP) guidelines (Kmet, et al., 2004) were used initially to assess quality; data were extracted into a table and then a design level was assigned using the McMasters guidelines for critical review standards (Law et al., 1998; Letts et al., 2007). The SQACEPRP is comprised of two checklists being



either qualitative or quantitative, depending on study design. Articles were rated accordingly using the SQACEPRP guidelines (Kmet, et al., 2004). These scores were independently attained by two reviewers and any discrepancies in opinion were resolved through discussion. Using the SQACEPRP guidelines quantitative articles were assessed on their objective or research question, study design, method of subject selection, subject inclusion criteria, randomisation, sample size, blinding of investigators and subjects, robustness of outcome measures, analysis methods, estimate of variance, controlling for confounding of results, if results were sufficiently reported and if conclusions were supported by the results. While qualitative articles were assessed on their aim or research question, study design, context of the study, link to conceptual framework, sampling strategy, data collection methods, data analysis, use of verification procedures, if conclusions were supported by the results and reflexivity of the account.

### **Data extraction**

Using the SQACEPRP (Kmet, et al., 2004) checklists and further analyses of each article, a descriptive analysis table was created (Table One). Data extracted included study design, subject description, intervention, outcome measure, results and methodological quality. The McMaster guidelines for the critical review (qualitative (Letts, et al., 2007) and quantitative (Law, et al., 1998) critical review standards) were then used to establish a research design level (ranging from 1-5) for each of the articles included within the descriptive table.

### **Results**

Electronic searches of databases ranged in results. Using EBSCO host with CINAHL plus, Medline, PsychInfo as the selected databases retrieved 104 results. OT seeker initially found zero results, using a less precise keyword matching search option (fuzzy logic) resulted 790 articles. Joanna Briggs Institute and Pedro both located zero results and no less precise

keyword matching search option was available. In total 894 articles were retrieved. From assessing the titles of the 894 retrieved articles 840 were excluded with 54 remaining.

Assessment of the abstract identified 8 articles which met the criteria. Reasons for exclusion were duplicates, not motorised mobility; population sample was children, congenital mobility limitations and other systematic reviews. Reference searches of similar systematic reviews and included articles resulted in a further 7 articles matching the inclusion criteria resulting in 15 full text articles to be assessed for acceptance or rejection into systematic review.

### **Description of included studies**

The articles included in this review varied significantly in their design and outcome measure (Table 1). Article ranged in year of publication, from 1994 to 2012. The powered mobility device in all studies was either a powered wheelchair, motorised scooter or both. One research article had a true experimental design being a randomised control trial and including all three criteria of randomisation, control and independent variable (Hoenig, Pieper, Branch, & Cohen, 2007). Four pre and post-test research articles were of pre-experimental design (Buning, Angelo, & Schmeler, 2001; Davies, Souza, & Frank, 2003; M. May & Rugg, 2010; Pettersson, Törnquist, & Ahlström, 2006). The final six research papers were included under non-experimental design with two utilising surveys (Edwards & McCluskey, 2010; E. May, et al., 2010) and four structured interviews (Brandt, Iwarsson, & Stahle, 2004; Evans, 2000; Lofqvist, Pettersson, Iwarsson, & Brant, 2012; Miles-Tapping & MacDonald, 1994).

### **Quality assessment of studies**

The methodological quality of the studies and research design level varied significantly (Table 1). Two articles had very strong methodological quality, but with different design levels (Hoenig, Pieper, et al., 2007; Lofqvist, et al., 2012). The other nine articles scored evidence levels of either 4 or 5, with various methodological quality scores between low and

strong. The shortcomings which resulted in methodological weakness include poor description of sample characteristics, small sample sizes, no homogeneity of sample, poor or nil connection to theoretical framework, no verification of results, poor controlling for confounding results and little estimate of variance. These weaknesses are characteristic of this type of descriptive research (Hoenig, Giacobbi, & Levy, 2007) and can be difficult to overcome.

### **Outcome measures**

Of the compiled studies, six utilised different outcome measures, while the remaining five conducted research without an outcome measure. The use of outcome measures varied considerably among the six studies, with no two studies utilising the same measure. The outcome measures can be categorised into two groups, one measuring occupational performance and the other assessing changes to quality of life. The following three studies used measures to detect change in individual's occupational performance. Pettersson et al. (2006) used the Individually Prioritised Problem Assessment (IPPA) to understand the effectiveness of assistive technology in conjunction with the World Health Organization Disability Assessment Schedule II (WHODAS II) to assess activity limitations and participation restrictions. To measure if mobility devices would maintain and/or improve walking capacities of individuals with arthritis of the knee Hoenig et al. (2007) used the Six Minute Walk Distance Assessment to determine if using powered mobility maintains, increases or decreases individual capacity to ambulate, along with a self-reporting questionnaire on mobility. Lofqvist et al. (2012) used the context specific Nordic mobility-related participation outcome evaluation of assistive device intervention (NOMO 1.0) assessment to measure the outcomes association with powered mobility device use. The three other researchers investigated the impact of powered mobility devices on the quality of life of the individual. Davies et al. (2003) used the European Quality of Life Measure (EQ-5D) in

conjunction with the Visual Analogue Scale (VAS) to gauge changes in the quality of life for people with severe disabilities using a powered mobility device. The Occupational Performance History Interview (OPHI) and the Psychosocial Impact of Assistive Device Scale (PIADS) were used in a pre- and post-test design by Buning et al. (2001) to investigate the impact of powered mobility devices on users' lives, roles and quality of life. M. May and Rugg (2010) used the Canadian Occupational Performance Measure (COPM) as an outcome measure to assess both changes to quality of life and occupational performance.

### **Engagement in occupations**

Five studies directly reported on the occupational performance of the power mobility device user: all articles reported a positive association or an increase in ability to engage in occupations. M. May and Rugg (2010) reported that the use of powered mobility device resulted in a statistically significant improvement in function and activity engagement in relation to occupational performance, this was tested using a Wilcoxon signed rank test ( $p < 0.01$ ). These results were further supported by Evans' (2000) study which indicated that participants highly value the greater control over their occupations with an enhanced opportunity to experience life gained through power mobility use. At follow up assessment participants in a study by Petterson et al. (2006) reported engagement in 16 new activities; this was also seen in research by Davies et al. (2003) where participants were able to perform new activities following the provision of a powered mobility device. Research by Buning et al. (2001) describes how powered mobility allows participants to engage in valued interests, roles and responsibilities thus enabling improvements in occupational performance. The remaining studies reported on other outcomes of powered mobility device use which are closely related to occupational performance such as independence, roles and environmental barriers.

The importance of independence has been shown to be closely linked to occupational engagement and enablement (Amini et al., 2008). The use of a powered mobility device was reported to have a positive impact on independence in four articles (Edwards & McCluskey, 2010; Evans, 2000; Lofqvist, et al., 2012; E. May, et al., 2010). Independence was further shown as an outcome of powered mobility use by Buning et al. (2001) in which their findings highlighted how use resulted in increases in autonomy and self-sufficiency for participants. This was in contrast to Davies et al, who found no significant increase in participant's independence and social life. This could be due to the short follow up time, and noticeable changes in the area of independence and social life require longer to establish. They further suggest that the population sample being a diverse mixture of people with disabilities, could have perceived independence as being able to complete self-care activities without assistance. In these cases a powered mobility device would not be perceived as providing independence. Closely linked to independence is the concept of role performance and expansion with findings suggesting that powered mobility enables people to engage in past roles. Expand existing roles, and provides a new sense of purpose (Evans, 2000).

Environmental barriers which impacted engagement in many community activities and desired occupations were frequently reported in the finding. The barriers commonly identified were narrow and uneven footpaths, lack of footpaths, stairs, kerbs, narrow doorways and aisles (Brandt, et al., 2004; Edwards & McCluskey, 2010; Hoenig, Pieper, et al., 2007; E. May, et al., 2010; M. May & Rugg, 2010; Pettersson, et al., 2006). These barriers were also associated with accidents and injury for the powered mobility user (Edwards & McCluskey, 2010; Hoenig, Pieper, et al., 2007). Nine accidents were reported in the study by Heonig et al. (2007) and the Edwards and McCluskey (2010) results showed that in the previous year one in five users had been involved in an accident. Accident types were

reported as driving into doors/walls/objects, tipping over, incorrectly loading device onto car lift for transportation and colliding with motor vehicles.

The powered mobility device was consistently reported as facilitating engagement in activities which can be categorised under the broad domains of interpersonal interactions and relationships and community, social and civic life according to the International Classification of Functioning, Disability and Health (World Health Organization, 2001). The activities reported in the research included shopping, going for a ride, visiting family and friends, attending appointments and church. (Brandt, et al., 2004; Edwards & McCluskey, 2010; Hoenig, Pieper, et al., 2007; Lofqvist, et al., 2012; M. May & Rugg, 2010)

Many of the articles discussed improvements to self-confidence, self-esteem, freedom and quality of life (Brandt, et al., 2004; Buning, et al., 2001; Edwards & McCluskey, 2010; Evans, 2000; Hoenig, Giacobbi, et al., 2007; Hoenig, Pieper, et al., 2007; E. May, et al., 2010; M. May & Rugg, 2010; Pettersson, et al., 2006). These results suggested that powered mobility devices can have a positive impact on one's well-being. Significant changes in these areas were not directly linked to occupational engagement within the studies, however improvements in any area of functioning would likely result in changes in other domains of life (Radomski & Trombly Latham, 2008).

## **Discussion**

The objective of this systematic review was to describe how powered mobility devices impact on an individual's participation and performance in occupations. Findings from this systematic review suggest that powered mobility devices are associated with increases in individual areas of independence, quality of life, and mobility which lead to engagement in valued past and new occupations. The positive impact associated with powered mobility device use is consistently reflected within the behaviour of the user. As seen by the

engagement and expansion of new roles and activities, this demonstrates that power mobility devices provide greater opportunity for individuals to experience life while maintaining independence and dignity. Highlighted within the literature were the negative aspects of use which were difficulty with environmental barriers and risk of accidents. The literature suggests that the positives aspects of use outweighed the negative aspects. This was demonstrated by users continuing to use the device while maintaining confidence when faced with challenges associated with powered mobility device use. This validates the importance of powered mobility devices, highlighting their positive impact in improving users' lives, mobility and confidence.

Conclusions need to be taken into consideration with the limitations which have been highlighted in this review. The varying methodological quality of the research impacts the validity of drawing conclusions and makes the task of compiling further conclusions from the evidence problematic. This review highlights that there is a lack of high quality evidence to support the impact and use of powered mobility devices. Improving this problem within the pool of literature on powered mobility devices is a challenge in itself as it is difficult to maintain a strong methodological quality when evaluating the impact of powered mobility. Completing the research in an ethical manner prevents the researcher from employing certain techniques for enhancing the strength of the research; for example blinding of participants and researcher to the intervention is not possible. Randomisation and use of comparative control groups is un-ethical when the research sample is in need of the intervention. Furthermore selecting and finding a homogenous sample is difficult for this population group (Hoenig, Giacobbi, et al., 2007). However the use of standardised assessments along with normative data as a comparison would aid in maintaining rigour in this area.

As mentioned previously the outcome measures used for this collection of literature falls within two categories; measuring changes in occupational performance and/or quality of life.

The relevance of certain measures can be debated due to their inherent context specific nature such as the NOMO 1.0 (Lofqvist, et al., 2012) which limits the ability to transfer and interpret the results confidently. Most of the measures fall within one of the above mentioned categories, with M. May and Rugg (2010) being the only example of using one measure to effectively assess both changes in occupational performance and quality of life. On a whole the various outcome measures which were exercised throughout the research were consistent in reporting on the two outcomes which are most relevant to health professionals and users of powered mobility. It is recommended that future studies use valid and reliable outcome measure to assess functional or psychological outcomes.

### **Limitations**

The included studies differ in focus, sample characteristics and outcome measures which impacts the ability to derive definitive conclusions for this systematic review. The varying terms used throughout different countries and studies for powered wheelchairs and motorised scooters could potentially impact the search results. The research team attempted to conceptualise, include and cover all possible terms for powered mobility, but given the diverse terminology it is possible that relevant research may have gone unnoticed.

Furthermore conference proceedings and grey literature were excluded and the material was limited to English language papers, potentially overlooking further articles. The concept of occupational engagement was not often directly measured within the research. Definitions of what is engagement and what is a precursor to engagement are difficult to define and subjective to the individual. What is known is engagement is generally precipitated by core foundation skills such as mobility which leads to independence and enables engagement (Radomski & Trombly Latham, 2008). Understanding the diverse way in which powered mobility impacts upon the individual and their occupational engagement was a key concept



within this review. These challenges were found in the literature and subsequently reported in the results.

### **Future research**

As demonstrated through this review the current body of evidence surrounding powered mobility has significant methodological weaknesses, resulting in low level evidence. Research attempting to control potential biases and improve quality will be of value for improving outcomes within this population. Long term follow up research studies would be beneficial in providing information regarding the long term consequences of powered mobility devices. Current research follow up times for pre and post-test designs were limited in their length, the longest being identified in this review was Lofqvist et al. (2012) with a 4 month and 1 year re-evaluation. Future research within this field should focus on utilising reliable and valid outcome measures to improve comparability of research outcomes and provide consistency in research. The use of surveys and/or constructed interviews for individual research leads to a potential bias; improvements should be made in regards to standardising surveys and interviews or employing other measures which withstand psychometric testing. Future research should aim at enhancing the evidence-based knowledge surrounding powered mobility to improve outcomes for the individual user.

### **Clinical implications**

Research into the way new technology facilitates mobility and community engagement provides an evidence based understanding of the associated impact. This understanding is significant in maintaining the health outcomes, independence and engagement for individuals with mobility limitations. Changing health outcomes for individuals is facilitated through conducting evidence based research; the findings of this systematic review demonstrate that there is a need for improved research by the health industry professional. The available

evidence which has been demonstrated to be of a low level is still applicable to the field of powered mobility; much of the research incorporates the user's perspective and opinion. Providing health professionals and the public information on the experience and issues encountered as a powered mobility user, this facilitates better knowledge and choices by professionals and consumers. With current trends set in favour for the population to continue expanding, it is of high importance to be aware of the issues facing the older generation allowing individuals to maintain health and function.

**Declaration of interest**

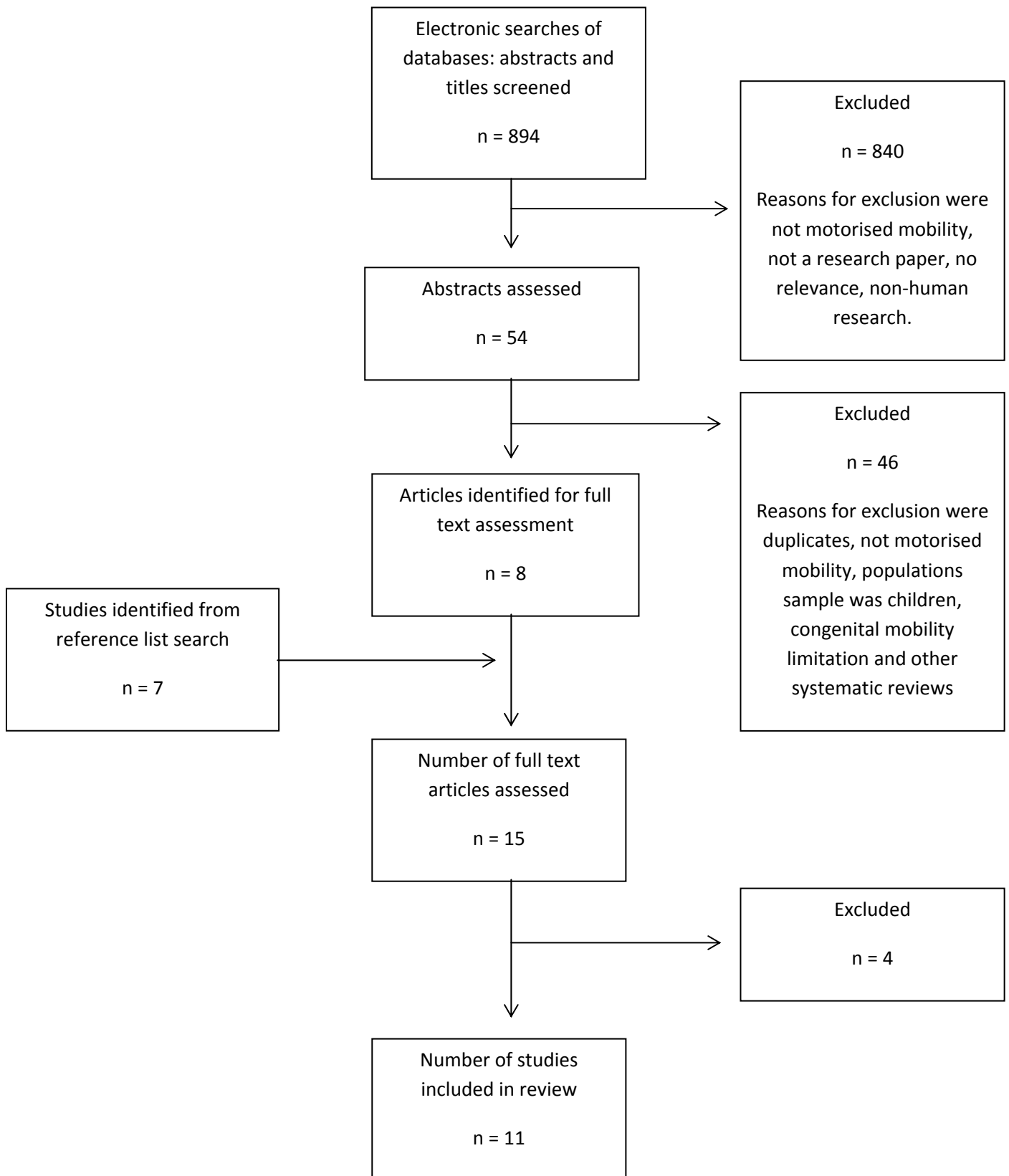
The authors report no declaration of interest.

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**Figure One: Flow diagram of study inclusion**



**Table One: Descriptive analysis table**

First Author/Year	Design/participants	Intervention	Outcome Measures	Methodological quality	Results/ level rating
Brant, 2004	Cross sectional interview using a study specific questionnaire of powered W/C users over the age of 65 (n=111)	Powered W/C	None	Strong quality (score = 19/22) Little description of sample characteristics. No estimate of variance reported in results.	Nearly all participants regarded W/C as important and facilitated independence. W/C made activity and participation possible for users Level 5
Pettersson, 2006	Pre and Post- test assessment. Individuals who have had a stroke (n=32)	Outdoor powered W/C	IPPA WHODAS II	Strong quality (score = 18/22) No mention of attempt to control for confounding factors. No clear conclusions drawn.	Strong positive effect on activity and participation. Most problems related to community, social and civic life under the ICF Level 4
Hoeing, 2007	Randomised control trial Ambulatory community dwelling outpatients with RA or OA of the knee. (n=43, 22 = scooter 21 = usual care)	Motorised scooter	6MWD Self-reported measures on scooter accidents and satisfaction.	Very strong quality (score = 24/24) Clear methodology, adequate sample size, results support conclusions.	Satisfaction with scooter use was generally positive. Scooter used for shopping going to mall and visiting others Level 1
Edwards, 2010	Cross sectional survey. 25% power W/C users 74% scooter users. (n=202)	Power W/C and Scooters	None	Adequate quality (score = 16/20) No inclusion criteria, inadequate description of survey, no estimate of variance in results.	Increases in independence and QOL. Challenges included environmental barriers. 21% reported accidents in previous year Level 5

Davies, 2003	Pre and Post-test Cohort study Individuals with both congenital and acquired mobility limitations (n=64)	Powered indoor/outdoor W/C	EQ-5D VAS	strong quality (score = 19/22) convenience sample with no clear criteria, no evidence of controlling for confounding in results.	No changes in individual perceived level of health state. Decreases in pain and discomfort. Improved level of mobility and quality of life Level 4
Miles-Tapping, 1994	Qualitative study using semi structured interviews. Power W/C users aged between 35-85. (n=11)	Powered W/C or scooter	None	Low quality (score = 10/20) Design and context of study not clear, convenience sample with no clear criteria, data collection not clear, no mention of data analysis, verification and reflexivity of researcher not discussed.	W/C or scooter allowed achievement of goals, reduced fatigue, instilled confidence, and provided access to variety of environments Level 5
Buning, 2001	Pre and Post-test study Individuals transitioning from manual to power W/c (n=8)	Powered W/C	OPHI PIADS	strong quality (score = 18/22) Study design not appropriate, small heterogeneous sample, no evidence of controlling for confounding in results.	Significant improvements in occupational performance. Positive improvements in PIADS scores Level 4
Evans, 2000	Semi structured interview Individuals with both congenital and acquired mobility limitations (n=8)	Powered W/C	None	Strong quality (score = 18/20) Limited connection to theoretical framework, sampling strategy not clear.	Increased independence and control over occupations, life experience, role expansion and social participation Level 5

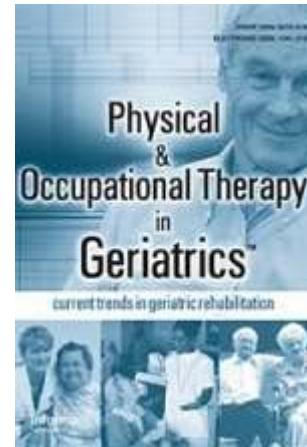
Lofqvist, 2012	Prospective cohort study First time users of a powered W/C or scooter over the age of 20 (n=34)	Powered W/C or Scooter	NOMO 1.0	Very Strong quality (score = 20/20) Appropriate sample size and selection, clear reporting of results with sufficiently supported conclusions.	Increase Independence, enhanced mobility related participation, Scooters were used for shopping, socialising and going for a ride Level 5
May, 2010	Descriptive and exploratory study using a survey and focus groups. Older adult scooter users. (n=67)	Scooter	None	Adequate quality (score = 14/20) Limited connection to theoretical framework, verification and reflexivity of researcher not discussed.	Common activities shopping, visiting friends, keeping appointments, going for a ride Level 5
May, 2010	Mixed method study: pre and post-test Non-experimental design. Individuals with both congenital and acquired mobility limitations (n=20)	Powered indoor/outdoor W/c	COPM	Strong quality (score = 18/22) No estimate of variance or controlling for confounding reported.	Statistically significant improvements in occupational performance and satisfaction scores. Enhance Occupational performance and QOL (Level 4)

### List of abbreviations

W/C: Wheelchair, IPPA: Individually prioritized problem assessment, WHODAS II: World health Organization Disability Assessment Schedule II, ICF: International Classification of Functioning, RA: Rheumatoid arthritis, OA: Osteoarthritis, QOL: Quality of Life, EQ-5D European Quality of Life measure, VAS: Visual Analogue Scale, OPHI: Occupational Performance History interview, PIADS: Psychosocial Impact of Assistive Device Scale, NOMO 1.0: Nordic mobility-related participation outcome evaluation of assistive device interventions, COPM: Canadian Occupational Performance Measure.



# Physical & Occupational Therapy in Geriatrics



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# **The experience of being a motorised mobility scooter user**

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## **The experience of being a motorised mobility scooter user**

Ryan Fomiatti

## **Abstract**

Purpose: This study explored the individual experiences of being a scooter user and the ways in which scooters impact the individual's community and social engagement, daily activities and maintenance of mobility.

Method: A qualitative, constructive framework utilising purposive sampling and a semi structured interview with fourteen individuals residing within aged care facilities in Perth, Western Australia was utilised. Data was analysed thematically with questions categorised under the main areas of activities, participation and environmental factors according to the International Classification of Functioning, Disability and Health framework.

Results: The three main themes identified through the research were knowledge, engagement and environments. Knowledge related to a lack of concise information, trialling and training prior to purchase leading to issues with the scooter catering for users' individual needs. Engagement consisted of two sub categories of participation and interaction. Environments were broken into two areas of discrimination from the wider population and building design and barriers related to space requirements and physical barriers in the built environment.

Conclusions: The research demonstrated a strong positive impact on individual's engagement from using a scooter, while highlighting a lack of efficient knowledge about scooters, batteries, skill ability and design along with environmental challenges of discriminatory attitudes and barriers. The research indicates the need for pre-purchase assessments and trials along with improvements in community attitudes and environments. The use of a scooter results in increases to participation, role maintenance, choice, freedom and social interaction.

Ryan Fomiatti,

Lois Moir,

Janet Richmond,

Jeannine Millstead

August, 2012

## **Abstract**

Purpose: To explore the individual experience of being a scooter user and the ways in which scooters impact community and social engagement, daily activities and enhance mobility.

Method: Qualitative research utilising purposive sampling and a semi structured interview with fourteen individuals was used. Questions were categorised according to the International Classification of Functioning, Disability and Health framework into the three areas of activities, participation and environmental factors.

Results: The three main themes identified through the research were knowledge, engagement and environments. The use of a scooter results in increases to participation, role maintenance, choice, freedom and social interaction.

Conclusions: The research demonstrated a strong positive impact on individual's engagement from using a scooter, while highlighting a lack of efficient knowledge about scooters, batteries, skill ability and design along with environmental challenges of discriminatory attitudes and barriers. The research indicates the need for pre-purchase assessments and trials along with improvements in community attitudes and environments.

keywords: motorised mobility scooter, engagement, mobility, social interaction, barriers, discrimination.



## **Introduction**

Western society is currently facing the challenges associated with having an increasing life expectancy resulting in an ageing population. The impact of living a longer life generally comes at a cost to the individual's physical capacities. Current figures suggest that one in five people require some level of assistance due to disability, and that this figure increases as people reach age 70 (Australian Bureau of Statistics, 2006). This strong relationship between an increase in age and an increase in the incidence of disability is supported by Murphy, Cooney, Shea, and Casey (2009).

Mobility is viewed as a pre-requisite to living functional and independent lives (Radomski & Trombly Latham, 2008). When individuals encounter disability challenges are experienced in relation to their mobility and engagement within society. Estimates in developing countries have suggested that roughly 70 per cent of individuals living with a disability encounter serious difficulties when mobilising in locations other than their own residence (Green, 2011). The current view of disability is that it results from a lack of inclusive physical and social environments, rather than the disability dwelling within the person (World Health Organization, 2001). To combat the marginalisation of individuals living with a disability, modifications and planning of inclusive environments is of paramount concern for society and governing bodies (World Health Organization, 2001).

Through advancements in technology people increasingly seek to maintain their desired level of mobility through the use of devices such as a motorised mobility scooter (hereafter referred to as a scooter). Scooters are increasingly being seen as an alternative to driving (Cassel & Clapperton, 2006) however, it is not fully understood to what extent the use of a scooter for mobility impacts on the physical and social aspects of the individual's life (Brownsdon & Marcar, 2002). With increased sales of scooters there has been a rise in the

reporting of accidents and injury related to falls, personal skill limitations and misuse of the scooters (Cassel & Clapperton, 2006; Hall, Partnoy, Tenenbaum, & Dawson, 2005).

According to research conducted by the Australian Competition and Consumer Commission there were 62 deaths between 2000 and 2010 and 442 admissions to hospitals between 2006 and 2008 from scooter use in Australia (Australian Competition and Consumer Commission., 2010). Questions are also raised as to how many incidents go undetected and un-reported due to self-management of symptoms and feelings of embarrassment by the individual. This significant number highlights the concerns that arise from the unregulated sale of scooters by untrained staff to an already vulnerable population (Brownsdon & Marcar, 2002).

The rapid development of mobility devices and the significant increase in purchase and use has resulted in little research in the field of scooter usage (Auger et al., 2008). There is a need for evidence-based knowledge related to the everyday use of scooters in the aged community (Hoenig, Giacobbi, et al., 2007). Much of the literature has focused on scooters and powered wheelchairs together as a single entity of assistive equipment, however differences exist between them. To comprehend the way in which scooters and other assistive equipment impact upon the user, it is necessary to separate and control the type of equipment within studies (Auger, et al., 2008; Edwards & McCluskey, 2010). Insufficient literature has solely focused on scooters, limiting our knowledge and understanding on the experience of being a scooter user.

## **Methods**

### *Research design*

A qualitative, constructivist approach was employed to interpret and understand the individual experience of being a scooter user, as each person experiences and interprets their use differently creating individual realities (Hammel & Carpenter, 2004). The constructivist

approach allowed understanding of these various realities (Taylor & Bogdan, 1998). Ethical approval was granted by the Human Research Ethics Committee at Edith Cowan University, with verbal and written informed consent obtained from all participants.

### *Recruitments of participants*

Recruitment of participants was established through contacting local retirement and lifestyle villages to identify suitable candidates for the research. Participants were then contacted to arrange time, date and location for interviews. Participants were included in the study if they used a scooter within the community for a minimum period of two months, compensating for an acquired mobility limitation and were over the age of 18. Individuals were excluded if they had a congenital disability resulting in mobility limitation, non-English speaking and were unable to independently use the scooter, requiring assistance from a carer. The research sample consisted of nine females and five males, all participants were over the age of sixty five, with the exception of one participant being below sixty five.

### *Data collection*

Each participant's experience was explored through semi structured interviews. Interviews followed a question guide (Appendix One), developed from the related literature on scooter use. Questions were categorised into main areas according the International Classification of Functioning, Disability and Health (World Health Organization, 2001). The main areas explored through the interviews were activities, participation and environmental factors. The semi structured nature of the interview allowed flexibility for the interviewer and interviewee to explore emerging themes relevant to the research (Flick, 2006). All interviews were digitally recorded; field notes were compiled to assist in data analysis.

### *Data Analysis*

Upon the completion of each interview a verbatim transcript was compiled; with all identifying data de-identified through the use of pseudonyms. A thematic analysis of the data identified common and emerging themes and occurred in three phases, data reduction, data display and conclusions. The process involved analysing and critiquing the data, selecting which material was important and identifying the meanings and common themes (Carpenter & Suto, 2008).

### Trustworthiness

To maintain and strengthen the trustworthiness of the data steps were taken to ensure that the credibility, transferability, dependability and confirmability were upheld through the research process. The use of member checking to ensure correct interpretation of responses, a purposive sampling technique, use of an audit trail and external peer reviewing to alleviate biases were all employed to maintain the trustworthiness of the data (Carpenter & Suto, 2008).

### **Findings**

The study aimed to explore the lived experience of individuals who used a scooter to compensate for limited mobility. Using a deductive approach and the ICF (World Health Organization, 2001) as a framework the data were sorted in the categories of participation, activities, personal factors and environmental factors. From this the three main themes were identified namely, knowledge, engagement and challenges.

#### *Theme one: Knowledge*

When looking to purchase a scooter, individuals rarely sought information from various suppliers, with only one individual receiving advice and referral from a health professional.

Often purchases were on the spot and impulsive with few participants trialling more than one scooter or seeking comparisons. No formalised training was provided and most participants were only given limited information regarding the basic operational instructions of the device such as, starting, accelerating and reversing. This resulted in many uninformed purchases of scooters

*“I had seen a couple of people with them, but that was just all. I just decided I needed one and we brought it” -Margaret*

The lack of formal training and trialling, coupled with limited information resulted in some participants being dissatisfied with their purchase. This overall deficit in information resulted in two individuals being in potentially harmful situations, including being thrown from the scooter due to the sudden stopping and being knocked over from leaving the key in the ignition.

Information about the correct charging of scooter batteries varied among people interviewed, ranging from constant charging of the batteries when not using the scooter to charging after a certain number of uses or when batteries life indicated low levels of power. Each participant indicated that their charging behaviour was what was recommended to them or what they thought was the recommended care. Not one of the participants interviewed was able to say with certainty how far their scooter should travel on a full battery charge. One participant was given an estimated distance to expect, but stated she never felt confident for fear of running out of power and being stranded. The concern created from the lack of knowledge surrounding battery power, performance and range of distance was commonly mentioned by the participants interviewed, with many stating they did not travel any further than they had to.

*“Well we know it can go quite a way, but I’m frightened of going to the shops and getting stuck and running out of battery” -Mary*

*“I don’t get very far because, I really don’t know how far the battery of the scooter will allow me to go and get back again, after all you have got to get back” -Sue*

The limited knowledge about scooter batteries severely impacted the way in which participants used their scooter. Many participants self-restricted their use to the immediate surroundings of the establishment and local community.

Prior to purchasing a scooter little consideration was displayed in regards to how participant’s current level of function would impact their skills and abilities to safely handle the scooter.

There was a strong perception that prior skills attained through vehicle driving directly transferred over to current scooter driving ability. Reasons for ceasing driving were generally in regards to near accidents or decline in attention. None of the participants interviewed acknowledged that there was a possible link between the decline in driving ability and risks to personal safety when driving the scooter.

Problems with the design of the scooter were raised in relation to having a visible battery life indicator, speedometer and the scooter’s lack of adjustability to cater to varying needs. From the participants experiences only one scooter had a visible battery life indicator and all were unaware of the speed they were travelling. The issue of adjustability focussed on the lack of adaptability present within current scooter seats and control systems to cater for varying levels of need. Participants commented that adjustable armrests, seat height, steering column height and distance from person are all feature which would potentially improve comfort when driving. One participant commented about pain and discomfort which resulted from having to apply continuous pressure to accelerate the scooter using the thumb as opposed to a

lever style in which all four fingers can be utilised. These problems which surfaced in the research were only recognised by participants post purchase of the scooter.

*Theme two: Engagement*

The second theme which emerged from the data was engagement, and can be divided into two sub categories of participation and interaction. Participation was a key outcome mentioned from using the scooter. All participants indicated that the scooter was primarily used for shopping and transporting goods home. The scooter was further used to engage in a variety of other activities such as attending appointments, church, health care (doctors, chemist, physiotherapy, Medicare) attending educational institutions, going for a ride, engaging in hobbies, going to the cinema, walking the dog, collecting mail and visiting family and friends. Use of the scooter was further attributed to maintaining community participation and valued roles, as displayed by the various activities in which people engaged.

The participants all expressed improvements to their quality of life through one or more of the following areas of independence, mobility, autonomy, freedom and convenience.

*“Well it has given me independence and freedom to still keep me being a person, not just a part of this establishment” -Catherine*

*“Well I can do things which I got past that stage of doing in mobility” -Bruce*

Convenience was mentioned in reflection to using a car, with some participants responding that the scooter provided a much more convenient way of travel; requiring less effort to get in and out of and they encountered fewer issues with parking. Participants who had previously driven reflected on the liberated feeling associated with transitioning to scooter use, this further lead to comments about obtaining and using a scooter before the onset and subsequent decline in health from age and disability. Participants revealed how the scooter allowed for

completion of a variety of tasks throughout each day, which prior to the scooter would have been difficult. It can be inferred from this that the scooter further provided a means for energy conservation.

Interacting in the community was associated with maintaining and facilitating social interactions. Participants mentioned that the scooter provided a catalyst for conversation among people and provided a means to visit friends and family.

*“People tell me how happy I am driving it down there and you make conversations, it opens a lot of conversations” -Margaret*

*“You can just jump on it and go for a ride around the village . . . you always find somebody to talk to” - Aileen*

The general consensus of the people interviewed was that when using the scooter in busy locations such as shopping centres and public transport there is an increased need to be vigilant and aware of the people around them.

*“The public they don’t take much notice besides what they are going to do and where they are going to go, so you have to watch, they will step out in front of you, walk backwards into you, do all sorts of things. So you have got to be very vigilant”*  
*-Robert*

Children created a further increased need for vigilance as they were difficult to notice, often unaware of their surroundings and some parents or guardians did not control the child’s behaviour or movements.

*“A lot of mothers let the children run wild in the shopping centres” -Renae*



*Theme three: Environments*

Emerging from the data was the final theme of environments which can be divided into the sub themes of discrimination and barriers. Discrimination was experienced in two different ways, through public stigma and a lack of universal design in village planning. Public stigma was felt in regards to the feeling of needing to prove one's eligibility to use a scooter through having a visible disability. Two participants commented on this issue:

*“You know I’m almost glad that I limp, because otherwise people would think ‘why isn’t she walking’ it’s, it’s stupid! . . . but I have a conscious feeling of, I have got to make people realise that I need to be on this.” –Jane*

*“They can’t see a physical disability; they think ‘why the hell is she using one of them’.” -Diane*

With scooter use almost exclusively dominated by the older population, stigma was also displayed in relation to the age of the driver. Looks and comments were made to one participant about perceived need and use of the scooter.

*“Well I get lots of looks because I am young, and people, I remember going out for a walk one time and the dog was with me and she was walking and this guy said to me ‘that is cheating’ and I said ‘why?’ and he said ‘you know, riding’. You don’t argue with them, you know, what’s the point? I use to get really, really upset with it, because I would think, you have no idea what is wrong with me” -Rena*

Discrimination was not contained to views from the wider community; discrimination was found in building design. One participant who resided in a lifestyle village commented about the frustration felt from the village design and the restrictions put in place for scooter users. When riding over the curbing in the village pain was felt in the limbs, due to the height of

curbs and subsequent impact related to changing height levels. Within the same village the participant was not allowed to take the scooter into indoor spaces such as the mail boxes, library or the pool area, the participant was required to park the scooter outside and walk in. This resulted in pain, difficulty and a feeling of being restricted in the village. When the participant confronted management with the challenges faced as a person living with a disability in the village, the response received was:

*“This is a lifestyle village, not a retirement village and we meet the rehab legislative standards’, . . . you are not supposed to grow old here, or disabled, . . . management have not accepted that disabled can be quite normal” -Diane*

In this particular incident it was noted by the participant that using the scooter outside of the lifestyle village in the wider community resulted in less difficulty and pain, due to less height variations in the community pathways, joins and curbs.

Built environmental barriers and uncontrollable weather patterns provided problems to community mobility when using the scooter. Difficulties were experienced with available space to manoeuvre in shopping aisles, checkouts, lifts and on public transport. Full attention was required to ensure enough available space and to avoid knocking into objects and walls. To combat this, participants frequented locations they knew provided adequate space and avoided peak times of the day for shopping and public transport use.

Space was again an issue in residential aged care facilities; participants residing in this type of care facility mentioned a lack of appropriate and available space for storage and charging. One participant commented that the location for storing the scooter was on the opposite side of facility in a room which housed two other scooters. The designated place for the scooter was underneath a wall mounted air conditioning unit, when accessing the power socket the participant mentioned bumping her head into the above unit and difficulty in reaching the

power switch. Problems were further encountered when trying to manoeuvre out of the room without colliding into other scooters. Physical barriers such as uneven footpaths, joins in pathways, steep gradients, overgrown grass and lack of graduated connections between pathways and roads all impacted on the riding experience. Not all experiences were the same; with some participants expressing no problems. Negative experiences were generally encountered by participants who ventured outside of the immediate surroundings of the 'village'. This resulted in some participants using the road in preference to pathways to avoid the environmental barriers on the pathways, thus engaging in risk taking behaviour.

*"You don't want to use the footpaths, if you can go on the road safely" -John*

The research demonstrated a strong positive impact on individual's engagement from using a scooter, while highlighting a lack of efficient knowledge about scooters, batteries, skill ability and design along with environmental challenges of discriminatory attitudes and barriers. This further supports the need for pre-purchase assessments and improvements in community attitudes and environments. The two factors of knowledge and environment both influence and impact the individual's engagement, independence and mobility. The use of a scooter results in increases to participation, role maintenance, choice, freedom and social interaction.

## **Discussion**

This research supports and is consistent with previous research literature surrounding scooters and further increases the evidence that scooters facilitate community engagement and maintain personal independence (Edwards & McCluskey, 2010; Evans, 2000; Lofqvist, et al., 2012; E. May, et al., 2010). Additionally, issues were highlighted which were not mentioned or found within the literature search.

With ageing, dysfunction and limitations arise from disability and disease. The design of the scooter severely impacts the user's experience, potentially resulting in pain, discomfort and decreases their desire to use the scooter. Thus the development of devices which can be modified and adapted to personal needs has the potential to improve user outcomes. This is an important finding to ensure that the scooters will be able to maintain and continue to meet the variety and changing needs of the user. Discrimination displayed by the wider community and village design further display the varied realities encountered as a scooter user. Recent reform in aged care management in Australia has seen a shift towards ageing in place (Commonwealth Department of Health and Ageing, 2002), which aims to provide flexible and continuous care to meet individuals changing level of need in environments which are familiar and appropriate (Commonwealth Department of Health and Ageing, 2002). If scooters continue to emerge as a popular alternative for individuals to maintain their mobility, the planning, designing and upgrading of facilities needs to cater for this trend, ensuring individuals can continue to age safely in current locations. The issue of space encountered in the residential aged care facilities highlights a large problem, as the facility was unable to provide appropriate space for the current users. If other individuals in the facility purchased a scooter, further difficulties will be experienced with storage and charging. It is interesting to note the problems encountered in the lifestyle village surrounding the design and strict rules as highlighted by a participant, demonstrate a discriminative approach to the changing needs of individuals within their facility. This indicates that little planning for an aging in place approach appear to have been utilised in both the lifestyle village and residential aged care facilities. The fourteen people interviewed all resided within some form of community living either a lifestyle village, independent living unit in a retirement village or within a residential aged care facility. From the fourteen experiences the issues of space and environmental discrimination were mentioned by those individuals living in the lifestyle village or nursing

home. The participants interviewed who lived within independent living units mentioned no problems with the built environment of their facility and all had access to locations which were close and convenient for charging and storage of the scooter.

Using the scooter requires an integration of both cognitive and physical skills (Radomski & Trombly Latham, 2008). As displayed in this research little consideration about skill level and ability influenced the decision to purchase a scooter. This research did not uncover any major accidents which required medical attention, but a link can be drawn between skill level and minor incidences with the scooter. The mention of small collisions, bumps and running into objects and people demonstrate that participants had difficulty with visual space dimensions, attention and reaction time due to decreases associated with age and disability. It can only be inferred that these issues will continue to become a problem as people age and continue to encounter further challenging situations. With a population group who are using scooters to compensate for already declining health, some consideration needs to be given for assessing cognition and skill level to determine whether the scooter is the best match of equipment for their needs and whether further training and information would improve the outcome.

Awareness of these issues helps to improve the general understanding of what it is like to be a scooter user in today's society, potentially highlighting areas for improvements to help maximise the potential gains from scooter use.

### **Limitations**

The research was limited by all participants residing within residential facilities. This limits the ability of the results to be compared to the wider population of community dwelling scooter users, although the research does highlight the important experience of using a scooter when residing in aged care and lifestyle villages. It would be expected that the

outcomes surrounding engagement, mobility, quality of life and activities would be relevant to both population groups as the literature supports this idea. The limited time available for data collection and analyses did not allow for a greater number of participants to be included in the research, which may have resulted in valuable experiences being missed. Furthermore themes which emerged at the end of data collection phase could not be explored with participants who had already been interviewed, again due to time restraints.

### **Recommendations**

It is evident that more research is needed into this population group and their scooter use. Areas for future research should include; investigating the specific training and information needs of individuals when purchasing a scooter. Research on the use of an assistive technology assessment, such as the Matching Person to Technology assessment (Scherer, 2008) to improve user outcomes, satisfaction and match between client needs and scooter would be of benefit. Research is needed to investigate the legislation surrounding lifestyle villages, aged care facilities and shopping centres in adhering to standards and providing adequate space for manoeuvrability. Further research would also be beneficial to investigate ways to decrease the problems associated with the design and the resulting discomfort. Research which includes scooter users living both in the community and residential facilities would highlight the potential differences in the experiences and research from other Australian states would provide an understanding of the overall experience of being a scooter user in Australia.

### **Clinical Implications**

The findings from this research will aid clinicians and health professionals in understanding the experience of being a scooter user and increase awareness of the challenges which are faced. The issues surrounding the design of the scooter and the lack of information and

training can potentially assist in developing targeted and appropriate assessments to screen candidates for suitability of scooters, with the aim being to create complementary matches between the person, scooter and their needs, thus decreasing problems and potential for accident or injury.

### **Declaration of interest**

The authors report no declaration of interest.

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## **Appendix One**

### **Interview Question Guide**

#### **Introduction questions**

Can you tell me about your scooter?

- Specifications, speed, type, three or four wheels

How did you find out about scooters?

Prior to purchase did you consult anyone and what advice did you seek?

When and where did you purchase your scooter?

What influenced your decision to purchase the model you decided on?

Were any trials or training offered to you prior to purchase? How did this affect your decision?

- Who offered the trial and training?
- Do you feel this was sufficient, if not how much would have been sufficient?
- Did you feel confident driving your scooter the first time?

#### **Activities**

Tell me about an average day with your scooter?

What activities do you use your scooter most for?

Are there any situations in which your scooter has stopped you from doing something you wanted to do?

#### **Participation**

What has your scooter enabled you to do, which you could not do before?

When you started using the scooter how comfortable were you in controlling the device?

- Any safety issues?
- Did it take time to adapt to the device and how long?
- Did you feel confident straight away? How long till you felt confident using the scooter?

### **Environmental factors**

Can you tell me about any problems you have encountered when using your scooter?

- Specifically what locations did the problems occur?
- What did you do to overcome the problems?

From your experience are there any places you would not travel with your scooter, and why?

Can you tell me about your understanding of the rules associated with being a scooter user?

- Speed, road safety, right of way

When you are travelling in the broader community, how do you feel the other people around you perceive you and your scooter?

- How does this make you feel?

### **Closing questions**

How has your life changed since you started using a scooter?

What is the best thing about using a scooter?

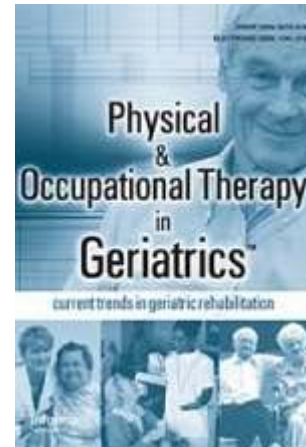
What is the worst thing about using a scooter?

What advice would you give to other people who are thinking about purchasing a scooter?

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