The meaning ascribed to wheeled mobility devices by individuals who use wheelchairs and scooters: a metasynthesis

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**Purpose:** To synthesize qualitative study findings on the meaning ascribed to wheelchairs and wheeled mobility devices (WMD) by WMD users.

**Method:** Bibliographic databases were systematically searched up to January 2015 to identify relevant papers. Reviewers selected studies, assessed methodological quality, and thematically synthesized findings using a metasynthesis process described by Thomas and Harden (2008).

**Results:** Twenty articles were included. Four descriptive themes emerged: physical environment interaction; sociocultural experiences; participation in activities and occupations; and WMD-self relationship. WMD use was found to be a complex experience that can fluctuate through interaction with aspects of the environment and opportunities for participation. The analytic theme, Dynamic Duality of WMD Experience, addressed the simultaneous enabling and disabling aspects of WMD use.

**Conclusions:** Metasyntheses enable researchers to gain a deeper understanding of issues by examining findings across studies. Findings of this study provide a framework for understanding the complexity of WMD use. The framework has practical applications for clinicians and users of WMD in understanding the experience of WMD to be neither singular nor static.

Word count: 170
Implications for Rehabilitation

- The meaning of wheeled mobility device use is dynamically influenced by the environment and opportunities afforded for occupational and social participation.

- A duality of experiences can emerge for wheeled mobility device users, where wheeled mobility use can be at the same time positive and negative, based on the interaction with the environment.

- Clinicians need to determine the meaning that each individual user ascribes to the WMD, and to consider how that meaning may change over time.

- By understanding the meaning ascribed to wheeled mobility device use by individuals, clinicians can be better prepared to work with wheeled mobility device users to address negative reinforcers of the experience in physical and sociocultural environments as well as highlighting the positive experiences.
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Introduction
Assistive technology (AT) holds an important place in the lives of people with disabilities, and access to AT has been identified as a means to full and equal enjoyment of human rights. However, AT may hold different meaning to different individuals: it is important to understand that the meaning ascribed to AT is viewed by individual users through a socially constructed lens shaped by one’s personal, social, community, cultural, historical, and political experiences.

Thus, Hocking states that: ‘The recipient’s values and emotional responses to using assistive devices may be more potent factors in surviving, or flourishing with assistive devices than the occupational opportunities they enable’. It follows that the best use of AT requires an understanding of the users’ experience.

Wheeled mobility devices (WMD) are common assistive technologies. WMD include wheelchairs, both manual and powered, as well as mobility scooters. While the WMD can either replace or augment an individual’s physical mobility, people who use WMD are a heterogeneous group (e.g., in terms of gender, age, length of WMD use, type of WMD used, and context of use). Thus, WMD users will likely hold individual, as well as shared, perspectives on the meaning of AT use; understanding this meaning is an important component of understanding WMD use.
Over the past decade, publication of qualitative research focused on the users’ meaning and experience of WMD use has increased. Given this recent proliferation of evidence, it is timely that this knowledge be synthesized in a way that can inform the practice of AT clinicians and policy-makers. Metasynthesis is one way of synthesizing information across studies in useful ways to inform practice. It uses a process of ‘systematic logic within which findings from distinct studies in a field can be rigorously integrated into stronger and more generalizable knowledge claims’ ⁶. The aim of metasynthesis research is to understand and explain phenomena whereby findings of primary studies are compared and integrated to develop a whole that addresses concepts at a more constructed level ⁷. This level seeks a new interpretation of the findings by comparing similarities and contradictions across studies ⁸. The interest in drawing together the findings of qualitative studies on AT is emerging, with recent metasyntheses published on the experience of prosthetic use ⁹, and the meaning and experience of AT use in older adults ¹⁰. This paper presents a metasynthesis of the qualitative literature pertaining to the question: ‘What meaning is ascribed to WMD by WMD users?’

**Method**

**Study design**

A metasynthesis was conducted on qualitative studies that stated they examined the meaning ascribed to WMD by users in the research purpose statement, aim, question, or objectives. Specifically, thematic synthesis was selected as the method of metasynthesis ¹¹. Using thematic synthesis, researchers engage in a process of open coding the findings of original research studies, and then organizing those codes into descriptive themes ¹² However, a signature feature of thematic synthesis is that it takes analysis further with a distinct step of ‘going beyond’ the
descriptive themes derived from the original study findings to develop higher order interpretive or analytic theme(s) \(^{11}\). It is in the development of this analytic theme that the researchers ‘seek to push beyond the original data to a fresh interpretation of the phenomena under review’\(^{12}\). Thematic synthesis addresses intervention need, appropriateness, acceptability and effectiveness with the intent to inform policy and practice \(^{12}\).

The research team was comprised of three individuals. Two are faculty members at academic institutions, with backgrounds in occupational therapy and research programs on AT use, and one is a medical and health sciences librarian. An audit trail was maintained to record decisions and progress regarding data selection, extraction, and analysis. As the researchers were geographically dispersed, technology was used to facilitate monthly research meetings (Skype)\(^{13}\), to manage the literature search (shared folders in EndNote online)\(^{14}\), to organize the data analysis (NVivo 10.0)\(^{15}\), and to share all working documents (Dropbox)\(^{16}\). Researchers met monthly, and worked both collaboratively (through electronic means) and independently between meetings.

**Inclusion and exclusion criteria**

Only peer-reviewed original research articles with qualitative findings emerging from qualitative research or qualitative data emerging from mixed methods studies when qualitative findings were discernible were included for all population sub-groups, ages, and disability types when respondents were users of wheelchairs (e.g., power, manual, or hybrid) and scooters. The exclusion criteria were: studies reporting on service provision; service providers or carers as participants; reports focused on the experience of disability where wheelchair use was synonymous with disability; walking aids (e.g., canes, crutches, walkers, orthotic devices,
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The search was conducted in compliance with the PRISMA Framework. The systematic literature search was conducted in January 2015 with Web of Science (1980 to January 2015), EMBASE (1980 to January 2015), CINAHL (1980 to January 2015), PsycINFO (1880 to January 2015), and Scopus (1966 to January 2015) using two sets of search terms: qualitative research (qualitative OR interview OR “lived experience” OR phenomenolog* OR ethnography OR “grounded theory” OR “focus group*”); and, WMD (“mobility device*” OR wheelchair* OR “mobility chair*” OR “power mobility” OR “mobility scooter*”) NOT (robot* or virtual or rehab*). In addition, a broad search using MeSH terms was performed in PubMed (1950 to January 2015) that included Wheelchairs[Mesh] AND ("Qualitative Research"[Mesh] OR "Quality of Life"[Mesh]). This was to provide an additional check for completeness as Scopus includes PubMed records but cannot easily be MeSH searched. Reference lists of relevant articles were hand searched to identify any further relevant papers. Because of the frequency of publication of relevant qualitative studies, the following two journals were also hand searched for relevant articles up to January 2015: (1) Disability and Rehabilitation: Assistive Technology, and (2) Scandinavian Journal of Occupational Therapy.

Selection of studies
The literature search identified 719 articles (Figure 1). After the removal of duplicates, JR and MV independently screened articles by title, then abstract, and then by full text to exclude articles that were not within the inclusion criteria. Discussion occurred at each stage of the selection process. Twenty-five articles met the study criteria.

*Insert figure 1 about here*

**Quality assessment**

While there is debate about the value and purpose of conducting quality appraisal of selected articles in a metasynthesis \(^{18}\), a balanced approach to quality appraisal was taken in this study, using it as a means to deconstruct the research process and findings in relation to the research question and to highlight the articles that provided findings that were rich, detailed and relevant to our question. Thus, quality appraisal was also used as a means of considering oversights or flaws in methodology that might impact interpretation of findings \(^{8}\). Quality appraisal was guided and scored using the McMaster Qualitative Research Review form \(^ {19}\), with a score of 0 (absent) or 1 (present) assigned to each of the questions and resulting in a score out of a total of 25.

Appraisal of the 25 articles selected through the screening process was undertaken by JR, with a sub-sample of five of the articles conducted independently by MV to ensure consistency in appraisal. Comparison of quality appraisal scores between researchers revealed a difference of one point on one article that was discussed and the score subsequently agreed upon. The appraisal process resulted in the exclusion of one article as, upon detailed reading, it did not address the research study purpose. After appraisal, the 24 articles were ranked in descending order of relative rigour. The articles were grouped into tertiles (score 17–25, n=7; score 9–16, n=13; score 1–8, n=4). The lowest tertile of articles were excluded from further review, based on
no indication of ethical review or informed consent of participants, or lack of evidence of analytical rigour, resulting in 20 articles selected for metasynthesis.

**Data extraction and analysis**

JR and MV undertook three stages of analysis, as guided by thematic synthesis: (1) line by line coding of the findings of each article; (2) combining the findings into ‘descriptive themes’; and, (3) interpretation of the descriptive themes to develop ‘analytical themes’ 11. Consistent with Thomas and Harden 11 and Fegran 20, we included both direct WMD user quotations from the original article as well as summary statements made by the authors found in the results (or findings) section of each article as data. Coding was inductive, allowing for the identification of new codes throughout the analysis as well as the recognition of re-occurring codes between each article analysed. Codes were constantly reviewed, expanded, condensed, and then clustered into four descriptive themes through on-going and iterative discussion. Finally, the analytic theme was conceptualized by conducting an overarching analysis of the combined body of literature and considering the relationships between the descriptive themes.

**Results**

Each of the selected articles is summarized in table 1. A total of 301 participants contributed to the 20 articles (19 studies). Most research participants used manual wheelchairs and/or power wheelchairs; two studies focused exclusively on the experience of scooter users. Two studies included findings based on the experience of children, while the remainder focused on the experiences of adults and older adults.

*Insert table 1 about here*
One hundred and twenty-two unique codes were developed and clustered into 15 subthemes, which were then organized into four overarching descriptive themes: physical environment interaction; sociocultural experiences; participation in activities and occupations; and the WMD-self relationship. These themes were comprised of related codes either identified numerous times or identified as key findings in some of the articles. Table 2 depicts the descriptive themes and subthemes, with examples of findings from the primary studies.

The overarching *Physical environment interaction* theme was reported in most articles and consisted of codes that addressed the physical accessibility of the environment in both positive and negative ways. Subthemes addressed how the built and natural environments influence the experience of WMD use, which was described either as challenging, or as accessible and safe. Some papers highlighted strategies for coping with physical environments. The physical environment interaction theme also emphasized the importance of physical features of the WMD including aesthetics, size, and reliability.

Codes clustered as *Sociocultural experiences* addressed how interaction with friends, family, society and with health care providers influenced the experience of WMD use. Subtheme findings included positive reports of support and acceptance. However, they also included findings related to negative attitudes and experiences of stigma, discrimination, pity, discomfort, and invisibility that WMD users experienced. Participants expressed a sense of discrimination, of feeling like a ‘second class citizen’, of being ‘embarrassed’ and of being inappropriately pitied. While some spoke of a sense of ‘social anonymity’
others reported that people were curious\textsuperscript{40} or even ‘nosey’\textsuperscript{21}. Relationships and the perception of being a burden was influenced by, and can influence, the experience of WMD use\textsuperscript{21,22,26,28,29,31,34,38,40}.

The third overarching descriptive theme was \textit{Participation in activities and occupations}. The use of WMD provided functional mobility benefits, and participants from many studies reported that WMD were enablers of activities and occupations both regained, and new\textsuperscript{24,26,27,30,35-37,40}. Enhanced social participation was an important and desired outcome of WMD use. For some, the nature of WMD use created a sense of increased spontaneity\textsuperscript{26,34}, while for others, it created a sense of reduced spontaneity\textsuperscript{21}. Other studies highlighted WMD use as creating barriers to everyday occupation and social activities\textsuperscript{22,24,27-31,38}.

Several codes addressing the personal relationship the user had with the WMD and clustered as the fourth descriptive theme: \textit{WMD-self relationship}. Subthemes suggested that the WMD was considered by some to be part of the self\textsuperscript{24,31,38,40} or of the body\textsuperscript{21,25,36}, but that for others, it was viewed as a separate device\textsuperscript{39,40} that was hard to accept\textsuperscript{21}. This relationship was influenced by the WMD features\textsuperscript{31,37}, aesthetics\textsuperscript{29,40} and WMD customization\textsuperscript{30,40}. The WMD-self relationship theme included many codes that had an emotional and symbolic aspect. For example, for some, WMD use represented freedom\textsuperscript{26,27,36,37,39,40} and autonomy\textsuperscript{24,25,27,34-36}, while for others, it created a sense of restriction\textsuperscript{21,36,38,39} or represented declining mobility capacity\textsuperscript{24,35,40}.

\textit{Insert table 2 about here}
Overarching analysis of the descriptive themes, and relationship between the themes, culminated in the conceptualization of the analytic theme related to the meaning of WMD use for individuals entitled Dynamic Duality of WMD Experience (Figure 2). Duality in this theme means, ‘a situation in which two opposite ideas or feelings exist at the same time’ 41. This conceptualization brought together the descriptive themes that emerged across studies into a whole that addresses the phenomenon of ascribed meaning and the sense that the wheelchair can be simultaneously ‘enabling and disabling’ 32. This was depicted by the inclusion of both positive and negative aspects of WMD use found within each of the descriptive themes (see Figure 2). The concept of duality was evident within individual study themes as well across studies. Furthermore the descriptive themes were viewed as interrelated and influential on one another. This interrelation was exemplified by Stenberg et al. 40 where their participant talked about freedom experienced and new possibilities and opportunities afforded by use of a power wheelchair, while at the same time experiencing barriers in the physical environment.

*Insert figure 2 about here*

This duality of experiences was prevalent throughout and between the articles but the variation in perspective was not dichotomous, i.e., one did not only feel one way or the other, but rather most experienced variation and fluctuation in the experience of WMD use, addressing both positive and negative symbolic aspects of the WMD experience: ‘No, but it’s…you see, it’s a hate object too. It’s both. It’s a bit like life, somehow. That is, it’s a bit like...I could compare it to a marriage, it’s up and [it’s] down’ 40. Furthermore, the dynamic nature of the duality was apparent, suggesting a change or transformation in perspective and meaning for some that may occur over time. For instance, the dynamic aspect was described in the following excerpt: ‘[the WMD was
concrete symbol of severe disability, and thus overt proof of a negative life change. Once they started to use it and experience its benefits, many were positively surprised. At least for some, the electric WMD became a symbol of freedom.  In the majority of the studies analysed, the physical and socio-cultural environment were dominant themes and in particular, barriers in the environment such as lack of accessibility, and negative social attitudes were prevalent. However, positive aspects of the environment were also highlighted. The dynamic duality of the experience of WMD use was clearly reflected in the study by Krantz et al.:

Informants described the role of the wheelchair concerning how others treated the wheelchair user. Differences were described between peers and outsiders (persons outside the group of conscious users) where reactions among peers concerned mainly functional aspects and outsiders tended to react on the occurrence of a wheelchair per se, understanding the wheelchair as signalling absence of autonomy and agency. Interviewees referred to the wheelchair as a disabling attribute among outsiders, and an enabling device among peers.

The inter-relation between the physical and sociocultural environment was described by Barlew et al.:

Through the analysis, the environment and participation in activities and occupations were identified as reinforcers of the experience of WMD use, and particularly of the wheelchair-self relationship. When the physical environment was accessible and allowed ease of access, when
participation in activities and occupations were promoted, and when positive social experiences, supportive relationships, and fulfilment of desired roles were enhanced, there was reinforcement of the WMD experience in a positive way (Figure 2). In situations where individuals experienced barriers in the physical environment and the use of the WMD limited or precluded engagement in activities or occupations, the experience was negatively reinforced, as depicted in the study by Korotchenko et al. 32: ‘So I can’t go to my kids’ games because it’s not wheelchair accessible’.

WMD technology features and appearance also contributed as reinforcers of meaning ascribed to the WMD. WMD features, aesthetics (such as colour) and functions (speed and size) that matched self-image and accommodated for functional limitations enhanced the sense of WMD-self relationship. ‘I want to have pink and blue flames on a black base...The wheelchair should be something personal, like clothes, shoes and hair colour’ 40. Conversely, WMD features that created irritation such as limited battery life, sense of spatial awkwardness or were not aesthetically pleasing (industrial looking) reinforced the negative connotations associated with WMD use. Variances such as these contributed to the duality of WMD experience.

Discussion

Metasynthesis was used to bring together the qualitative literature pertaining to the question: ‘What meaning is ascribed to WMD by WMD users?’ The results examined the major themes in the literature, and developed an analytical or interpretive understanding of how these findings relate to one another. Bringing together studies across populations, countries of origin, author positionality, and types of WMD resulted in identification of descriptive themes and the development of an analytic theme. In each of the primary studies, the main themes tended to
focus on one or two of the descriptive themes. For example, individual studies commonly focused on environmental barriers and accessibility, occupational participation, or the WMD-self relationship. The emphasis in each study was often dictated by the disciplinary perspective that the researcher brought to the study (for example, emphasis on occupational participation and roles by occupational therapy researchers). By drawing this literature together, we have developed a comprehensive and nuanced understanding of the meaning, and influences on meaning, that individuals ascribe to their WMD.

The analytic theme of Dynamic Duality of WMD Experience provides a useful addition to the literature, reinforcing the idea that WMD use is not static or ideographic, but rather fluid and dynamic and influenced by the environment and by opportunity for occupational and social participation. This duality has been previously identified in the study by Papadimitriou 36, who described wheelchair users as being in a ‘curious position’, viewing their wheelchair as a means of freedom and independence while simultaneously being subjected to society assumptions that ‘degrade, demote and devalue’. Consistent with the concept of environmental press (Lawton (1973) as described in Letts Rigby & Stewart (2003) 42, we found that the environment plays a substantive role in the experience and perspective on wheelchair use, i.e., the interaction of the environment on the individual elicits an adaptive (or maladaptive) response. When the demands of the environment and the capacity of the wheelchair/individual match, or when the capacity of the wheelchair/individual exceed the demands of the environment, a ‘fit’ exists.

When the demands of the environment exceed the capacity of the wheelchair/individual, a more maladaptive response emerges. Clinicians can work with WMD users to address and reduce
environmental barriers and to facilitate occupational participation. The need to address societal attitudes at the general societal as well as the policy-making level continues to prevail in the literature. While accessibility has been on the public agenda for differing spans of time in different jurisdictions (e.g., over 25 years in the US, 10 or fewer years in Canada) social attitudes perpetuate that view access as predominately an individual issue rather than a societal responsibility. An aging western society will result in an increased number of individuals with mobility impairments; organizations that advocate for WMD users will benefit from partnering with those identified as supporting older adults as they address larger societal barriers and attitudes. Health care practitioners or researchers can engage with policy-makers, community organizations and individuals with mobility impairments to make decisions targeted at reducing social and physical barriers 43.

Differences in terms of whether individuals incorporated the WMD into their self-identity were evident. For some, the WMD was experienced as integrated into or embodied as a part of self. Papadamitrous 36, described this embodiment as follows:

‘Becoming en-wheeled means that a new ontological style is created, a comfortable style in and through which the chair is experienced as an extension and integral part of the lived body. John, a 27-year-old paraplegic, explained this idea of the new style when he said: “I put my chair on along with my clothes. … It’s a part of me, … I forget it”.’

Clearly, this perspective contrasted with those who viewed the WMD as an object separate from oneself as described by Barker et al. 21. ‘Although the powered mobility was part of the daily lives of these participants, they seemed to view the device as primarily a method of transportation outside the home, almost as they might have previously viewed a car.’ The
findings of the current study also support the work of others, such as Mortenson et al.’s study of wheelchair users in residential care where some residents were regarded as ‘assimilating [the wheelchair] in the user’s sense of self’. In a grounded theory study of environmental control system use, Palmer and Seale also identified how some users integrated their environmental control systems as part of themselves in the theme, ‘utility transcended’ while others experienced the limitations of these assistive technologies as separate objects described in the theme ‘utility denied’.

It is useful for clinicians to understand the duality of experience as inevitable and complex, emphasizing the multi-dimensional and dynamic aspects to be considered when prescribing WMD. For some individuals, it may be helpful to work more closely on addressing the ways that the WMD can become better integrated with self (if that is a goal of the individual). This may be addressed firstly by working with new WMD users to address environmental barriers, promoting selection of WMD options congruent with, or that strengthen, one’s self-identity. Secondly, working with individuals to promote opportunity for meaningful engagement in occupation will serve to support the integration of WMD-self. For others, it may be important to recognize that integration of WMD-self may not be a goal. For example, individuals with temporary mobility limitations may choose to continue to see the WMD as an object separate from them.

Overall, the research supports taking a client-centred approach to working with the individual who is, or will be, using the WMD to understand their individual experience and personally ascribed meaning. AT use has been described as a process of getting used to and overcoming the ‘hassle’ of use and it may be that the duality felt is less prominent for experienced users.
However, the analytical findings of this metasynthesis suggest that the experience may be less sequential and more transient or dynamic, influenced at any one point by the physical and sociocultural environment as well as by the users’ experience of participating (or being prevented from participating) in occupation (see Figure 2). The findings suggest an ongoing need to acknowledge and discuss the dynamic influences of the physical and sociocultural environment and opportunities to participate in activities and occupations on the WMD experience within individuals through their trajectory of WMD use.

Several limitations on this research should be noted. Given the limited number of qualitative research reports in this area, we chose to include scooters as a type of WMD, however some have suggested that they should be considered separately given the different user profile of scooters. Several of the studies included in the metasynthesis involved people who used both wheelchairs and scooters as well as those who used only scooters. While not overtly stated in the located literature, it may be that scooter users do not embody the scooter into sense of self in the same way as wheelchair users, given that codes for integration of wheelchair-self arose from studies of mixed WMD users, but not from those pertaining solely to scooter users. Further exploration into the experience of scooter users is warranted. We also included studies with both new and experienced WMD users, those with different reasons for using a WMD, and WMD users with a wide range of ages, resulting in a heterogeneous group of WMD users and experiences. Future qualitative studies related to different types of WMD and users of WMD will allow for device and/or person-specific metasyntheses in the future. In addition, longitudinal studies which compare different stages of WMD use, from acquisition to experienced use, are warranted.
The analytic theme identified in this metasynthesis held across the diverse body of literature that formed the foundation of this study and was shared through conference presentation and with clinicians in a hospital based WMD service. Pragmatic validity\(^8\) was supported by clinicians who confirmed that the analytic theme was reflective of their clinical experience. However, the literature used in this metasynthesis provided a developed world view of WMD use, with studies primarily conducted in Canada, Scandinavian countries, UK, Australia, and the US. Those who use WMD in developing countries will have different contexts, worldviews, and access to WMD resulting in different experiences and meanings ascribed. The perspective on meaning from these latter individuals is profoundly lacking.

**Conclusion**

The process of conducting a metasynthesis served to draw together and identify relationships between the most commonly reported qualitative themes is the literature. Understanding the meaning of WMD use as a dynamic duality of experience, reinforced (either positively or negatively) by physical and social environments, and opportunity (or lack thereof) for occupational and social participation provides a framework for examining these experiences and understanding the meaning ascribed to WMD use by individuals. This framework has practical applications for clinicians and users of WMD as it provides insights into understanding the experience to be neither singular nor static. Future metasyntheses can be conducted on other types of assistive technologies, including augmentative and alternative communication, environmental control systems, vision and hearing technologies. While individual qualitative reports are essential, we can gain a deeper understanding by examining findings across reports in
a metasynthesis. Ultimately, we can use the results of metasyntheses to guide our understanding of the experiences of AT users.

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Declaration of interest
The authors report no conflicts of interest.

References


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- The meaning of wheeled mobility device use is dynamically influenced by the environment and opportunities afforded for occupational and social participation.

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Over the past decade, publication of qualitative research focused on the users’ meaning and experience of WMD use has increased. Given this recent proliferation of evidence, it is timely that this knowledge be synthesized in a way that can inform the practice of AT clinicians and policy-makers. Metasynthesis is one way of synthesizing information across studies in useful ways to inform practice. It uses a process of ‘systematic logic within which findings from distinct studies in a field can be rigorously integrated into stronger and more generalizable knowledge claims’ 6. The aim of metasynthesis research is to understand and explain phenomena whereby findings of primary studies are compared and integrated to develop a whole that addresses concepts at a more constructed level 7. This level seeks a new interpretation of the findings by comparing similarities and contradictions across studies 8. The interest in drawing together the findings of qualitative studies on AT is emerging, with recent metasyntheses published on the experience of prosthetic use 9, and the meaning and experience of AT use in older adults 10. This paper presents a metasynthesis of the qualitative literature pertaining to the question: ‘What meaning is ascribed to WMD by WMD users?’

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Only peer-reviewed original research articles with qualitative findings emerging from qualitative research or qualitative data emerging from mixed methods studies when qualitative findings were discernible were included for all population sub-groups, ages, and disability types when respondents were users of wheelchairs (e.g., power, manual, or hybrid) and scooters. The exclusion criteria were: studies reporting on service provision; service providers or carers as participants; reports focused on the experience of disability where wheelchair use was synonymous with disability; walking aids (e.g., canes, crutches, walkers, orthotic devices,
prosthetics); wheelchair sport; wheelchair seating products; and other types of wheeled mobility devices not used specifically as a replacement or augmentation for ambulation by persons with disabilities (e.g., commodes, bicycles, tricycles). Also excluded were studies on robotics, virtual reality and rehabilitation. Papers not available in English were also excluded.

The search was conducted in compliance with the PRISMA Framework. The systematic literature search was conducted in January 2015 with Web of Science (1980 to January 2015), EMBASE (1980 to January 2015), CINAHL (1980 to January 2015), PsycINFO (1880 to January 2015), and Scopus (1966 to January 2015) using two sets of search terms: qualitative research (qualitative OR interview OR “lived experience” OR phenomenolog* OR ethnography OR “grounded theory” OR “focus group*”); and, WMD (“mobility device*” OR wheelchair* OR “mobility chair*” OR “power mobility” OR “mobility scooter*”) NOT (robot* or virtual or rehab*). In addition, a broad search using MeSH terms was performed in PubMed (1950 to January 2015) that included Wheelchairs[Mesh] AND ("Qualitative Research"[Mesh] OR "Quality of Life"[Mesh]). This was to provide an additional check for completeness as Scopus includes PubMed records but cannot easily be MeSH searched. Reference lists of relevant articles were hand searched to identify any further relevant papers. Because of the frequency of publication of relevant qualitative studies, the following two journals were also hand searched for relevant articles up to January 2015: (1) Disability and Rehabilitation: Assistive Technology, and (2) Scandinavian Journal of Occupational Therapy.

Selection of studies
The literature search identified 719 articles (Figure 1). After the removal of duplicates, JR and MV independently screened articles by title, then abstract, and then by full text to exclude articles that were not within the inclusion criteria. Discussion occurred at each stage of the selection process. Twenty-five articles met the study criteria.

Insert figure 1 about here

Quality assessment

While there is debate about the value and purpose of conducting quality appraisal of selected articles in a metasynthesis 18, a balanced approach to quality appraisal was taken in this study, using it as a means to deconstruct the research process and findings in relation to the research question and to highlight the articles that provided findings that were rich, detailed and relevant to our question. Thus, quality appraisal was also used as a means of considering oversights or flaws in methodology that might impact interpretation of findings 8. Quality appraisal was guided and scored using the McMaster Qualitative Research Review form 19, with a score of 0 (absent) or 1 (present) assigned to each of the questions and resulting in a score out of a total of 25. Appraisal of the 25 articles selected through the screening process was undertaken by JR, with a sub-sample of five of the articles conducted independently by MV to ensure consistency in appraisal. Comparison of quality appraisal scores between researchers revealed a difference of one point on one article that was discussed and the score subsequently agreed upon. The appraisal process resulted in the exclusion of one article as, upon detailed reading, it did not address the research study purpose. After appraisal, the 24 articles were ranked in descending order of relative rigour. The articles were grouped into tertiles (score 17-25, n=7; score 9-16, n=13; score 1-8, n=4). The lowest tertile of articles were excluded from further review, based on
no indication of ethical review or informed consent of participants, or lack of evidence of analytical rigour, resulting in 20 articles selected for metasynthesis.

**Data extraction and analysis**

JR and MV undertook three stages of analysis, as guided by thematic synthesis: (1) line by line coding of the findings of each article; (2) combining the findings into ‘descriptive themes’; and, (3) interpretation of the descriptive themes to develop ‘analytical themes’\(^1\). Consistent with Thomas and Harden\(^1\) and Fegran\(^2\), we included both direct WMD user quotations from the original article as well as summary statements made by the authors found in the results (or findings) section of each article as data. Coding was inductive, allowing for the identification of new codes throughout the analysis as well as the recognition of re-occurring codes between each article analysed. Codes were constantly reviewed, expanded, condensed, and then clustered into four descriptive themes through on-going and iterative discussion. Finally, the analytic theme was conceptualized by conducting an overarching analysis of the combined body of literature and considering the relationships between the descriptive themes.

**Results**

Each of the selected articles is summarized in table 1. A total of 301 participants contributed to the 20 articles (19 studies). Most research participants used manual wheelchairs and/or power wheelchairs; two studies focused exclusively on the experience of scooter users. Two studies included findings based on the experience of children, while the remainder focused on the experiences of adults and older adults.

*Insert table 1 about here*
One hundred and twenty-two unique codes were developed and clustered into 15 subthemes, which were then organized into four overarching descriptive themes: physical environment interaction; sociocultural experiences; participation in activities and occupations; and the WMD-self relationship. These themes were comprised of related codes either identified numerous times or identified as key findings in some of the articles. Table 2 depicts the descriptive themes and subthemes, with examples of findings from the primary studies.

The overarching *Physical environment interaction* theme was reported in most articles and consisted of codes that addressed the physical accessibility of the environment in both positive and negative ways. Subthemes addressed how the built and natural environments influence the experience of WMD use, which was described either as challenging, or as accessible and safe. Some papers highlighted strategies for coping with physical environments \(^{24,27,31,40}\). The physical environment interaction theme also emphasized the importance of physical features of the WMD including aesthetics, size, and reliability \(^{24,27,31,32,35,37,40}\).

Codes clustered as *Sociocultural experiences* addressed how interaction with friends, family, society and with health care providers influenced the experience of WMD use. Subtheme findings included positive reports of support and acceptance \(^{21,24,31,32,35,38,39}\). However, they also included findings related to negative attitudes and experiences of stigma, discrimination, pity, discomfort, and invisibility that WMD users experienced \(^{21,23,25,36,40}\). Participants expressed a sense of discrimination \(^{36}\), of feeling like a ‘second class citizen’ \(^{40}\), of being ‘embarrassed’ \(^{23}\) and of being inappropriately pitied \(^{21,40}\). While some spoke of a sense of ‘social anonymity’ \(^{32}\).
others reported that people were curious or even ‘nosey’. Relationships and the perception of being a burden was influenced by, and can influence, the experience of WMD use.

The third overarching descriptive theme was Participation in activities and occupations. The use of WMD provided functional mobility benefits, and participants from many studies reported that WMD were enablers of activities and occupations both regained, and new. Enhanced social participation was an important and desired outcome of WMD use. For some, the nature of WMD use created a sense of increased spontaneity, while for others, it created a sense of reduced spontaneity. Other studies highlighted WMD use as creating barriers to everyday occupation and social activities.

Several codes addressing the personal relationship the user had with the WMD and clustered as the fourth descriptive theme: WMD-self relationship. Subthemes suggested that the WMD was considered by some to be part of the self or of the body, but that for others, it was viewed as a separate device that was hard to accept. This relationship was influenced by the WMD features, aesthetics and WMD customization. The WMD-self relationship theme included many codes that had an emotional and symbolic aspect. For example, for some, WMD use represented freedom and autonomy, while for others, it created a sense of restriction or represented declining mobility capacity.

Insert table 2 about here
Overarching analysis of the descriptive themes, and relationship between the themes, culminated in the conceptualization of the analytic theme related to the meaning of WMD use for individuals entitled Dynamic Duality of WMD Experience (Figure 2). Duality in this theme means, ‘a situation in which two opposite ideas or feelings exist at the same time’ . This conceptualization brought together the descriptive themes that emerged across studies into a whole that addresses the phenomenon of ascribed meaning and the sense that the wheelchair can be simultaneously ‘enabling and disabling’. This was depicted by the inclusion of both positive and negative aspects of WMD use found within each of the descriptive themes (see Figure 2). The concept of duality was evident within individual study themes as well across studies. Furthermore the descriptive themes were viewed as interrelated and influential on one other. This interrelation was exemplified by Stenberg et al. where their participant talked about freedom experienced and new possibilities and opportunities afforded by use of a power wheelchair, while at the same time experiencing barriers in the physical environment.

Insert figure 2 about here

This duality of experiences was prevalent throughout and between the articles but the variation in perspective was not dichotomous, i.e., one did not only feel one way or the other, but rather most experienced variation and fluctuation in the experience of WMD use, addressing both positive and negative symbolic aspects of the WMD experience: ‘No, but it’s...you see, it’s a hate object too. It’s both. It’s a bit like life, somehow. That is, it’s a bit like...I could compare it to a marriage, it’s up and [it’s] down’. Furthermore, the dynamic nature of the duality was apparent, suggesting a change or transformation in perspective and meaning for some that may occur over time. For instance, the dynamic aspect was described in the following excerpt: ‘[the WMD was
a] concrete symbol of severe disability, and thus overt proof of a negative life change. Once they started to use it and experience its benefits, many were positively surprised. At least for some, the electric WMD became a symbol of freedom. 40.

In the majority of the studies analysed, the physical and socio-cultural environment were dominant themes and in particular, barriers in the environment such as lack of accessibility, and negative social attitudes were prevalent. However, positive aspects of the environment were also highlighted. The dynamic duality of the experience of WMD use was clearly reflected in the study by Krantz et al. 33:

Informants described the role of the wheelchair concerning how others treated the wheelchair user. Differences were described between peers and outsiders (persons outside the group of conscious users) where reactions among peers concerned mainly functional aspects and outsiders tended to react on the occurrence of a wheelchair per se, understanding the wheelchair as signalling absence of autonomy and agency. Interviewees referred to the wheelchair as a disabling attribute among outsiders, and an enabling device among peers.

The inter-relation between the physical and sociocultural environment was described by Barlew et al. 23: ‘At her church, she found that there was no wheelchair seating near the rest of the congregation so felt “ostracized”.’

Through the analysis, the environment and participation in activities and occupations were identified as reinforcers of the experience of WMD use, and particularly of the wheelchair-self relationship. When the physical environment was accessible and allowed ease of access, when
participation in activities and occupations were promoted, and when positive social experiences, supportive relationships, and fulfilment of desired roles were enhanced, there was reinforcement of the WMD experience in a positive way (Figure 2). In situations where individuals experienced barriers in the physical environment and the use of the WMD limited or precluded engagement in activities or occupations, the experience was negatively reinforced, as depicted in the study by Korotchenko et al. 32: ‘So I can’t go to my kids’ games because it’s not wheelchair accessible’.

WMD technology features and appearance also contributed as reinforcers of meaning ascribed to the WMD. WMD features, aesthetics (such as colour) and functions (speed and size) that matched self-image and accommodated for functional limitations enhanced the sense of WMD-self relationship. ‘I want to have pink and blue flames on a black base...The wheelchair should be something personal, like clothes, shoes and hair colour’ 40. Conversely, WMD features that created irritation such as limited battery life, sense of spatial awkwardness or were not aesthetically pleasing (industrial looking) reinforced the negative connotations associated with WMD use. Variances such as these contributed to the duality of WMD experience.

**Discussion**

Metasynthesis was used to bring together the qualitative literature pertaining to the question: ‘What meaning is ascribed to WMD by WMD users?’ The results examined the major themes in the literature, and developed an analytical or interpretive understanding of how these findings relate to one another. Bringing together studies across populations, countries of origin, author positionality, and types of WMD resulted in identification of descriptive themes and the development of an analytic theme. In each of the primary studies, the main themes tended to
focus on one or two of the descriptive themes. For example, individual studies commonly focused on environmental barriers and accessibility, occupational participation, or the WMD-self relationship. The emphasis in each study was often dictated by the disciplinary perspective that the researcher brought to the study (for example, emphasis on occupational participation and roles by occupational therapy researchers). By drawing this literature together, we have developed a comprehensive and nuanced understanding of the meaning, and influences on meaning, that individuals ascribe to their WMD.

The analytic theme of Dynamic Duality of WMD Experience provides a useful addition to the literature, reinforcing the idea that WMD use is not static or ideographic, but rather fluid and dynamic and influenced by the environment and by opportunity for occupational and social participation. This duality has been previously identified in the study by Papadimitriou 36, who described wheelchair users as being in a ‘curious position’, viewing their wheelchair as a means of freedom and independence while simultaneously being subjected to society assumptions that ‘degrade, demote and devalue’. Consistent with the concept of environmental press (Lawton (1973) as described in Letts Rigby & Stewart (2003) 42, we found that the environment plays a substantive role in the experience and perspective on wheelchair use, i.e., the interaction of the environment on the individual elicits an adaptive (or maladaptive) response. When the demands of the environment and the capacity of the wheelchair/individual match, or when the capacity of the wheelchair/individual exceed the demands of the environment, a ‘fit’ exists.

When the demands of the environment exceed the capacity of the wheelchair/individual, a more maladaptive response emerges. Clinicians can work with WMD users to address and reduce
environmental barriers and to facilitate occupational participation. The need to address societal attitudes at the general societal as well as the policy-making level continues to prevail in the literature. While accessibility has been on the public agenda for differing spans of time in different jurisdictions (e.g., over 25 years in the US, 10 or fewer years in Canada) social attitudes perpetuate that view access as predominately an individual issue rather than a societal responsibility. An aging western society will result in an increased number of individuals with mobility impairments; organizations that advocate for WMD users will benefit from partnering with those identified as supporting older adults as they address larger societal barriers and attitudes. Health care practitioners or researchers can engage with policy-makers, community organizations and individuals with mobility impairments to make decisions targeted at reducing social and physical barriers 43.

Differences in terms of whether individuals incorporated the WMD into their self-identity were evident. For some, the WMD was experienced as integrated into or embodied as a part of self. Papadamitrous 36 described this embodiment as follows:

‘Becoming en-wheeled means that a new ontological style is created, a comfortable style in and through which the chair is experienced as an extension and integral part of the lived body. John, a 27-year-old paraplegic, explained this idea of the new style when he said: “I put my chair on along with my clothes. … It’s a part of me, … I forget it.”’

Clearly, this perspective contrasted with those who viewed the WMD as an object separate from oneself as described by Barker et al. 21. ‘Although the powered mobility was part of the daily lives of these participants, they seemed to view the device as primarily a method of transportation outside the home, almost as they might have previously viewed a car.’ The
findings of the current study also support the work of others, such as Mortenson et al.’s study of wheelchair users in residential care where some residents were regarded as ‘assimilating [the wheelchair] in the user’s sense of self’. In a grounded theory study of environmental control system use, Palmer and Seale also identified how some users integrated their environmental control systems as part of themselves in the theme, ‘utility transcended’ while others experienced the limitations of these assistive technologies as separate objects described in the theme ‘utility denied’.

It is useful for clinicians to understand the duality of experience as inevitable and complex, emphasizing the multi-dimensional and dynamic aspects to be considered when prescribing WMD. For some individuals, it may be helpful to work more closely on addressing the ways that the WMD can become better integrated with self (if that is a goal of the individual). This may be addressed firstly by working with new WMD users to address environmental barriers, promoting selection of WMD options congruent with, or that strengthen, one’s self-identity. Secondly, working with individuals to promote opportunity for meaningful engagement in occupation will serve to support the integration of WMD-self. For others, it may be important to recognize that integration of WMD-self may not be a goal. For example, individuals with temporary mobility limitations may choose to continue to see the WMD as an object separate from them.

Overall, the research supports taking a client-centred approach to working with the individual who is, or will be, using the WMD to understand their individual experience and personally ascribed meaning. AT use has been described as a process of getting used to and overcoming the ‘hassle’ of use and it may be that the duality felt is less prominent for experienced users.
However, the analytical findings of this metasynthesis suggest that the experience may be less sequential and more transient or dynamic, influenced at any one point by the physical and sociocultural environment as well as by the users’ experience of participating (or being prevented from participating) in occupation (see Figure 2). The findings suggest an ongoing need to acknowledge and discuss the dynamic influences of the physical and sociocultural environment and opportunities to participate in activities and occupations on the WMD experience within individuals through their trajectory of WMD use.

Several limitations on this research should be noted. Given the limited number of qualitative research reports in this area, we chose to include scooters as a type of WMD, however some have suggested that they should be considered separately given the different user profile of scooters. Several of the studies included in the metasynthesis involved people who used both wheelchairs and scooters (e.g., as well as those who used only scooters). While not overtly stated in the located literature, it may be that scooter users do not embody the scooter into sense of self in the same way as wheelchair users, given that codes for integration of wheelchair-self arose from studies of mixed WMD users, but not from those pertaining solely to scooter users. Further exploration into the experience of scooter users is warranted. We also included studies with both new and experienced WMD users, those with different reasons for using a WMD, and WMD users with a wide range of ages, resulting in a heterogeneous group of WMD users and experiences. Future qualitative studies related to different types of WMD and users of WMD will allow for device and/or person-specific metasyntheses in the future. In addition, longitudinal studies which compare different stages of WMD use, from acquisition to experienced use, are warranted.
The analytic theme identified in this metasynthesis held across the diverse body of literature that formed the foundation of this study and was shared through conference presentation and with clinicians in a hospital based WMD service. Pragmatic validity\textsuperscript{8} was supported by clinicians who confirmed that the analytic theme was reflective of their clinical experience. However, the literature used in this metasynthesis provided a developed world view of WMD use, with studies primarily conducted in Canada, Scandinavian countries, UK, Australia, and the US. Those who use WMD in developing countries will have different contexts, worldviews, and access to WMD resulting in different experiences and meanings ascribed. The perspective on meaning from these latter individuals is profoundly lacking.

**Conclusion**

The process of conducting a metasynthesis served to draw together and identify relationships between the most commonly reported qualitative themes in the literature. Understanding the meaning of WMD use as a dynamic duality of experience, reinforced (either positively or negatively) by physical and social environments, and opportunity (or lack thereof) for occupational and social participation provides a framework for examining these experiences and understanding the meaning ascribed to WMD use by individuals. This framework has practical applications for clinicians and users of WMD as it provides insights into understanding the experience to be neither singular nor static. Future metasyntheses can be conducted on other types of assistive technologies, including augmentative and alternative communication, environmental control systems, vision and hearing technologies. While individual qualitative reports are essential, we can gain a deeper understanding by examining findings across reports in
a metasynthesis. Ultimately, we can use the results of metasyntheses to guide our understanding of the experiences of AT users.

Acknowledgements

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Declaration of interest

The authors report no conflicts of interest.

References


Records identified through database searching (n = 719)

Additional records identified through other sources (handsearching) (n = 9)

Records after duplicates removed and titles screened (n = 88)

Records after abstracts screened (n = 32)

Abstracts excluded as did not meet inclusion criteria (n = 56)

Full-text articles assessed for eligibility (n = 25)

Full-text articles excluded as did not meet inclusion criteria (n = 7)

Full-text articles excluded, lowest tertile in quality appraisal (n = 5)

Articles included in qualitative metasynthesis (n = 20)

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Figure 1. PRISMA Flow diagram of search and selection process
Table 1. Description of studies included in the metasynthesis.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Aim</th>
<th>WMD type; methodology, &amp; participants (total = 301 participants*)</th>
<th>Findings/themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barker, Reid &amp; Cott, 2004 21</td>
<td>‘to gain an understanding of the lived experience of senior stroke survivors who used prescribed wheelchairs in their homes and communities’</td>
<td>Manual wheelchairs, power wheelchairs or scooters Qualitative (undefined) Semi-structured interviews with 10 participants*, ages 70 to 80 years</td>
<td>Three categories of acceptance of wheelchair use identified, where increased mobility, varied social response, and loss of some valued roles were common. Level of burden, freedom, and spontaneity varied in degree among the three acceptance categories.</td>
</tr>
<tr>
<td>Barker, Reid &amp; Cott, 2006 22</td>
<td>To gain an understanding ‘…of the lived experience of senior stroke survivors who used prescribed wheelchairs in their homes and communities’</td>
<td>Manual wheelchairs, power wheelchairs or scooters Qualitative (undefined) Semi-structured interviews with 10 participants*, ages 70 to 80 years</td>
<td>Wheelchair was an enabler of community participation but also limited destinations and created increased dependence on others.</td>
</tr>
<tr>
<td>Barlew et al., 2013 23</td>
<td>‘…to investigate the experience of being in a wheelchair’</td>
<td>Type of WMD not specified Existential-phenomenological Open ended interviews with 6 participants, ages 45-70 years</td>
<td>Humiliation, frustration, loss, and humility, arising from the experience of self as disabled and perception of time.</td>
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<tr>
<td>Study</td>
<td>Purpose</td>
<td>Type of WMD</td>
<td>Methodology</td>
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<tr>
<td>Blach Rossen et al., 24</td>
<td>‘…to explore how users of [power] wheelchairs experience their everyday life and how their [power] wheelchairs influence their daily occupation.’</td>
<td>Power Wheelchairs</td>
<td>Qualitative (undefined) Semi-structured interviews with 9 participants, ages 35-77 years</td>
</tr>
<tr>
<td>Costa et al., 2010 25</td>
<td>‘…to understand the social representation of the use of the wheelchair’.</td>
<td>Type of WMD not specified</td>
<td>Qualitative descriptive Semi-structured interviews with 10 participants, mean age 44.3 years</td>
</tr>
<tr>
<td>Evans, 2000 26</td>
<td>‘…to understand the effect that [power wheelchairs] have on the users.’</td>
<td>Power wheelchairs</td>
<td>Qualitative (undefined) Semi-structured interviews with 8 participants, ages 39-76</td>
</tr>
<tr>
<td>Formiatti et al., 2014 27</td>
<td>‘To explore the individual experience of being a scooter user and the ways in which scooters impact the individual’s community and social engagement, daily activities and enhances mobility.’</td>
<td>Scooters</td>
<td>Qualitative (constructivist approach) Semi-structured interviews with 14 participants, over 18 years</td>
</tr>
<tr>
<td>Frank et al., 2010 28</td>
<td>To explore ‘the effects of [power wheelchair] provision to users on their family and carers.’</td>
<td>Power Wheelchairs</td>
<td>Qualitative (undefined)</td>
</tr>
<tr>
<td>Study</td>
<td>Methodology</td>
<td>Participants</td>
<td>Findings</td>
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<tr>
<td>Giacobbi et al., 2010 29</td>
<td>Semi-structured interviews with 64 participants. mean age of 38 years</td>
<td></td>
<td>’To assess wheelchair users’ perceptions of and experiences with [power assisted manual wheelchairs’]. Primary evaluations included wheeling on challenging terrains, performance of novel activities, social/family aspects, fatigue, and pain. Secondary evaluations indicated that the wheelchair was cumbersome and prohibitive because of difficulties with transport in and out of a vehicle and battery life.</td>
</tr>
<tr>
<td>Giesbrecht et al., 2011 30</td>
<td>Repeated interviews with 20 participants; mean age 42.75 years</td>
<td></td>
<td>To assess wheelchair users’ perceptions of and experiences with [power assisted manual wheelchairs’]. Power assisted manual wheelchairs Qualitative (undefined) Repeated interviews with 20 participants; mean age 42.75 years Primary evaluations included wheeling on challenging terrains, performance of novel activities, social/family aspects, fatigue, and pain. Secondary evaluations indicated that the wheelchair was cumbersome and prohibitive because of difficulties with transport in and out of a vehicle and battery life.</td>
</tr>
<tr>
<td>Gudgeon &amp; Kirk, 2015 31#</td>
<td>Focus groups with 8 participants, ages 33-63 years</td>
<td></td>
<td>To explore ‘…the experience of using a power-assisted [manual] wheelchair in the community’ Power assisted manual wheelchairs Qualitative description Focus groups with 8 participants, ages 33-63 years Themes included: relative advantages and disadvantages, environmental factors that affect accessibility, and evaluation of mobility device as a replacement to power mobility.</td>
</tr>
<tr>
<td>Korotchenko &amp; Clarke, 2014 32</td>
<td>Semi-structured interviews with 9 children, ages 7-16 years</td>
<td></td>
<td>‘…to explore the lived experiences of children and young people who use a…[power wheelchair]’ Power wheelchairs Interpretative Phenomenological Analysis Semi-structured interviews with 9 children, ages 7-16 years Children work to achieve an adequate fit between self, the power wheelchair and the environment. Adequate fit led to increased participation and positive feelings. Inadequate fit led to reduced participation, fear and anxiety.</td>
</tr>
<tr>
<td></td>
<td>In-depth interviews with 29 participants, ages 51–92 years</td>
<td></td>
<td>‘…to examine older… adults’ experiences of utilizing power wheelchairs and motorized scooters in the context of the built environment.’ Power wheelchairs and scooters Qualitative (undefined) In-depth interviews with 29 participants, ages 51–92 years Themes were: disabling and enabling technologies, the disabling organization of public space, the enabling and disabling organization of private space.</td>
</tr>
<tr>
<td>Reference</td>
<td>Summary</td>
<td>Methodology</td>
<td>Participants</td>
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<tr>
<td>Krantz &amp; Edberg, 2011</td>
<td>‘…to describe the experience of active [rigid frame manual] wheelchair provision and aspects of importance concerning the wheelchair.’</td>
<td>Manual wheelchairs Qualitative (undefined) Semi-structured interviews with 11 participants, ages 25-52 years</td>
<td>Features of the wheelchair should support physical and social functioning, users experienced injustice and unfairness when negotiating their wheelchair needs and felt insecure within the system.</td>
</tr>
<tr>
<td>May &amp; Rugg, 2010</td>
<td>To explore how ‘…provision of … [power …wheelchair] affects recipients’ views of their occupational performance and quality of life’.</td>
<td>Power wheelchairs Mixed methods Semi-structured interviews with 6 participants, ages 11-60 years</td>
<td>Findings linked changes in participants’ functional abilities and psychological health to power wheelchair provision. Perceived environmental constraints and separation from society by disability were unaffected by power wheelchair provision.</td>
</tr>
<tr>
<td>May, Garrett &amp; Ballantyne, 2010</td>
<td>‘…to investigate the meaning that older people attribute to having an electric mobility-scooter as well as the factors that influence and impact on their purchase and use’.</td>
<td>Scooters Mixed methods Focus groups with 15 participants, ages 65 or more years</td>
<td>Three major themes: obtaining a scooter, the meaning of mobility, and issues around sharing spaces.</td>
</tr>
<tr>
<td>Papadimitriou, 2008</td>
<td>‘…to document the process of learning to use a [manual] wheelchair and making it a part of one’s embodied existence.’</td>
<td>Manual wheelchairs Phenomenology, from a critical social research standpoint Interviews and ethnographic descriptions with 30 participants, ages 22-40 years</td>
<td>Becoming en-wheeled: the chair as an extension of the self, and becoming en-wheeled in an ableist world: the chair as a symbol of incapacity.</td>
</tr>
<tr>
<td>Pettersson et al., 2014</td>
<td>‘To describe how men and women experience their use of powered wheelchairs … and powered scooters</td>
<td>Powered wheelchairs</td>
<td>Major themes included: struggling to be an independent wheelchair user, experiencing an imbalance between individual needs and regulations for power mobility</td>
</tr>
<tr>
<td>Reference</td>
<td>Title/Methodology</td>
<td>Participants</td>
<td>Results</td>
</tr>
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<tr>
<td>Reid et al., 2003</td>
<td>To ‘…examine the experiences of mothers who are wheelchair [manual, power or scooter] users in their roles of homemaking and parenting.’</td>
<td>Manual wheelchairs, power wheelchairs and scooters Qualitative (undefined) In-depth interviews with 11 participants, ages 20-55 years</td>
<td>Three major themes: lived space restricting personal autonomy advocacy strategies to secure appropriate housing, and my wheelchair, my liberator, my sense of comfort.</td>
</tr>
<tr>
<td>Rousseau-Harrison et al., 2012</td>
<td>‘To document perceived impacts in users’ daily activities and social roles (social participation) following the acquisition of a first manual or powered wheelchair.’</td>
<td>Manual wheelchairs and power wheelchairs Qualitative design with a phenomenological approach Semi-structured interview with 10 participants, mean age 64.3 years</td>
<td>Four main themes: changes in daily activities, expectations not met, impacts on social roles, and emotional changes.</td>
</tr>
<tr>
<td>Stenberg, 2016</td>
<td>‘To explore the experiences of using …a [power wheelchair] in daily living.’</td>
<td>Power wheelchairs Grounded theory Semi-structured interview with 15 participants, ages 20-66 years</td>
<td>Main theme: integrating the electric wheelchair – a manifold process, comprised of 6 categories incorporating the electric wheelchair into the self-identity process, calculating functional consequences, encountering the reactions of others, facing duality in movability, using proactive strategies, and being at the mercy of the system.</td>
</tr>
</tbody>
</table>

*Participants refer to the same group of individuals so only counted once, # published online before Jan 2015
Table 2. Descriptive themes and subthemes resulting from metasynthesis of articles.

<table>
<thead>
<tr>
<th>Theme and subthemes</th>
<th>Illustrative quotes</th>
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<tbody>
<tr>
<td><strong>Physical environment</strong></td>
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<tr>
<td><strong>Interaction</strong></td>
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<tr>
<td><em>Accessibility</em></td>
<td>‘Across all focus groups, the participants experienced accessibility problems in public buildings such as libraries and shops’ 37</td>
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<tr>
<td><em>Strategies</em></td>
<td>‘To combat this, participants frequented locations they knew provided adequate space and avoided peak times of the day for shopping and public transport use. Supermarket one I think is the one that is more awkward but supermarket two has a very nice wide checkout that I always go through and I take my scooter out the front and come back and pay because it helps with other people, it’s not a hindrance to other people’ 27</td>
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<tr>
<td><strong>WMD technology barriers</strong></td>
<td>‘Some participants were concerned about the length of battery charge and were apprehensive about being ‘stranded’ should the batteries run down’ 30</td>
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<td><strong>Sociocultural experiences</strong></td>
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<tr>
<td><em>Support and acceptance</em></td>
<td>‘Wheelchair use, in spite of the difficulties it brought to family life, seemed to be generally acceptable and there appeared to be increased kindness and consideration from family members’ 21</td>
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<tr>
<td><em>Negative social attitudes</em></td>
<td>‘…second class citizen…’ 40</td>
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</tbody>
</table>
‘...people look at you “weird” and you get “funny stares,”... people treat you differently; they tend to think you’re not intelligent. They sometimes overlook you.’ 23

‘Informants spoke about being treated in discriminatory ways, as invalids or useless people, just because they were wheelchair users.’ 36

‘...participants described that the wheelchair had influenced the way they looked at themselves, that they were dependent on a wheelchair and maybe also personal helpers.’ 24

‘Reduced burden was reported by respondents of all ages’ 28

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**Burden**

**Participation in activities and occupations**

**New and regained occupations**

‘All the participants felt that [their powered wheelchair] use had enhanced their opportunity to experience life. Even seemingly routine experiences were valued. Fran, for example, described it as an ‘enormous thrill’ to be able to take her dog for a walk again’ 26

‘One big thing I haven’t been able to do in years. We went to the flea market and actually got to do the whole flea market and enjoy it. It’s been a long time. In this chair, I was zooming around.’ 29

‘Interacting in the community was associated with maintaining and facilitating social interactions. Participants considered that the scooter provided a catalyst for social engagement among people and provided a means to visit friends and family.’ 27

‘The interviewees’ language also suggested a new spontaneity in their lives. For example, previously housebound interviewees now talked of ‘popping down the shops ... [and] ... popping out into the garden’ (Anne)’ 34

**Enhanced social participation**

**Spontaneity**
### WMD as barrier to participation

Outings needed to be planned ahead of time, from beginning to end... disabled transit... caregivers... time... wheelchair accessible washrooms... confirmed... All these factors added together to produce the need to carefully plan outings and activities.²¹.

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### WMD-self relationship

**WMD as part of self**

Some participants describe their electric wheelchair as a part and an extension of their body – not only functionally, but also in appearance, sound, and movements.⁴⁰.

Using [a powered wheelchair] was seen as allowing a new self to emerge, one that integrated their body and [the wheelchair].³¹.

‘Bernardo eloquently expressed this: “the chair] is a part of me. It’s my other half. My mind is one half, the wheelchair is my body”.’³⁶.

‘...some participants did not relate to the electric wheelchair as an extension of their body. They explicitly made a distinction between themselves and the device. I’m not feeling at one with it [the electric wheelchair]; rather...I think I am sitting on top of it.’⁴⁰.

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**WMD as separate from self**
<table>
<thead>
<tr>
<th>Customization</th>
<th>‘A good-looking wheelchair was described to be as discrete as possible, but at the same time good-looking.’33</th>
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<tbody>
<tr>
<td>Symbolic nature – negative connotation</td>
<td>‘…they saw it as a sign of failure and of decline.’37.</td>
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<tr>
<td>Symbolic nature – positive connotation</td>
<td>‘Most participants described seeing electric wheelchair users as a group they could not identify with. Using an electric wheelchair was for the participants a symbol of being one of “those”.’33.</td>
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<td>‘I was stuck like in a cage. I’d have liked to go out but there’s danger if you go outside, so stay in your cage, I didn’t feel free. […] Since I’ve had my chair, I feel much better.’39.</td>
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<tr>
<td></td>
<td>‘…now able to engage in everyday occupations independently.’37.</td>
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<td></td>
<td>‘I am not stuck at home, I can go out when I want to and I go on the train and go to town and other places. It gives you a second life.’35.</td>
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<td>Overall the wheelchair was viewed by the participants as a liberator… enabled them to be more independent to perform the occupations that were relevant to them… “I love the freedom….This is really liberating” [Karen]38.</td>
</tr>
</tbody>
</table>
Dynamic Duality of WMD Experience

WMD ↔ Self Relationship

Sociocultural Experiences

Participation in Activities & Occupations

Physical Environment Interaction

WMD = Wheeled Mobility Device including: manual wheelchair, power wheelchair, power assist wheelchair and scooters