Impact of wheeled seated mobility devices on adult users' and their caregivers' occupational performance: a critical literature review

Reid D, Laliberte-Rudman D, Hebert D

Authors' objectives
To examine the impact and effectiveness of the provision of wheeled seated mobility on the occupational performance of wheelchair users and their caregivers.

Searching
MEDLINE, CINAHL, AgeLine, Applied Science and Technology Abstracts, HealthSTAR, REHABDATA, Ei Compendex and SPORTDiscus were searched from 1980 to 1999. The search terms were reported. Reference lists were used to identify further studies. The studies were restricted to English-language references.

Study selection
Study designs of evaluations included in the review
Studies with a qualitative, quantitative or mixed design were eligible. The included quantitative studies were classified as one of the following designs: split plot factorial, cross-sectional, case-control, before-and-after, cohort, randomised controlled trial, case study, single case, or randomised comparative. Most of the included qualitative studies used a grounded theory or broad exploratory approach.

Specific interventions included in the review
Studies of self-propelled wheeled seated mobility systems were eligible. Where specified, the included studies were conducted in laboratory settings, specific physical settings (e.g. homes, workplaces, restaurants, cars, shopping malls, grocery stores), or community and institutional settings.

Participants included in the review
Adults aged 21 years or over with mobility impairments that required the use of a wheeled seated mobility device, and the caregivers of such adults, were eligible. Where reported, the participants in the included studies had the following disability impairments: athetoid, ankle ankylosis, amputations, ataxia, chronic fatigue, congenital limb deficiency, cerebral palsy, cerebral vascular accident, hearing impairments, hereditary sensory motor neuropathy, muscular dystrophy, myasthenia gravis, mobility impairments, muscular sclerosis, musculoskeletal disability, neuromuscular disability, orthopaedic disease, osteogenesis imperfect, polio, poliomyelitis, post-polio paralysis, rheumatoid arthritis, spasticity, spina bifida, spinal cord injury, Sudeks dystrophy, spinal muscular atrophy, spastic spinal paralysis, traumatic brain injury, viral infection, visual impairment, wheelchair user, and other.

Outcomes assessed in the review
Studies examining performance components (e.g. physical or cognitive change) and/or occupational performance (e.g. parenting, wheelchair driving, and community participation) were eligible. The included studies examined physical, affective, and/or cognitive variables. The dependent variables measured in the quantitative studies included self-esteem, internal locus of control, satisfaction with quality of life, shoulder pain, degree of spinal curvature, oxygen consumption, heart rate, extent and severity of wheelchair-related accidents, degree of building accessibility, community integration, and special and social interaction. The constructs explored in the qualitative studies included adaptation to the use of a wheelchair, acceptance of assistive devices, leisure experiences, perceptions regarding accessibility, perceived impact of power wheelchair use, caregiver health care needs, perceived mobility requirements, and public perceptions.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the reviewers performed the selection.
Assessment of study quality
The validity of the studies was assessed using criteria based on existing criteria developed by the McMaster University Occupational Therapy Evidence Based Practice Research Group. The criteria for qualitative studies related to study purpose, design, sampling, results and conclusions. The criteria for quantitative studies related to study purpose, design, sample, outcomes, intervention, results and conclusions. Three independent raters coded 12 of the 46 included studies for quality. It was not stated how any disagreements were resolved. The remaining studies were coded by one rater.

Data extraction
The authors do not state how the data were extracted for the review, or how many of the reviewers performed the data extraction. The studies were coded for the following: development stage (e.g. adult, older adult), gender, disability type (e.g. spinal cord injury, stroke), context of wheelchair use (e.g. laboratory, home), racial background, societal attitudes, and occupation/activities/role (e.g. self-care, productivity, and/or leisure).

Methods of synthesis
How were the studies combined?
A narrative synthesis of the studies was undertaken.

How were differences between studies investigated?
Differences between the studies were discussed in the narrative.

Results of the review
Forty-six studies were included: 36 quantitative and 10 qualitative. The total number of participants was not specified.

One quantitative study met all of the 18 quality criteria, 22 met over 75% of the criteria, and 13 met between 50 and 75% of the criteria. No qualitative studies met all of the criteria, 3 met over 75% of the criteria, 6 met between 50 and 75% of the criteria, and 1 met less than 50% of the criteria.

Twelve studies focused on the physical component area, as it relates to cardiorespiratory functions and propulsion issues that reflect wheelchair design. In 2 studies shoulder pain was found to be a common problem associated with long-term wheelchair use. Three studies showed evidence that seat height and position, handrim size, and push angle contributed to propulsion quality.

Ten studies focused on personal adjustment, lifestyle and quality of life factors. In 5 studies the acceptance of wheelchairs was found to be related to aspects of self-perception (in relation to the need for independence) and the attitudes of others.

Seven studies focused on aspects of the physical environment, as it relates to accessibility issues and wheelchair accidents. One study identified that most wheelchair accidents occur outdoors or on ramps.

Six studies addressed social factors since they influence interactions between non-disabled and wheelchair users. In one study wheelchair users were more likely to be discriminated against for employment opportunities than able-bodied job applicants.

Five studies addressed how the wheelchair impacted directly on specific occupations. One study found that there was an increase in social interaction and feeding skills as a result of being in a wheelchair. Three studies documented the effects of the wheelchair in enabling community participation.

One study addressed specific issues related to women wheelchair users, while another was conducted to specifically address the needs of caregivers.

Authors' conclusions
The majority of research conducted to date has methodological limitations, which limit the extent to which it can be...
drawn upon to provide evidence for the effectiveness of wheeled mobility systems. This review is an important first step in increasing the ability of occupational therapists to demonstrate the effectiveness of wheeled seated interventions.

**CRD commentary**

There was a clear objective to the review, which was well supported by clearly defined a priori inclusion criteria. A number of appropriate databases were searched, but the studies were restricted to those in English and it appears that unpublished studies were not sought. Relevant studies may therefore have been missed. The validity of the studies was systematically assessed using appropriate criteria. Details of the included studies were tabulated, but some basic details (e.g. the number of participants) were omitted. The data were appropriately synthesised in a narrative fashion according to the main factors. Details of how the inclusion criteria were applied and how the data were extracted were not provided. Therefore, it is not possible to determine how rigorous this process was and, consequently, any potential bias that may have arisen. One reviewer assessed the quality of most of the studies; this process could have been more rigorous if two independent reviewers had carried out the assessment. The authors’ conclusions follow on from the results.

**Implications of the review for practice and research**

**Practice:** The authors stated that there is a need for public buildings to implement barrier-free access changes for wheelchair users. There is also a need for a venue that enables persons in wheelchairs to voice and problem-solve accessibility issues on an ongoing basis.

Change at a broad social level is required to provide a social context in which mobility device users can view devices, primarily in terms of how they open up occupational possibilities rather than as a potential source of stigma. Occupational therapists can employ their expertise and work in collaboration with groups and individuals to focus on developing and disseminating knowledge regarding solutions to specific role challenges, such as providing childcare when in a wheelchair.

Prescriptions of wheelchairs should take into account the occupations of the persona. There is also a need to maximise the wheelchair-person-occupational fit. The implications for wheelchair assessment and prescription is to devise methods to integrate knowledge of a person's physical, cognitive and affective status with knowledge of their occupations and environments.

Beyond provision of a wheelchair that is physically manageable by the caregiver, there is a need for the occupational therapist to assist the caregiver and the wheelchair user to resume meaningful co-occupations, and to ensure that the caregiver does not sacrifice his or her own individual needs. Interventions such as facilitation of the use of wheelchair transportation devices, and advocacy for accessibility of facilities that were important to the caregiver and wheelchair user, should become part of the occupational therapist’s intervention. Research: The authors stated that future research in the area of wheeled seat mobility devices and their impact on occupational performance needs to be directed at the development of relevant outcomes. More studies should be conducted incorporating designs, study characteristics, and good explanations of procedures. Future research should consider impact at the level of the user, as well as at the level of other key individuals in that person’s life. Future studies should also explicitly consider environmental context factors as mediating variables in assessing impact.

Much remains to be done with respect to research focused on aspects of the social environment. Research to address specific issues related to female wheelchair users in relation to their gendered specific role performance (e.g. homemaking and childcare) is required. Research conducted with caregivers requires more attention. Outcomes related to aspects of cultural, economic and institutional environments need to be explored, as do specific contexts such as the home and workplace. More research is required in the area of training by occupational therapists.

**Bibliographic details**

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Subject indexing assigned by NLM

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.