



### Introduction

The interaction between mobility device and environment is most important in the home where the majority of wheelchair use occurs (1). Environmental barriers, such as unmet home modification needs, may impact the performance of mobility related activities of daily living (MRADLS) (2,3). This study reports preliminary results from a study measuring the effect of home modifications and wheelchair usability on the activities and participation among 78 people who rely on a wheelchair for the majority of their mobility needs.

### Methods

This cross-sectional study administered 3 self-report instruments to experienced manual and power wheelchair users 18 years and older. The Assistive Technology Outcome Measure (ATOM) measured wheelchair usability in the home and community(4). The Comprehensive Assessment & Solution Process for Aging Residents (CASPAR) assessed home modification needs necessary to perform MRADLS (5). The Impact on Participation and Autonomy (IPA) examined participation-restriction across multiple domains including autonomy in indoor and outdoor activities, family roles, social life/relationships and work/education (6).

Independent sample t-tests were used to examine the relationship between 1) met and unmet home modification needs and 2) participation. Pearson correlation coefficients were conducted to assess the impact of wheelchair usability on participation.

### Results

Data were collected from 78 wheelchair users between 2009 and 2010. Subjects' ages ranged from 20-78 years (mean=46.13 years; SD=13.278) and 31 (39.7%) were male. The majority of people (71.8%) lived in single family homes. The most common medical reasons for using a wheelchair included SCI (52.6%), neuromuscular degenerative disease (15.4%), spina bifida (9%), and polio (6.4%). 59% used power chairs and 41% used manual chairs. Most subjects had used a wheelchair 10 years or longer (74.4%) and spent more than 10 hours a day in their chairs (88.5%).

Table 1 demonstrated that subjects' IPA scores reflected the least participation restriction in 3 subscales: autonomy indoors, family role, and social life & relationships.

**Table 1: Participation Restriction (IPA Scores -- "0" indicates no restriction, "4" indicates most restriction)**

N=78	Mean	SD	More restrictive (≥2)	Less restrictive (<2)
<b>Autonomy Indoors (MRADLS)</b>	0.519	0.58	2 (3%)	76 (97%)
<b>Family Roles</b>	1.015	0.72	6 (8%)	72 (92%)
<b>Autonomy Outdoors</b>	1.426	0.82	24 (31%)	54 (69%)
<b>Social Life/Relationships</b>	0.639	0.57	2 (3%)	76 (97%)
<b>Work/Education</b>	0.869	1.14	10 (13%)	68 (87%)

Table 2 showed that most subjects did not report significant home modification needs. However, individuals with unmet needs reported greater participation restrictions across all IPA subscales, with significantly more restrictions in (1) autonomy indoors (p=.037), (2) autonomy outdoors (p=.030), (3) social life/relationships (p=.021).

**Table 2: Home Modification (CASPAR scores)**

N=78	Home Modifications	Unmet need	Preexisting Mods
<b>A. Getting in / out of the house</b>	73 (93.6%)	4 (5.1%)	1 (1.3%)
<b>B. Moving around the house</b>	66 (84.6%)	3 (3.8%)	9 (11.5%)
<b>C. Toileting</b>	54 (69.2%)	4 (5.1%)	20 (25.7%)
<b>D. Bathing/ Showering</b>	75 (96.1%)	1 (1.3%)	2 (2.6%)
<b>E. Grooming, etc.</b>	48 (61.5%)	12 (15.4%)	18 (23.1%)
<b>F. Using the bedroom</b>	60 (76.9%)	3 (3.8%)	15 (19.2%)

Table 3 compares wheelchair usability scores (ATOM) with unmet modification needs: The mean for ATOM scores was .81 (SD=.098) indicating good wheelchair usability. Wheelchair usability was negatively correlated with participation restriction across all IPA subscales (p=.000-.002). However, it was not significantly correlated across IPA subscales among those with unmet modification needs. Table 3 shows the correlations between ATOM and IPA scores.

**Table 3: Wheelchair Usability and Participation**

	Correlations with Wheelchair Usability				
	Autonomy Indoors	Family Role	Autonomy Outdoors	Social Life/Relationships	Work
<b>All (N=78)</b>	-.386 (P=.000)	-.340 (P=.002)	-.460 (P=.000)	-.351 (P=.002)	-.479 (P=.000)
<b>No unmet need (n=59)</b>	-.461 (P=.000)	-.397 (P=.002)	-.523 (P=.000)	-.433 (P=.001)	-.572 (P=.000)
<b>With unmet needs (n=19)</b>	-.082 (N.S.)	-.037 (N.S.)	-.056 (N.S.)	.059 (N.S.)	-.134 (N.S.)

### Results (cont.)

ATOM: Wheelchair usability and participation (age):

Younger individuals (<45 years old, n=39) with unmet modification needs reported more participation restrictions in social life and relationships (mean=1.00), work/education (mean=1.13) than older people (>45 years old, n=39) with unmet modification needs (social life, mean=.81 and work, mean=.096). However, the differences are not significant. In addition, while wheelchair usability was significantly correlated with all IPA subscales among older individuals, only 4 out of 5 IPA subscales were correlated with wheelchair usability among younger individuals. Family role and work activities did not appear to be significantly correlated with wheelchair usability among younger people.

**Table 4: Younger vs. older groups**

	Correlations with Wheelchair Usability				
	Autonomy Indoors	Family Role	Autonomy Outdoors	Social Life/Relationships	Work
<b>&lt;45 (n=39)</b>	-.324 (P=.044)	-.288 (N.S.)	-.437 (P=.005)	-.341 (P=.034)	-.495 (P=.001)
<b>≥ 45 (n=39)</b>	-.484 (P=.002)	-.485 (P=.002)	-.507 (P=.001)	-.367 (P=.022)	-.460 (P=.003)

### Discussion

This project showed a strong relationship between home modifications, wheelchair usability, and activity & participation. Results suggest that both wheelchair usability and home modifications support MRADLS in the home, and community activities such as visiting friends/relatives and leisure activities. In addition, wheelchair usability appears to be increasingly important as individuals age. However, the impact of wheelchair usability on participation appears to be less critical among those with unmet modification needs. This may be because unmet modification needs results in fewer activities in the community and, correspondingly less wheelchair use.

### References

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### Acknowledgements

This work was completed as part of the Mobility RERC, which is funded by the National Institute on Disability and Rehabilitation Research of the U.S. Department of Education under grant number H133E080003. The opinions contained in this poster are those of the grantee and do not necessarily reflect those of the U.S. Department of Education.