

# **THE EXTENT TO WHICH CAREGIVERS ENHANCE THE WHEELCHAIR SKILLS OF POWERED WHEELCHAIR USERS: A CROSS-SECTIONAL STUDY**

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## **ABSTRACT**

Our objective was to test the hypothesis that caregivers and powered wheelchair users working together have higher levels of wheelchair skills capacity and confidence than wheelchair users performing alone. This was a multi-center cross-sectional study. The project was approved by the research ethics boards of the participating institutions and all participants provided written informed consent. We studied 150 participants – 75 caregivers and 75 wheelchair users. Wheelchair users had used their powered wheelchairs for a median (inter-quartile range) of 10.0 (16) years and spent a mean (SD) of 9.4 (4.6) hours per day in them. As outcome measures, we used Version 4.3 of the Wheelchair Skills Test, Objective (WST) and Questionnaire (WST-Q) versions. For each individual skill, we recorded data about the wheelchair user “alone” and in combination with the caregiver (“blended”). The mean (SD) total WST capacity scores alone and blended were 79 (9)% and 93 (6)% ( $p < 0.0001$ ); the mean (SD) WST-Q capacity scores were 77 (11)% and 93 (6)% ( $p < 0.0001$ ); and the mean (SD) WST-Q confidence scores were 76 (13)% and 93 (7)% ( $p < 0.0001$ ). Caregivers enhance wheelchair-skills capacity by relative improvements of 18-21% and wheelchair-skills confidence by 22%. Despite the need for further study, this project has answered important questions about how caregivers provide mobility assistance to the users of powered wheelchairs.

## **INTRODUCTION**

There has been some published work on the wheelchair skills of powered wheelchair users<sup>1-3</sup> and also on a variety of issues affecting their caregivers.<sup>4-8</sup> However, the extent to which caregivers assist with wheelchair skills has received little attention.

The objective of this study was to test the hypothesis that caregivers and powered wheelchair users working together have higher levels of wheelchair skills capacity and confidence than wheelchair users performing alone.

## **METHODS**

This was a multi-center cross-sectional study. The project was approved by the research ethics boards of the participating institutions. All participants (caregivers and the wheelchair users with whom they worked) provided written informed consent.

Sample size was based on a power analysis. Potential participants were dyads of caregivers and the wheelchair users to whom they provide care. Both the caregiver and the wheelchair user must have been  $\geq 18$  years of age, able to communicate in English and/or French (depending upon the site), living within 50 km of the research center, willing to participate, able to set a scheduled time for the study visit when both the caregiver and wheelchair user would be present and have provided written informed consent. Each caregiver participant must have been an unpaid caregiver and have

spent an average of at least 2 hours per week with the powered wheelchair user that included powered wheelchair mobility. Each wheelchair-using participant must have had his/her own powered wheelchair, have used the powered wheelchair for at least 6 hours per week, and have required no more than minimal assistance for communication and auditory comprehension. Caregiver or wheelchair-using participants were excluded if they had unstable medical conditions that might have made the use of a powered wheelchair dangerous, and/or emotional problems that might have made participation unsafe or unpleasant.

By interview, we recorded demographic and wheelchair-related data regarding the caregivers and wheelchair users. Specifics about the powered wheelchairs used were recorded by observation.

As outcome measures, we used Version 4.3 of the Wheelchair Skills Test, Objective (WST) and Questionnaire (WST-Q) versions.<sup>9,10</sup> For each of 30 individual skills, we recorded data about the wheelchair user "alone" and in combination with the caregiver ("blended"). After the WST-Q was completed, the WST was administered. The total percentage alone and blended WST capacity, WST-Q capacity and WST-Q confidence scores were calculated.

The assessments took place wherever it was most convenient for the participants, including in or around the participants' place of residence.

We assessed the extent to which the caregiver enhanced the WST-Q and WST scores, using matched-pairs Sign tests to compare the wheelchair-user and blended total percentage WST-Q and WST scores.

## **RESULTS**

We studied 150 participants – 75 caregivers and 75 wheelchair users. The mean (SD) ages were 57.0 (15.1) and 56.1 (14.7) years respectively. Of the caregivers and wheelchair users, 28 (37.3%) and 39 (52.0%) were male. The majority of caregivers were family members. Caregivers spent a median (IQR) of 20.0 (38.5) hours per week with the wheelchair users. Only 14 (18.7%) of the caregivers had

ever received any formal training in wheelchair use, whereas 47(62.7%) of the wheelchair users had. Wheelchair users had used their powered wheelchairs for a median (IQR) of 10.0 (16) years and reported spending a mean (SD) of 9.4 (4.6) hours per day in them. The proportion of powered wheelchairs that were rear-, mid- and front-wheel drive were 37 (49.3%), 34 (45.3%) and 4 (5.3%); almost all wheelchairs (74 [98.7%]) were joystick-controlled.

The mean (SD) WST capacity scores alone and blended were 79 (9)% and 93 (6)%, with a mean difference of 14 (9)% ( $p < 0.0001$ ). The mean (SD) WST-Q capacity scores alone and blended were 77 (11)% and 93 (6)%, with a mean difference of 16 (10)% ( $p < 0.0001$ ). The mean (SD) WST-Q confidence scores alone and blended were 76 (13)% and 93 (7)%, with a mean difference of 17 (12)% ( $p < 0.0001$ ). The extent of the added value provided by caregivers varied among the 30 individual skills.

## **DISCUSSION**

We achieved our objective, corroborating the hypothesis that caregivers and powered wheelchair users working together have higher levels of wheelchair skills capacity and confidence than wheelchair users performing alone. We documented the extent of the enhancements – relative improvements over baseline of 18%, 21% and 22% for the three outcome measures. Further study is needed to explore caregiver effects on individual skills and how the caregiver effect might be enhanced by training.

## **CONCLUSIONS**

Caregivers enhance wheelchair-skills capacity by relative improvements of 18-19% and wheelchair-skills confidence by 21%. Despite the need for further study, this project has answered important questions about how caregivers provide mobility assistance to the users of powered wheelchairs.

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