Relationships among Wheelchair Skills Test Questionnaire (WST-Q) capacity, confidence and performance measures

R. Lee Kirby,¹ Sonja de Groot,² Rachel E. Cowan³

¹Dalhousie University, Halifax, NS, Canada; ²University of Groningen, Groningen, the Netherlands; ³Miami Project to Cure Paralysis, Miami, FL, USA

INTRODUCTION

The Wheelchair Skills Test (WST) [1,2] objectively assesses a test subject’s capacity (what the person ‘can do’) to carry out 34 skills [3]. There is a questionnaire version (the WST-Q) that, in addition to capacity, permits the assessment of wheelchair-skill confidence (self-efficacy) [4] and wheelchair-skill performance (what the person does do) [3]. The total capacity scores of the WST and WST-Q are highly correlated, although WST-Q values tend to be slightly higher [5,6]. Rushton et al.[6] and Inkpen et al.[7] studied manual wheelchair users with a variety of diagnoses accounting for wheelchair use and found that total WST-Q Version 4.1 capacity scores are also correlated with WST-Q confidence and performance scores, but exceed these values slightly. Kirby et al.[8] found similar relationships using WST-Q Version 4.2 with a sample of 117 wheelchair-using participants with spinal cord injury (SCI).

The objective of the current study was to replicate the Kirby et al. study [8], using WST-Q Version 4.3 and experienced, community-dwelling manual wheelchair users with SCI, to confirm the relationships among total wheelchair skills capacity, confidence and performance scores.

METHODS

This study was part of a larger cross-sectional study [9,10] on wheelchair outcome measures. The project was approved by the University of Miami Medical Institutional Research Board (Protocol #20160005, IRB-A #IRB00005621). All participants provided written informed consent. Details about recruitment and screening, demographic, clinical and wheelchair data recorded can be found in an earlier report [10]. For each of the individual skills that comprise Version 4.3 of the WST-Q, we recorded WST-Q capacity, confidence and performance scores, using 0-2 ordinal scales for each according to the procedures described in the Wheelchair Skills Program Manual [1]. The total percentage WST-Q scores (0-100%) were calculated, as were subtotals (0-100%) based on the three skill levels (Basic, Intermediate and Advanced) [1].

We used SPSS statistical software for the analysis and an α level of 0.05. Descriptive statistics were computed for all variables. The normality of continuous data was assessed with the Shapiro Wilks test to guide the choice of parametric versus nonparametric statistics. If the data were normal, we reported the means (standard deviations [SDs]); if not, we reported the medians (interquartile ranges [IQRs]). There were no missing data. We looked for relative agreement and differences among the total scores, using Intraclass Correlation Coefficients and paired Sign tests.

RESULTS
The demographic, clinical and wheelchair data have been previously reported [10]. The WST-Q data are shown in table 1.

Table 1. WST-Q data (total and subtotal scores)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Sub-parameter or units</th>
<th>Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>WST-Q capacity</td>
<td>Total (%)</td>
<td>83.3 (74.2-94.1)</td>
</tr>
<tr>
<td></td>
<td>Basic level (%)</td>
<td>95.1 (94.0-100.0)</td>
</tr>
<tr>
<td></td>
<td>Intermediate level (%)</td>
<td>93.3 (90.3-100.0)</td>
</tr>
<tr>
<td></td>
<td>Advanced level (%)</td>
<td>61.5 (35.2-81.8)</td>
</tr>
<tr>
<td>WST-Q confidence</td>
<td>Total (%)</td>
<td>81.5 (68.1-96.0)</td>
</tr>
<tr>
<td></td>
<td>Basic level (%)</td>
<td>92.2 (90.0-100.0)</td>
</tr>
<tr>
<td></td>
<td>Intermediate level (%)</td>
<td>91.3 (79.0-100.0)</td>
</tr>
<tr>
<td></td>
<td>Advanced level (%)</td>
<td>60.8 (39.8-87.5)</td>
</tr>
<tr>
<td>WST-Q performance</td>
<td>Total (%)</td>
<td>76.7 (69.3-86.8)</td>
</tr>
<tr>
<td></td>
<td>Basic level (%)</td>
<td>92.5 (84.0-100.0)</td>
</tr>
<tr>
<td></td>
<td>Intermediate level (%)</td>
<td>87.1 (77.0-96.5)</td>
</tr>
<tr>
<td></td>
<td>Advanced level (%)</td>
<td>49.9 (27.3-70.5)</td>
</tr>
</tbody>
</table>

* Median (IQR) values are shown

Abbreviations: IQR = interquartile range, WST-Q = Wheelchair Skills Test Questionnaire

*Alternative description of this table: The median WST-Q capacity, confidence and performance scores were 83.3%, 81.5% and 76.7%. For the subtotal scores in each case, the Basic-level subtotals were highest and the Advanced-level subtotals lowest.*

The WST-Q capacity total and subtotal scores were generally higher than the confidence scores and the performance scores, in order. The relative agreements and differences among the WST-Q measures are shown in table 2.

Table 2: Intraclass Correlation Coefficients and mean differences among WST-Q total percentage scores for capacity, confidence and performance

<table>
<thead>
<tr>
<th>WST-Q Measure</th>
<th>Intraclass Correlation Coefficients*</th>
<th>Mean Differences (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WST-Q Capacity</td>
<td>WST-Q Confidence</td>
</tr>
<tr>
<td>WST-Q Confidence</td>
<td>0.937 (0.864-0.972) (p &lt; 0.001)</td>
<td>-</td>
</tr>
<tr>
<td>WST-Q Performance</td>
<td>0.756 (0.303-0.905) (p &lt; 0.001)</td>
<td>0.736 (0.477-0.874) (p &lt; 0.001)</td>
</tr>
</tbody>
</table>

* Intraclass Correlation Coefficients (95% Confidence Intervals) are shown.

Abbreviation: SD = standard deviation, WST-Q = Wheelchair Skills Test Questionnaire

*Alternative description of this table: The mean difference between WST-Q capacity and WST-Q confidence was 1.9% (p = 0.162) with an Intraclass Correlation Coefficient (ICC) of 0.937 (p <
The mean difference between WST-Q capacity and WST-Q performance was 6.7% (p = 0.001) with an ICC of 0.756 (p < 0.001). The mean difference between WST-Q performance and WST-Q confidence was 4.8% (p = 0.033) with an ICC of 0.736 (p < 0.001).

DISCUSSION

We were able to corroborate our hypothesis that there are moderate relationships between WST-Q capacity, confidence and performance scores. As for the strength of the relationships among the three wheelchair skill measures, we did not expect these to be strong; different constructs are represented by the three measures in terms of the International Classification of Function [3].

The WST-Q values observed in this study were similar to those previously reported in the literature [11,12]. The literature about the WST and WST-Q measures is extensive [13-15]. The WST-Q capacity and confidence values in our study showed apparent ceiling effects, although this was not the case for the Advanced-level subtotal WST-Q scores. Ceiling effects have been reported before [11,12,16] and such effects are understandable for the current study population (highly experienced wheelchair users with SCI).

WST-Q capacity showed a sufficient correlation with WST-Q confidence; although capacity was slightly larger, the difference was not significant. WST-Q capacity showed a moderate correlation with WST-Q performance; capacity was larger by a mean difference of 6.7% which was highly significant. WST-Q confidence also showed a moderate correlation with WST-Q performance; confidence was larger by a mean difference of 4.8% and the difference was significant. The sufficient or moderate positive correlations among the three WST-Q measures [17] add to the literature regarding the concurrent validity of the WST-Q.

The major limitation of this study was the small sample size, although it was adequate to confirm the three relationships that we hypothesized. Another limitation was that this was a cross-sectional study. Refinement of the WST and WST-Q measures would be useful to eliminate ceiling effects, if this can be done without adding to the burden of testing. Despite the study limitations and the need for further study, this study adds to the literature about the relationships among wheelchair skills measures.

CONCLUSIONS

Moderate relationships exist among wheelchair skills capacity, confidence and performance scores of community-dwelling manual wheelchair users with SCI.

Acknowledgements: We thank Janiek van de Burgt, MSc. for testing all the participants.

REFERENCES


[9] van de Burgt J. The reliability of the 400m wheelchair push test and its capacity to elicit a peak oxygen uptake [master’s thesis]. Amsterdam, Netherlands: VU University (Vrije Universiteit); 2016.


