Title: Reliability and responsiveness of the Self-Efficacy in Assessing, Training and Spotting wheelchair skills (SEATS) outcome measure

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Abstract

Objectives. The aim of this study was to evaluate the internal consistency, test-retest reliability and responsiveness of the Self-Efficacy in Assessing, Training and Spotting manual wheelchair skills (SEATS-M) and Self-Efficacy in Assessing, Training and Spotting power wheelchair skills (SEATS-P).

Methods: A 2-week test-retest design was used with a convenience sample of occupational and physical therapists who worked at a provincial rehabilitation center (inpatient and outpatient services). Sixteen participants completed the SEATS-M and 18 participants completed the SEATS-P.

Results: For the SEATS-M assessment, training, spotting and documentation sections, Cronbach’s alpha coefficients ranged from 0.90-0.97, the 2-week intraclass correlation coefficients (ICC$_{1,1}$) ranged from 0.81-0.95, the standard error of measurements (SEM) ranged from 5.06-8.70 and the smallest real differences (SRD) ranged from 6.24-8.18. For the SEATS-P assessment, training, spotting and documentation sections, Cronbach’s alpha coefficients ranged from 0.83-0.92, the ICCs ranged from 0.72-0.86, the SEMs ranged from 4.54-8.91 and the SRDs ranged from 5.90-8.27.

Conclusions: Both the SEATS-M and the SEATS-P have good test-retest reliability and support for responsiveness. These tools can be used in evaluating clinician self-efficacy with assessing, training, spotting and documenting wheelchair skills included on the Wheelchair Skills Test.

Keywords: self-efficacy, confidence, wheelchair skills, measurement, reliability, responsiveness
Introduction

Evidence suggests that the provision of a manual or power wheelchair for an individual with mobility limitations has a positive impact on participation, health, and health-related quality of life [1]. However, simply providing a wheelchair does not ensure its safe and effective use. It is important to address assessment and training of wheelchair skills [2]. The Wheelchair Skills Program (WSP), a free, evidence-based approach to wheelchair skills training for manual wheelchair, power wheelchair, and scooter users [3] is available to guide this process. Its effectiveness in improving wheelchair skills among manual wheelchair users [4-6] and more recently power wheelchair users [7,8] is well documented. However, the program is reportedly underutilized with only 66% of Canadian rehabilitation clinicians providing basic manual wheelchair skills training to their clients and only 12% providing advanced wheelchair skills training [9]. Thus, many wheelchair users who could benefit from wheelchair skills training may not be provided with this opportunity.

One means of knowledge translation to enhance the implementation of the WSP into practice is training clinicians via a ‘bootcamp’ approach. The effectiveness of this type of knowledge translation among occupational therapy students [10,11] and medical students [12] has been demonstrated. Specifically, these studies have measured participants’ wheelchair-related knowledge [12], wheelchair skill capacity [10-12], and confidence to perform the skills [11], using a WSP written knowledge test, the Wheelchair Skills Test (WST) [3] and the WheelCon [13,14] respectively. However, although these studies have measured the participant’s knowledge, wheelchair skill and wheelchair confidence, they have not measured the participant’s
self-efficacy to implement the WSP (e.g., assess and train wheelchair skills to others), a primary influence on successful implementation of evidence-based practice [15] and predictor of future behavior [16].

To address this gap and facilitate a more comprehensive evaluation of WSP knowledge translation activities, we have developed the Self Efficacy in Assessing, Training, and Spotting (SEATS) wheelchair skills, a version for manual wheelchair skills (SEATS-M) and a version for power wheelchair skills (SEATS-P). Based on the Wheelchair Skills Tests (WSTs) for manual wheelchair users and power wheelchair users [3], the SEATS measures clinicians’ self-efficacy to administer the WSP. To facilitate the use of the SEATS in research and knowledge translation, it is important to establish the reliability and responsiveness of the tool. The objective of this study was to evaluate the internal consistency, test-retest reliability and responsiveness of the SEATS-M and SEATS-P for use in knowledge translation and/or train the trainer contexts.

**Methods**

**Design**

We used a 2-week test-retest design, using data from a larger study investigating the feasibility of implementing a knowledge translation intervention for the WSP. Ethical approval was obtained by the Behavioral Research Ethics Board of the University of British Columbia. Each participant provided informed consent.

**Participants**
Participants were clinicians (occupational therapists and physical therapists) who worked in inpatient or outpatient services at a large provincial rehabilitation center. Clinicians were included if they had worked in clinical practice for a minimum of 6 months, and treated a minimum of 5 wheelchair users/month. This convenience sample was recruited as part of the larger knowledge translation study and, thus, the number of participants was determined for that purpose.

Self-Efficacy in Assessing, Training, and Spotting wheelchair skills (SEATS)

The SEATS-M and SEATS-P are self-report outcome measures of clinicians’ self-efficacy to assess, train and spot each of the 32 wheelchair skills in the WST (version 4.2) for manual wheelchair users (SEATS-M) or the 30 wheelchair skills in the WST (version 4.2) for power wheelchair users (SEATS-P). The measures also ask clinicians to rate their self-efficacy for documentation of the wheelchair skills assessment results, goals, treatment plan, progress and discharge. The stem for assessing, training and spotting wheelchair skills was ‘As of now, how confident are you that you can assess, train and spot your clients to…’. For the documentation items, the stem was ‘As of now, how confident are you that you can document…’. Clinicians rated their confidence level for each item using a 0 (not at all confident) to 5 (completely confident) response scale. The term confidence, as opposed to self-efficacy, was used in the outcome measures stems as it is a term more easily understood. In terms of scoring the SEATS-M, separate percentage scores for assessing, training and spotting were calculated using the following formula: Total SEATS-M Assessment / Training / Spotting Score (%) = (sum of individual skill scores / 32 x 5) x 100%. The documentation score was calculated by: Total SEATS-M Documentation (%) = (sum of individual scores / 5 x 5) x 100%. Possible percentage
scores range from 0-100% with higher scores representing higher self-efficacy. The SEATS-P is calculated in the same way.

Data collection

Participants completed the SEATS-M or SEATS-P at two time points, approximately two weeks apart. No wheelchair skill training was provided during that time.

Analyses

Descriptive statistics were conducted to describe the sample. The normality of the data was tested with the Kolmogorov-Smirnov test. Cronbach’s alpha was used to measure the internal consistency of the SEATS-M and SEATS-P. To evaluate retest reliability, we calculated ICC_{1,1} with a 95% confidence interval (CI) for within-person (T1-T2) SEATS scores for each subscale. To determine responsiveness, we calculated the minimum amount of change detectable based on measurement error at a between-person level for each subscale by calculating the standard error of measurement (SEM) (SEM=baseline SD x \sqrt{1 – test retest ICC}) [17]. We also calculated the smallest real difference (SRD) for a single individual using SRD = 1.96 x \sqrt{2} x SEM [18]. All analyses were conducted using the Statistical Package for the Social Sciences 21.0 (IBM Corp., Released 2012, IBM SPSS Statistics for Mac, Version 21.0. Armonk, NY).

Results

Participants
We recruited 16 clinicians to complete the SEATS-M, and 18 clinicians to complete the SEATS-P (Table 1). Participants represented a variety of practice areas, largely inpatient or outpatient spinal cord injury and inpatient acquired brain injury. Sixty-nine percent (68.8%) of the SEATS-M participants and 58.8% participants of the SEATS-P participants had previously completed some wheelchair skills training prior to this study.

### Table 1. Participant Demographics

<table>
<thead>
<tr>
<th>Demographic Characteristic</th>
<th>SEATS-M Participants</th>
<th>SEATS-P Participants</th>
</tr>
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<tbody>
<tr>
<td>Profession, n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical therapist</td>
<td>11 (68.8)</td>
<td>7 (41.2)</td>
</tr>
<tr>
<td>Occupational therapist</td>
<td>5 (31.3)</td>
<td>10 (58.8)</td>
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<tr>
<td>Program, n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acquired Brain Injury Inpatient</td>
<td>4 (25)</td>
<td>3 (17.6)</td>
</tr>
<tr>
<td>Acquired Brain Injury Outpatient</td>
<td>--</td>
<td>1 (5.9)</td>
</tr>
<tr>
<td>Arthritis &amp; Neurology Inpatient</td>
<td>1 (6.3)</td>
<td>2 (11.8)</td>
</tr>
<tr>
<td>Neurology Outpatient</td>
<td>1 (6.3)</td>
<td>--</td>
</tr>
<tr>
<td>Adolescent and Young Adult</td>
<td>1 (6.3)</td>
<td>1 (5.9)</td>
</tr>
<tr>
<td>Spinal Cord Injury Outpatient</td>
<td>4 (25)</td>
<td>3 (17.6)</td>
</tr>
<tr>
<td>Spinal Cord Injury Inpatient</td>
<td>7 (43.8)</td>
<td>4 (23.5)</td>
</tr>
<tr>
<td>Intensive Rehabilitation Day Program</td>
<td>1 (6.3)</td>
<td>3 (17.6)</td>
</tr>
<tr>
<td>Seating Service</td>
<td>--</td>
<td>1 (5.9)</td>
</tr>
<tr>
<td>Years of clinical practice, mean (SD)</td>
<td>16.0 (9.4)</td>
<td>20.3 (13.6)</td>
</tr>
<tr>
<td>Years experience with Manual/Power wheelchair users, mean (SD)</td>
<td>13.5 (9.5)</td>
<td>15.5 (11.4)</td>
</tr>
<tr>
<td>Previous attendance at wheelchair skills workshop, n (%)</td>
<td>11 (68.8)</td>
<td>10 (58.8)</td>
</tr>
</tbody>
</table>

SD=standard deviation
SEATS scores demonstrated a non-normal distribution, as determined by the Kolmogorov-Smirnov test (p>0.05). The median (interquartile range [IQR]) SEATS-M scores for assessment, training, spotting, and documentation at T1 were 70.08 (56.41-97.66), 62.29 (51.41-95.94), 85.63 (61.79-99.84), and 44.00 (25.00-63.00) percent respectively. The median (IQR) SEATS-P scores for assessment, training, spotting, and documentation at T1 were 82.00 (73.00-99.33), 73.33 (64.33-80.00), 80.67 (69.00-90.00), and 60.00 (56.00-66.00) percent respectively.

Internal consistency

Cronbach’s alpha coefficients for the SEATS-M and SEATS-P for assessment, training, spotting and documentation ranged from 0.90 to 0.97 and 0.83 to 0.92 respectively. All coefficients are well above the recommended minimum acceptable value of 0.70 [19].

Test-retest reliability

The SEATS-M ICCs for assessment, training, spotting and documentation ranged from 0.81 to 0.95 and for the SEATS-P ICCs from 0.72 to 0.86 (Table 2).

Responsiveness
The SEMs for the SEATS-M and SEATS-P for assessment, training, spotting and documentation ranged from 5.06 to 8.70 and 4.54 to 8.91 respectively providing an indication of the minimal change in score that would reflect a meaningful change beyond measurement error for a group of individuals. The SRDs for the SEATS-M and SEATS-P for assessment, training, spotting, and documentation ranged from 6.24 to 8.18 and 5.90 to 8.27 respectively indicating the minimal amount of change in score that would reflect a meaningful change beyond measurement error for an individual.

Table 2. SEATS-M and SEATS-P Test-Retest Reliability and Responsiveness

<table>
<thead>
<tr>
<th>SEATS for Manual Wheelchair Users (SEATS-M)</th>
<th>Assessment</th>
<th>Training</th>
<th>Spotting</th>
<th>Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median (%)</td>
<td>70.08</td>
<td>62.29</td>
<td>85.63</td>
<td>44.00</td>
</tr>
<tr>
<td>IQR (%)</td>
<td>56.41 - 97.66</td>
<td>51.41 – 95.94</td>
<td>61.79 - 99.84</td>
<td>25.00-63.00</td>
</tr>
<tr>
<td>Cronbach’s alpha</td>
<td>0.90</td>
<td>0.97</td>
<td>0.93</td>
<td>0.94</td>
</tr>
<tr>
<td>Retest ICC&lt;sub&gt;1,1&lt;/sub&gt; (CI)</td>
<td>0.81</td>
<td>0.95</td>
<td>0.87</td>
<td>0.89</td>
</tr>
<tr>
<td>SEM (%)</td>
<td>8.22</td>
<td>5.06</td>
<td>8.70</td>
<td>6.60</td>
</tr>
<tr>
<td>SRD (%)</td>
<td>7.95</td>
<td>6.24</td>
<td>8.18</td>
<td>7.12</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>SEATS for Power Wheelchair Users (SEATS-P)</th>
<th>Assessment</th>
<th>Training</th>
<th>Spotting</th>
<th>Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median (%)</td>
<td>82.00</td>
<td>73.33</td>
<td>80.67</td>
<td>60.00</td>
</tr>
<tr>
<td>IQR (%)</td>
<td>73.00 - 99.33</td>
<td>64.33 - 80.00</td>
<td>69.00-90.00</td>
<td>56.00-66.00</td>
</tr>
</tbody>
</table>
Cronbach’s alpha 0.92  0.91  0.88  0.83
Retest ICC$_{1,1}$ 0.86  0.84  0.80  0.72
   (CI)         (0.67-0.95) (0.61-0.94) (0.54-0.92) (0.39-0.89)
SEM (%)        4.54  4.63  5.12  8.91
SRD (%)        5.90  5.96  6.27  8.27


Discussion

This study provides evidence that the SEATS-M and SEATS-P have high internal consistency, overall good test-retest reliability and support for responsiveness. Participants in this study were a mix of experienced occupational and physical therapists who worked in a range of inpatient and outpatient rehabilitation programs. Their self-efficacy varied for the different aspects of assessing, training, spotting and documenting manual and power wheelchair skills.

Interestingly, participants’ scores on the SEATS-M were lower for assessment and training than on the SEATS-P. This finding may be related to the relative complexity of manual wheelchair skills compared to power wheelchair skills. For example, there are more steps required to teach the same skill (e.g., ascending a 5 degree ramp) for a manual wheelchair user than for a power wheelchair user [3]. Additionally, the WST for power wheelchair users contains a number of items that are easily assessed and trained, such as turning the chair on and off, which may contribute to higher scores. Documentation scores were lower than assessment, training and spotting for both the SEATS-M and the SEATS-P. This result is consistent with clinical
observations. Further, it is not surprising as poor documentation of outcome measures has been identified as an issue in both occupational therapy [21] and physical therapy [22] practice.

The SEATS-M and the SEATS-P had high internal consistency. These outcome measures also had good test-retest reliability. ICCs for all subscales of the SEATS-M and three subscales SEATS-P were excellent [20]. The ICC for Documentation in the SEATS-P was in the good to moderate range [20].

The lower ICC_{1,1} for the SEATS-P documentation score may reflect the small sample size and relatively small number of items within the documentation subscale (only 5 versus 30 in each of the other SEATS-P subscales).

The range of SEMS from 4.54 to 8.91 and SRDs from 5.90 to 8.27 represents the minimal change in SEATS scores that reflect a meaningful change beyond measurement error for a group and individual respectively. These values allow for important statistical changes to occur following knowledge translation or train-the-trainer interventions given the 0-100% scores. Further, these values meet Smidt et al’s standard of 10% or less of the possible score range [23].

In terms of study limitations, the findings of this study are specific to self-efficacy associated with assessing, training, spotting and documenting the specific skills found in the WSP, and may not be generalizable to wheelchair skills training which does not employ this program. Further, this study had a small sample of convenience and thus there is an opportunity for this study to be repeated using a larger sample to verify these results.
The SEATS-M and SEATS-P can be considered internally consistent, reliable and responsive self-report measures for assessing clinician self-efficacy for assessing, training, spotting, and documenting manual and power wheelchair skills. These measures may thus be useful in determining the effectiveness of clinician focused wheelchair skills knowledge translation interventions or train the trainer workshops from the self-efficacy perspective. Future research may investigate the relationship between assessment/training self-efficacy and wheelchair skills capacity.
References


Implications for Rehabilitation

• The SEATS-M and SEATS-P are reliable and responsive outcome measures that can be used to evaluate the self-efficacy of clinicians to administer the Wheelchair Skills Program.

• Measurement of clinicians' self-efficacy in this area of practice may enable an enhanced understanding of the areas in which clinicians lack self-efficacy, thereby informing the development of improved knowledge translation interventions.