RESPONSIVENESS OF THE SEATED POSTURAL CONTROL MEASURE (SPCM) AND THE LEVEL OF SITTING SCALE (LSS)

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INTRODUCTION

Outcome measurement has become a topic of great interest in rehabilitation, including assistive technology services [1-4]. One challenge is the lack of feasible, reliable and valid tools for measuring many of the outcomes needed to answer clinically relevant questions and evaluate the effectiveness of emerging technologies [1-4].

Some measurement tools in pediatric rehabilitation and assistive technology provide a limited number of items, or do not have adequate depth, to inform use of a specific type of technology. Others have been designed for use in research settings but are not easily transferable to clinical application [5] because of expense, need for specific equipment, or specialized knowledge for administration and/or interpretation of results. In several tools some aspects of psychometric testing have been reported, but they have not been evaluated to meet all criteria for instrument development [3,6].

The Seated Postural Control Measure (SPCM), a 34-item, criterion-referenced, evaluative measure was designed to measure specific aspects of postural alignment (SPCM-A) and functional movement (SPCM-F) that are expected to change as a result of adaptive seating intervention [7,8]. The Level of Sitting Scale (LSS) was designed to classify sitting ability [7,8]. Both were developed by a team of clinicians and researchers at Sunny Hill Health Centre for Children. They have been used in research with children [7,8,9] and adults [5,10,11].

Inter-rater and test-retest reliability as well as face, content and concurrent validity (a form of criterion-related validity) of the SPCM and LSS have been documented [5,7-11], but responsiveness has yet to be demonstrated, which to date has limited its clinical usefulness.

PURPOSE

The purpose of this presentation is to describe the results of a 3 year study, determining the responsiveness of the SPCM and exploring the use of the LSS as an evaluative measure.

METHOD

A convenience sample of children with neuromotor disorders who used seating systems for postural control was selected from clients on active caseloads of therapists at Sunny Hill Health Centre for Children and British Columbia Children's Hospital. Ethics approval was obtained from the University of British Columbia Clinical Research Ethics Board. Informed written consent was obtained from parents of all participants.

Participants were divided into two groups: those whose posture was expected to change, and those who were expected to remain stable. They ranged in age from 1-18 years. Both SPCM and LSS were administered twice, 6 months apart. Parents and two therapists rated changes in alignment and function, and indicated importance of those changes on a criterion change measure, the Global Change Scale (GCS).

The total change scores for alignment (SPCM-A), function (SPCM-F) and sitting ability (LSS) were compared with the GCS. The *a priori* hypotheses predicted moderate correlations ($r > 0.40$). To account for the possibility of finding a Type 1 error (rejecting the null hypothesis, when in fact it was true)

due to the number of correlations examined, the alpha level was adjusted. The usual alpha level (0.05) was divided by 3 (for the three variables included-SPCM-A, SPCM-F and LSS) to give a new alpha level of 0.017. Values were deemed significant at $p<0.01$.

RESULTS

Of 159 potential subjects approached for the study, 114 agreed to participate; 107 subjects completed both sessions (T_1 & T_2), including the SPCM and the Parent GCS. Seven participants were unable to complete the second session. For three participants of the 107, the videotape segments of the first session were lost, making these impossible to score. Consequently, 104 participants were rated by the two blinded therapists using the Therapist GCS.

Assumptions of the correlation coefficient were met, enabling parametric analysis. Table 1 illustrates the Pearson correlation coefficients for the Therapist GCS 'change' group and the Therapist GCS 'stable' group of the total change scores for the SPCM-A, SPCM-F, the LSS change score and the GCS scores for degree of change and for degree of importance of change by both parents and therapists. The relationships between each of the total SPCM-A and SPCM-F change scores and LSS change scores for the Therapist GCS 'change' group and the Therapist GCS 'stable group' are also presented. Analyses using the standardized response mean (SRM) for the SPCM-A, SPCM-F and the LSS were also undertaken to verify the responsiveness of the data, see Table 2.

To verify inter-rater reliability of the SPCM-A, SPCM-F, and LSS scores, the intraclass correlation coefficient (ICC) was calculated using data from the sessions where two therapists were in attendance and scored the assessment simultaneously, but independently ($n=27$). The ICC (3,1) for the total raw score of the SPCM-A was 0.996 (CI_{95} 0.991-0.998) . The ICC (3,1) for the total raw score of the SPCM-F score was 0.997(CI_{95} 0.993-0.998), and the LSS score was 0.996. (CI_{95} 0.992-0.998).

CONCLUSION

Fair-to-moderate significant correlations ($p \leq 0.01$) between SPCM-F and LSS change scores and parents' and therapists' rating of change & importance of change on the GCS were determined. Correlations for SPCM-A change scores were insignificant. Standardized response mean values for SPCM-F and LSS confirmed a minimal clinically important difference.

SIGNIFICANCE

This study demonstrates the SPCM-F shows promise as a responsive outcome measure, and the LSS may be used for evaluative purposes, as well as a sitting classification index.

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Table 1: Correlations between total SPCM-A, SPCM-F and LSS change scores and GCS scores by parents and therapists by group (as determined by therapist determination of change on the GCS – cut-point >+/- 4)

	P-GCS -A	P-GCS -F	T-GCS -A	T-GCS -F	P-GCS I-A	P-GCS I-F	T-GCS I-A	T-GCS I-F	SPCM -A	SPCM -F
SPCM-A										
No Change	0.02		-0.04		0.02		-0.05			
Change	-0.33		-0.22		0.28		-0.22			
SPCM-F										
No Change		0.10		0.00		0.14		-0.01	0.05	
Change		0.71*		0.63*		0.69*		0.41	-0.10	
LSS	0.21	0.16	0.27*	0.28*	0.17	0.19	0.31*	0.31*	0.03	0.33*

*Correlation is significant at the <.01 level

SPCM-A = Total Change Score for Seated Postural Control Measure - Alignment
SPCM-F = Total Change Score for Seated Postural Control Measure - Function
LSS= Total Change Score for Level of Sitting Scale
P-GCS-A= Parent Global Change Scale Score for Change in Alignment
P-GCS-F= Parent Global Change Scale Score for Change in Function
T-GCS-A= Therapist Global Change Scale Score for Change in Alignment
T-GCS-F= Therapist Global Change Scale Score for Change in Function
P-GCS-I-A= Parent Global Change Scale Score for Importance of Change in Alignment
P-GCS-I-F= Parent Global Change Scale Score for Importance of Change in Function
T-GCS-I-A= Therapist Global Change Scale Score for Importance of Change in Alignment
T-GCS-I-F= Therapist Global Change Scale Score for Importance of Change in Function

Table 2: Comparison of means of total SPCM-A and SPCM-F change scores and LSS change scores between change group and stable group (as determined by age and diagnosis)

	SPCM-A	**SPCM-F**	**LSS**
Change group (n=57)	Mean= -1.04 SD= 4.84	Mean= 1.49 SD= 3.23	Mean= 0.22 SD= 1.18
Stable group (n=59)	mean= -0.86 SD= 4.99	mean= 1.02 SD= 3.07	mean= -0.10 SD= 0.81
	p = 0.86	p = 0.44	p = 0.11

SPCM-A = Total Change Score for Seated Postural Control Measure - Alignment
SPCM-F = Total Change Score for Seated Postural Control Measure - Function
LSS= Change Score for Level of Sitting Scale
SD = standard deviation