

# Item analysis of the Seated Postural Control Measure (SPCM)

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## Introduction

Research Version of the Seated Postural Control Measure (SPCM)  
 - for children with neuromotor disabilities  
 - an evaluative measure  
 - 34 criterion-referenced items  
 - 22 Alignment, 12 Function  
 - NCMRR - impairment and functional limitations  
 - ICF<sup>3</sup> - impairment, activity  
 - content validity, concurrent validity, rater reliability and test-retest reliability established<sup>1,2</sup>



## Characteristics of Participants

	1991 Study (N=41)	1993 Study (N=51)
<b>Sex</b>		
Male	23	27
Female	18	24
<b>Age</b>		
<3	6	4
3 - 5	8	8
6 - 9	17	5
9 - 16	17	20
>16	4	14
<b>Medical Diagnosis</b>		
Cerebral palsy	20	25
Brain injury	7	6
Meningocele	2	4
Muscle disease	3	2
Developmental delay	2	0
Chromosomal abnormality	0	3
Other	7	11

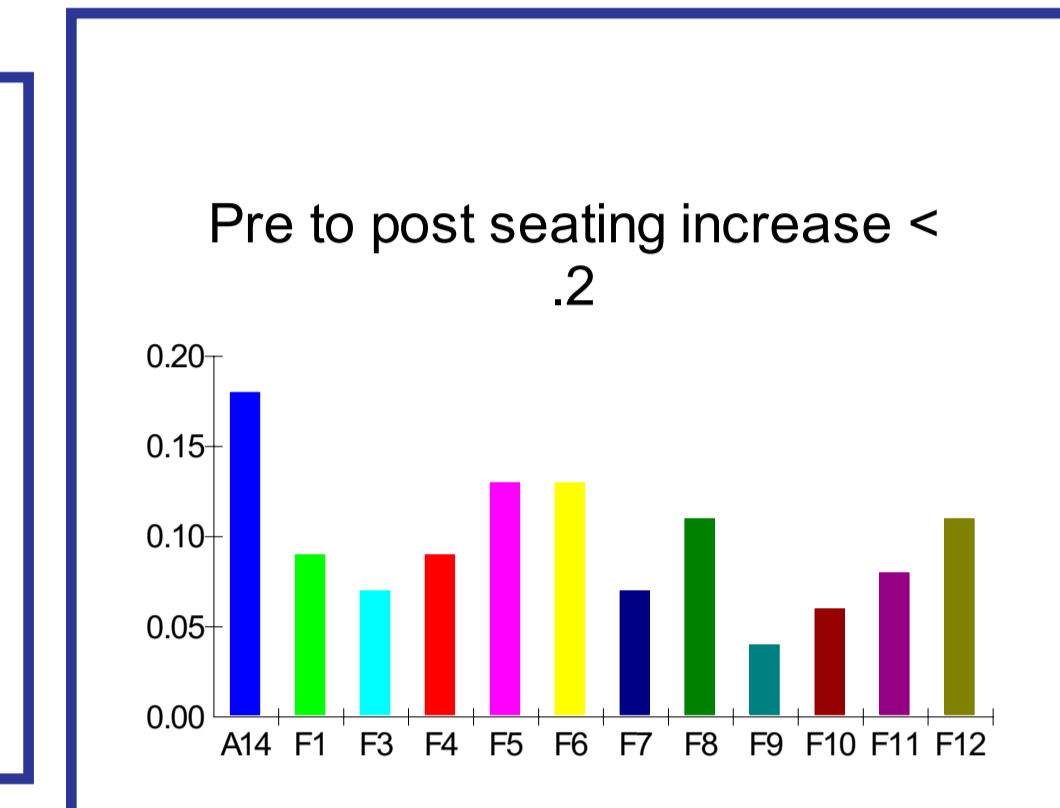
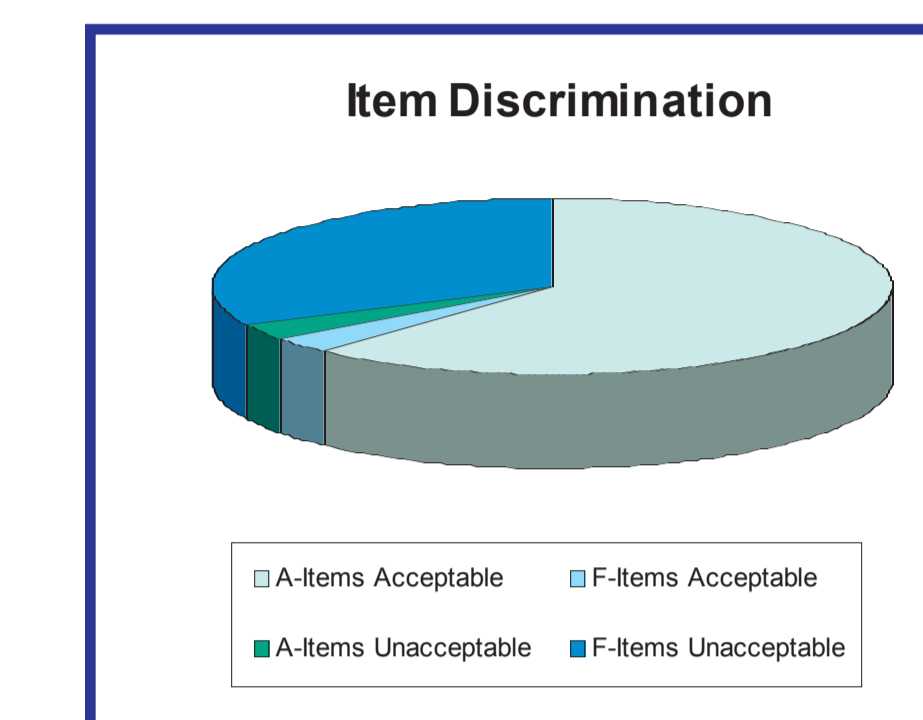
## For Hypothesis 3: Item Discrimination

The individual gain (Berk<sup>4</sup>) discrimination index (DIS<sub>IG</sub>) was calculated for each of the 34 SPCM items using data sets from the 1991 study.

$$DIS_{IG} = \frac{\# \text{ increased scores pre to post seating}}{\text{total \# of scores}}$$

The four discrimination indices for each item were averaged and the mean DIS<sub>IG</sub> examined to determine whether each was greater than or equal to 0.2 and thus whether hypothesis 3 was upheld for each item.

## Hypothesis 3: Item Discrimination



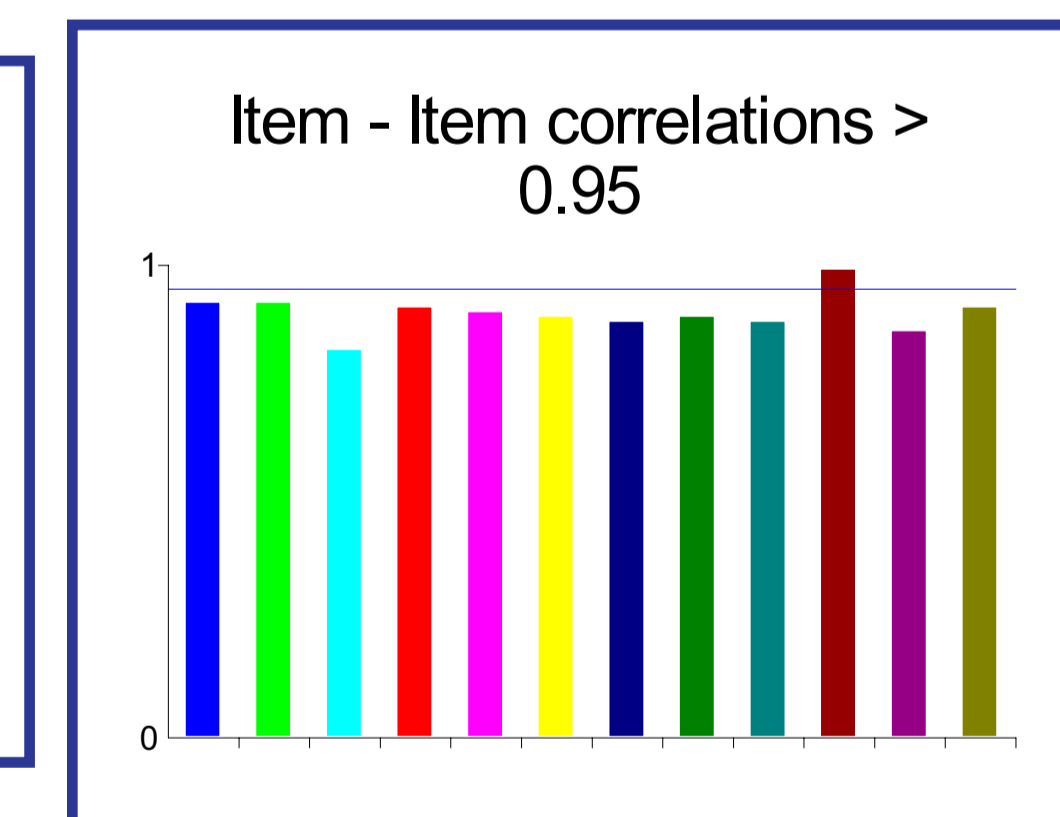
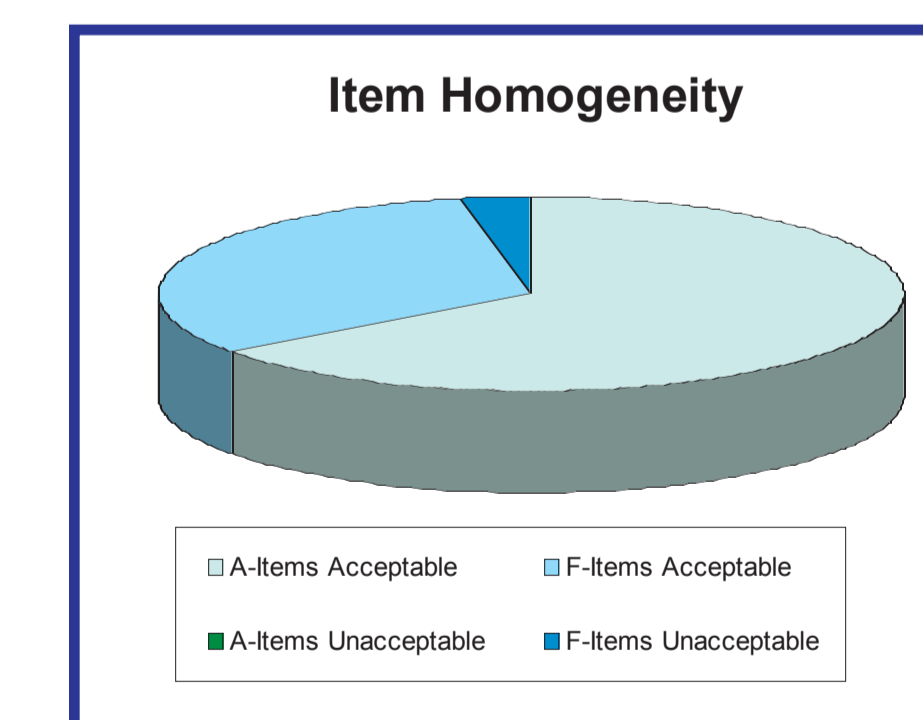
## Results

### Missing Data

Thirty-eight of a possible 532 tests were missing and 147 of the remaining 16,796 items scores. Items with missing data were omitted from the calculations.

### Hypothesis 1: Item Homogeneity

Scatter plots of the 561 item pairs in each of the four data sets revealed 37 item pairs which did not meet one or more of the assumptions for use of the correlation coefficient; these item pairs were thus excluded from the data analysis.



## Conclusion

The Function items that had a low discrimination index but acceptable difficulty index and item homogeneity will be retained. Only minor changes to 3 items and elimination of one redundant item is required to achieve optimum item properties for this evaluative measure prior to undertaking a full responsiveness study.

### References:

1. Fife SE, Roxborough LA, Armstrong RW, Harris SR, Gregson JL, Field D (1991) Development of a clinical measure of postural control for assessment of adaptive seating in children with neuromotor disabilities. *Physical Therapy*, 71, 981-993.
2. Fife SE, Roxborough LA, Story M, Field D, Harris SR, Armstrong R (1993) Reliability of a measure to assess outcomes of adaptive seating in children with neuromotor disabilities. *Canadian Journal of Rehabilitation*, 7, 11-12.
3. World Health Organization (2001) International Classification of Functioning, Disability and Health. Geneva: World Health Organization.
4. Berk R (1984) Conducting the item analysis. In Berk RA (Ed), *A Guide to Criterion-Referenced Test Construction*. Baltimore MD: Johns Hopkins University Press.

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## Purpose

To analyze the item properties of the SPCM to determine whether there are redundant items and whether items have the capacity to detect change.

## Hypotheses

Item homogeneity - inter-item correlations will be less than or equal to 0.95

The item difficulty index in the pre-seating condition will be less than or equal to 3.50 for multi-point items and less than or equal to 3.83 for limb items with only two score levels.

The item discrimination index, individual gain (DIS<sub>IG</sub>), will be greater than or equal to 0.2 (proportional increase from the pre-seating to post-seating condition).

## Methods

This study involved secondary analysis of data from 2 previous repeated measures reliability studies<sup>1,2</sup>. In the first reliability study (n=41) the SPCM was administered 8 times - 2 raters, 2 occasions and 2 seating conditions (with and without seat). In the second reliability study (n=51) two raters administered the SPCM on two occasions three weeks apart.



## Data Analysis

### For Hypothesis 1: Item Homogeneity

Analysis consisted of calculation of correlation coefficients for each of the 561 item pairs using data from the 1993 reliability study. Scatter plots were graphed to determine whether the assumptions of the correlation coefficients were met. If all assumptions were met, the Spearman rank correlation coefficient was calculated for each item pair in each data set. The mean correlations across all four data sets were calculated for items with at least one correlation greater than 0.90 (so that means would only need to be calculated for those item pairs which might possibly have mean correlations nearing 0.95).

### For Hypothesis 2: Item Difficulty

Data from the Fife et al. (1991) reliability study collected in the pre-seating condition were used to calculate the item difficulty indices. Because item reliability was not sufficiently high for all items across raters and time, item scores could not be combined across data sets. The item difficulty (mean score) for each item was calculated for each of the four data sets and the mean item difficulty then calculated. The mean item difficulty index was examined in relation to the preset levels for multi-point and two-point items to determine whether hypothesis 2 was upheld for each item.

### Hypothesis 2: Item Difficulty

