

# HOW TO CLASSIFY CHILDREN WITH CEREBRAL PALSY HOLISTICALLY?

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## BACKGROUND

- Children with cerebral palsy (CP) present with heterogenous features
- The prevailing classification systems classify children with CP primarily based on any one particular feature i.e distribution of involvement,<sup>1</sup> motor disorder,<sup>2,3</sup> gross motor function,<sup>4,5</sup> manual function,<sup>6,7</sup> or communication function<sup>8</sup>
- Identifying subtypes to classify children with CP on multiple variables is an important step in establishing a meaningful, holistic classification system

## FRAMEWORK FOR MULTIVARIATE CLASSIFICATION

Comprehensive Severity Index <sup>9</sup>	Body Function Index in Cerebral Palsy
Disease specific informed by ICD	Condition Specific informed by ICF
Measures severity - negative focus - based on physiological signs and symptoms and laboratory measures	Measures function - positive focus - based on neuro-musculoskeletal and associated co-morbid health conditions using clinical measures

ICD - International Classification of Diseases, ICF - International Classification of Functioning, Disability and Health

## PRELIMINARY STUDY

- Selected childhood neurodisabilities [i.e CP, Developmental Co-ordination Disorder (DCD), Autism Spectrum Disorders (ASD)]

Summary of the results of preliminary study:

- Primarily used cluster analysis for classifying children with DCD and ASD
- None of the classifications addressed all of the key features of the disorder
- Classifications presented with variable psychometric properties
- Classification systems in CP and ASD served dual purposes of examination and prognosis
- Variability in addressing developmental aspects
- Only classification systems of CP are feasible to administer

## OBJECTIVES

Study 1:

1. To develop the Body Function Index in Cerebral Palsy version I (BFI-CP I), using measures of primary and secondary impairments and associated health conditions using a simple summing technique
2. To develop the Body Function Index in Cerebral Palsy version II (BFI-CP II), by conducting a sophisticated cluster analysis on the measures of the primary and secondary impairments and health conditions
3. To explore the relationship between the BFI-CP versions I and II and the Gross Motor Function Classification System (GMFCS)

Study 2:

1. To investigate the association between the BFI-CP I and the outcome of change in motor function over a one-year period based on fifty percent probability that the children are developing 'more poorly than expected', 'as expected', or 'better than expected'
2. To investigate the association between the BFI-CP II and the outcome of change in motor function over a one-year period based on fifty percent probability that the children are developing 'more poorly than expected', 'as expected', or 'better than expected'
3. To investigate the association between the GMFCS and the outcome of change in motor function over a one-year period based on fifty percent probability that the children are developing 'more poorly than expected', 'as expected', or 'better than expected'

## STUDY DESIGN & SAMPLE

- Retrospective studies
  - Data collected from the Move & PLAY study<sup>10,11</sup>
- Children between ages 18 months and 5 years who were included in the Move & PLAY study were included
- Study 1: N = 405
  - Study 2: N = 365

## MEASURES

The following measures were used in developing two versions of the BFI-CP

- Modified Ashworth Scale (MAS)<sup>12</sup>
- Distribution of involvement<sup>1</sup>
- Early Clinical Assessment of Balance (ECAB)<sup>13</sup>
- Functional Strength Assessment (FSA)
- Spinal Alignment and Range of Motion Measure (SAROMM)<sup>14</sup>
- Early Activity Scale for Endurance (EASE)<sup>15</sup>
- Health Conditions Questionnaire

Outcome for Study 2

- Gross Motor Function Measure (GMFM 66 - B & C)<sup>16</sup>

Probability <sup>17</sup>	GMFCS				
	I	II	III	IV	V
50 %	± 10.5	± 10.5	±8.4	± 8	±8.9



Description of the measures used:

[www.canchild.ca/eb/ourresearch/moveplay.asp](http://www.canchild.ca/eb/ourresearch/moveplay.asp)

## STATISTICAL ANALYSIS

Study 1:

- BFI-CP I will be developed using a unit weighted summing technique
- BFI-CP II will be developed using cluster analysis
- Spearman's correlation co-efficient will be used to explore the association between the BFI-CP versions and the GMFCS

Study 2:

Outcome:

- Classification of the GMFM will be done based on the method suggested by Hanna and colleagues<sup>17</sup>
- Analysis
- Spearman's correlation co-efficient will be used to explore the bivariate relationship between the BFI-CP versions, the GMFCS, and outcome classifications based on the GMFM

## SIGNIFICANCE

- Classify children with CP as a whole
- Describe a child with CP meaningfully
- Assists decision making on selection of services to meet all needs
- Facilitate effective, efficient, and family-centred care

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