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Consensus Classifications of the Gross Motor, Manual Abilities, and Communication Function Classification Systems between Therapists and Parents of Children with Cerebral Palsy

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Dear Sir,

The purpose of this communication is to share our experiences in establishing consensus classifications between trained research service providers and parents of children with cerebral palsy (CP) using the Gross Motor Function Classification System (GMFCS),[1] the Manual Abilities Classification System (MACS)[2] and the Communication Function Classification System (CFCS).[3] We anticipate that our interim solutions to dealing with situations in which consensus was not achieved might spark discussion to arrive at 'current best practices' to establish consistent consensus classifications internationally.

This work is conducted in the context of a multi-site international study on '*Developmental Trajectories of Impairments, Health Conditions and Participation of Children with Cerebral Palsy'* (short title: the On Track Study). In previous work, we established an understanding of the child, family, and service factors that contribute to motor development,[4] self-care,[5] and participation (under review) of two functionally distinct subgroups of children with CP. To assist with planning for individualized care to optimize these outcomes, the next stage in our research is to describe the developmental trajectories (both longitudinal growth and percentile curves) of change in balance, limitations of range of motion, strength and endurance, and number and impact of associated health conditions, as well as participation in self-care and recreational activities. We plan to present these trajectories using a combination of the GMFCS, MACS and CFCS levels.

The GMFCS, initially designed for service providers to classify usual motor performance of children with CP, was later validated for completion by parents. Both the MACS[2] and the CFCS[3] were developed for service providers to use in collaboration with parents. Acknowledging the importance of both parent and service provider perspectives in classifying the full range of usual ability across settings, we have developed a consensus approach to classification rather than comparing independent classifications.

We have data from the first time point of our longitudinal study from parents of 671 children with CP (56% male) between 2 and 12 years of age (average 6 years 3 months, SD=31 months) enrolled in the On Track Study using convenience sampling from a variety of clinical settings in Canada and the United States. Eighty-eight percent of respondents were mothers; 77% had some form of post-secondary education. Ninety trained and reliable physical or occupational therapists provided service providers' perspectives. Ethical approval was provided by the Health Sciences Research Ethics Board at Western University and similar ethics boards at McMaster University, Drexel University and the University of Washington (as well as Mercer University and Oklahoma University of Health Sciences) and multiple agencies across all participating sites (https://www.canchild.ca/en/ourresearch/on_track_study.asp). All ethical recommendations have been adhered to. Signed informed consent/assent was obtained from each parent/child participant prior to data collection; all consented to data being used in publications.

Parents were asked to complete the GMFCS, MACS and CFCS prior to a therapist visit. During the visit, parents and therapists discussed the classifications and the therapist documented: i) immediate agreement with the parent, ii) consensus with the parent after discussion, or iii) disagreement with the parent. We used percentage agreement to describe the proportion of cases in which a consensus classification was ultimately reached.

Consensus classifications were reached 97.8, 96.7 and 94.5% of the time for the GMFCS, MACS and CFCS, respectively. The Table provides details of the pattern of consensus ratings and disagreements. Notably, all GMFCS disagreements were within one level, and all but 3 and 10 disagreements for the

MACS and CFCS were within one level. Percentage agreement for levels I and II versus III, IV and V (i.e. the same functional dichotomy used in previous work[4,5]) was higher for the more functional group (levels I & II) by 1.1 (GMFCS), 2 (MACS) and 4 (CFCS) percent , with only the CFCS reaching statistical significance (Chi Square = 4.62, df = 1, p = 0.03).

We generated guidelines to reconcile disagreements for research purposes. Fundamentally, we relied on parents' classifications (they know their children best, see them in multiple settings, and are most able to describe usual performance) unless the therapist provided compelling comments. Reasons to accept the therapists' ratings included: therapists' descriptions of capability was lower than parent-reported performance, the incorrect age band was used for the GMFCS, therapists provided information that the parent was not ready to discuss relatively lower function, parents' desire to classify each hand separately or not recognizing alternative ways of using the hands for the MACS, and for the CFCS, some parents appeared to over-estimate children's communication performance with unfamiliar partners.

Based on our experience, therapists and our sample of predominantly mothers with relatively high levels of education were able to come to consensus on GMFCS, MACS and CFCS classifications frequently. In most cases, consensus agreement can be readily obtained, and when there is disagreement further collaboration is encouraged, either at the time of classification or in future.

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Table. Pattern of Consensus Immediately or After Discussion (shaded boxes) and Disagreements

GMFCS	Parent Classification				
Assessor Classification	I	II	III	IV	V
I	212	3	0	0	0
II	2	149	1	0	0
III	0	2	75	0	0
IV	0	0	2	116	0
V	0	0	0	5	104
MACS	Parent Classification				
Assessor Classification	I	II	III	IV	V
I	135	5	0	0	0
II	3	256	0	0	0
III	0	3	99	1	0
IV	0	2	1	105	0
V	0	0	1	6	54
CFCS	Parent Classification				
Assessor Classification	I	II	III	IV	V
I	254	5	1	0	0
II	4	111	0	0	0
III	2	2	115	1	1
IV	0	3	12	108	0
V	0	2	1	3	46

Note: GMFCS = Gross Motor Function Classification System; MACS = Manual Abilities Classification System; CFCS = Communication Function Classification System