Inconsistencies with Physical Functioning and the Child Health Questionnaire in Children with Cerebral Palsy

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Objectives   To explore the performance of the Physical Functioning (PF) subscale of the Child Health Questionnaire (CHQ) in children with cerebral palsy (CP).

Study design   Parents of 177 children and adolescents (age 3 to 18 years) with CP completed the CHQ -Parent Form 50. Severity of CP was assessed using the 5-level Gross Motor Function Classification System (GMFCS), in which higher levels reflect more severe impairment.

Results   PF scores were negatively correlated with GMFCS classification ($R = -0.62$) and were distributed bimodally in subjects with severe motor impairment. For GMFCS classifications IV and V (n = 59), PF scores were very low (means, 9 to 28; medians, 0 to 8); however, 12% of these subjects had excellent PF scores (> 88) despite being nonambulatory.

Conclusions   Although the CHQ PF subscale correlated well with the GMFCS, the CHQ questions on physical functioning resulted in unexpected responses in approximately 1 in 8 subjects with severe CP. These unanticipated responses to the PF subscale questions may be due to ambiguity in the questions (which do not differentiate between health problems and disability) or to alternative parental interpretation of physical functioning. Confusion in differentiating health status and functional status may make the CHQ less useful in children with significant disabilities. *(J Pediatr 2008;153:199-202)*

The Child Health Questionnaire (CHQ) is one of the most widely used tools for assessing health status in children.[1] As a generic instrument for measuring health outcomes, well being, and functional status, the CHQ has been used worldwide in studies evaluating children with a wide range of diagnoses.[1-3] The CHQ has been demonstrated to be valid and reliable in many settings,[4,5] and has an internal consistency median reliability coefficient of 0.84 in a population sample.[1] As a generic instrument for assessing health status, the CHQ includes questions aimed at assessing a wide range of domains applicable to a broad spectrum of children.

The CHQ has been used in populations of children with cerebral palsy (CP). Because CP manifests with such varied impairments,[6] it is not surprising that studies have demonstrated reduced CHQ scores in children with CP compared with population data.[7-9] Furthermore, a relationship between gross motor severity of CP and CHQ subscale scores has been reported,[8] supporting the notion that several domains of health status are correlated with the physical functioning of children with CP.

The Physical Functioning (PF) CHQ subscale has the highest reliability coefficient of all the CHQ subscales, at 0.94.[1] This subscale includes 6 items pertaining to such tasks as bending, dressing, getting around school, and climbing stairs. Previous research has suggested that some respondents may find these items ambiguous in terms of differentiating existing disability or diagnoses from more acute health problems.[10] In particular, respondents may not be clear as to whether their child's physical disabilities are meant to be considered a health problem, or whether only an acute or chronic illness (eg, bone fracture, asthma) should count as a health problem.

The CHQ is usually described as a health status measure, not a quality-of-life measure. Although the broad idea of quality of life may seem clear, functional status (or disability) and health status (or health-related quality of life) are not the same and probably do not relate equally to quality of life. Various measures described as addressing health status, health-related quality of life, or quality of life may assess a range of

CHQ	Child Health Questionnaire	HUI3	Health Utilities Index–Mark 3
CP	Cerebral palsy	PF	Physical Functioning (subscale)
GMFCS	Gross Motor Function Classification System		

sometimes overlapping domains. Additional ambiguity may arise when differentiating health and disability. The relationship between severity of CP and health status in children, as measured by the Health Utilities Index–Mark 3 (HUI3), varies depending on the domain, with, for example, high correlations with mobility and dexterity but no correlations with pain and emotion.[11] In adolescents, severity of CP correlates strongly with health status (HUI3) scores, but does not correlate with quality of life, as measured by the Quality of Life Instrument for People with Developmental Disabilities.[12]

In the present study, we evaluated the performance of the CHQ by examining the extent to which responses to the items in the PF subscale corresponded with severity of motor impairment, particularly in children with more severe CP.

METHODS

The subjects were a convenience sample of patients in a pediatric rehabilitation clinic, CP clinic, or outpatient therapy department at Cincinnati Children's Hospital Medical Center. Recruitment was done either in person or by standard mail. Each child's parent or guardian completed the CHQ 3 times over the course of a year, with all data collection done between February 1, 2002 and February 28, 2004.

Inclusion criteria were diagnosis of CP and age 3 to 18 years. Exclusion criteria were progressive neurologic disease, severe concurrent illness not commonly associated with CP, or previous participation in a study of a spasticity intervention that used the CHQ as an outcome measure. This study was approved by the hospital's Institutional Review Board.

Severity of CP

Each subject was classified with the Gross Motor Function Classification System (GMFCS) for severity of CP by his or her treating physiatrist or therapist. The GMFCS, a valid and reliable tool, stratifies children into 5 groups based on gross motor function.[13] Children in level V, the lowest-functioning stratum, are not independently mobile and need significant assistance, whereas children in level I, the highest-functioning stratum, demonstrate only mild impairment in speed or coordination. The GMFCS represents gross motor skills, such as walking, as a barometer of CP severity, insofar as gross motor impairment is the hallmark of CP. It does not assess fine motor skills or oral motor skills (which also are frequently impaired in CP), nor does it reflect common co-morbidities, such as cognitive impairment, sensory impairment, seizure disorder, or orthopedic deformity. Despite these drawbacks, however, the GMFCS is the best available single classification system for describing this aspect of CP severity.

Health Status Measures

The CHQ was administered as the CHQ-Parent Form 50. It was completed, as recommended, by each child's parent or guardian, who was instructed to answer the 50 items with the child in mind. The CHQ form was not altered or

Table I. GMFCS and PF subscale scores

| GMFCS	Description	n	PF, mean (standard deviation)
I	Walks without restrictions; limitations in more advanced gross motor skills	70	73 (30)
II	Walks without assistive devices; limitations walking outdoors and in the community	24	38 (26)
III	Walks with assistive mobility devices; limitations walking outdoors and in the community	23	38 (35)
IV	Self-mobility with limitations; children are transported or use power mobility outdoors and in the community	28	28 (39)
V	Self-mobility is severely limited even with the use of assistive technology	27	9 (27)
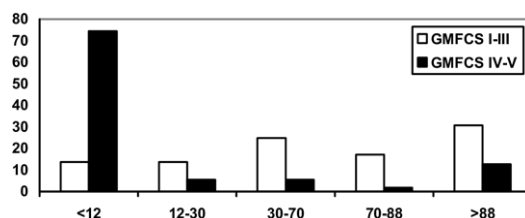
Figure. Distribution of PF scores by GMFCS. The *y*-axis (vertical) represents percentage of responses; the *x*-axis (horizontal), PF scores.

amended in any way, and the respondents were given no additional guidance while completing the form. The CHQ was scored using the customary algorithm, which calculates subscale scores ranging from 0 to 100, with higher scores indicating better health status. Any written comments about the CHQ items provided by the respondents were recorded.

Statistical Analysis

Descriptive statistical analyses were performed. In addition, Spearman's correlation coefficients were calculated to address the distribution of PF scores by GMFCS. Further analysis identified the proportion of atypical responses. An atypical response was defined as any subject in GMFCS IV or V (more impaired/more severe) with a PF score > 70 or "not limited" as a response to a specific PF item.

RESULTS

The CHQ was completed for 177 subjects (55% male; 84% Caucasian; mean age, 8.5 years [standard deviation ± 4.2 years] at enrollment). In terms of GMFCS classification, 40% of the subjects (n = 71) were in GMFCS I, and the remainder were fairly evenly divided among the other 4 GMFCS strata, a similar distribution as in previous population-based reports.[14,15] Additional demographic information, analyses of the various subscales, relationship with severity of CP, and