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# Hemiparesis and Epilepsy Are Associated With Worse Reported Health Status Following Unilateral Stroke in Children

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## Abstract

**BACKGROUND—**Perinatal and childhood stroke result in neurological impairment in the majority of survivors, but less is known about patient and parent perception of function following stroke in children. Our aim was to characterize parent-proxy and child-reported health status in children following unilateral arterial ischemic stroke or intraparenchymal hemorrhage.

**METHODS—**Fifty-nine children 2–18 years (30 girls, 29 boys) with unilateral arterial ischemic stroke or spontaneous intraparenchymal hemorrhage at least 6 months before evaluation were enrolled from a single center. The PedsQL version 4.0 Generic Short Form and PedsQL version 3.0 Cerebral Palsy Module were administered to childhood stroke subjects and parents. Generic PedsQL Inventory scores were compared between children with stroke and published data from healthy children. Reported health status scores for children with varying degrees of hemiparesis were compared.

**RESULTS—**Children with stroke had lower reported health status scores on the Generic PedsQL Inventory than healthy children. Children with moderate-severe hemiparesis had worse scores than children without hemiparesis on several measures of the Cerebral Palsy Module as reported by both parents and children. The parents of children with epilepsy reported worse scores on several measures compared with children without epilepsy, and the parent scores were lower on several

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measures for children with lower intelligence quotients. Agreement between parent and child scores was better on the Cerebral Palsy Module than on the Generic Inventory.

**CONCLUSIONS—**Children with stroke have worse reported health status than healthy controls. Degree of hemiparesis, epilepsy, and lower intelligence quotient affect reported health status on some measures. Agreement between parent-proxy and child scores ranges from slight to good which suggests that both provide useful information.

### Keywords

childhood stroke; perinatal stroke; intracerebral hemorrhage; health status; PedsQL

Perinatal and childhood stroke result in persistent motor deficits in the majority of survivors, and epilepsy, cognitive, or behavioral abnormalities occur in many.[1–4] Most outcome studies have focused on deficits determined by a neurologist or other health care professional. However, to understand the lasting impact of stroke on the day-to-day life of survivors, measures of health status are most informative. Having information about health status following stroke will allow clinicians to target therapies, to counsel families, and to identify groups at high risk for adverse sequelae.

A small number of studies have evaluated health status and quality of life in children following stroke and have found worse health status and quality of life in these children compared with healthy children or to children with other chronic medical conditions.[4–11] However, the measures used to assess health status and quality of life, and the inclusion criteria for the studies have varied. Scales of physical functioning used in past studies have emphasized gross motor tasks rather than the fine motor and bimanual tasks that are most affected by hemiparesis, the most common motor deficit following stroke. Furthermore, factors associated with worse health status and quality of life have differed across studies. Predictors of worse health status and quality of life have included different measures of neurological impairment,[4,5,7–10,12] female sex, older age at testing,[11] and lesion size.[7]

The first goal of the current study was to characterize parent-proxy and child-reported health status in children who experienced unilateral arterial ischemic stroke or intraparenchymal hemorrhage using both the PedsQL Generic Inventory and Cerebral Palsy Module. Although the PedsQL includes the term “quality of life” in its title, its content assesses health status (i.e., how much of a problem a child has with certain activities or situations) rather than quality of life (how a child feels about his or her situation).[13] A second objective was to assess whether stroke laterality, stroke mechanism, degree of hemiparesis, presence of epilepsy, or intelligence quotient was associated with worse reported health status.

## Method

Potential subjects who were 2–18 years of age and had experienced unilateral arterial ischemic stroke (AIS) or spontaneous intraparenchymal hemorrhage (IPH) at least 6 months prior were eligible for participation. Subjects were recruited from an ongoing study of visuospatial function at The Children’s Hospital of Philadelphia. Potential subjects for the visuospatial function study were identified through chart review of outpatient neurology

clinic charts and an institutional prospective pediatric stroke database. Subjects had unilateral AIS or IPH confirmed by a pediatric neuroradiologist on clinically-acquired magnetic resonance imaging scans and independently confirmed by review of the scans by the principal investigator (S.E.S.). AIS was defined as ischemic injury on magnetic resonance imaging conforming to a known arterial vascular territory. Information about the timing of stroke was obtained from parental report and chart review. Subjects were excluded if they had any known processes that might affect global brain function, such as neurofibromatosis or other genetic syndromes, sickle cell anemia, moyamoya, birth before week 35 of gestation, history of central nervous system infection, exposure to chemotherapy or radiation therapy, or hydrocephalus. Time of stroke was considered "perinatal" if the stroke symptoms occurred ≤28 days of life or if neuroimaging after 28 days of life was consistent with chronic arterial ischemic stroke or intraparenchymal hemorrhage in the absence of acute symptoms (presumed perinatal). Stroke was classified as "childhood" if the stroke symptoms occurred at 29 days of life to 18 years, consistent with the National Institute of Neurological Disorders and Stroke Common Data Elements definition (http://www.commondataelements.ninds.nih.gov/stroke.aspxhttp://www.commondataelements.ninds.nih.gov/stroke.aspx-#tab=Data_Standards, accessed August 19, 2013).[14,15] All subjects were fluent in English and had verbal and comprehension level of 2 or more years of age. Health status was assessed in person or by telephone between June 2007 and September 2009 using the PedsQL Generic Inventory and Cerebral Palsy Module (see the following section).

The institutional review board at the Children's Hospital of Philadelphia granted approval for the study. Parents or legal guardians gave their verbal consent to participate and children older than 7 years gave verbal assent.

## Measures

The PedsQL version 4.0 Generic Short Form consists of 15 items addressing Physical Functioning (five items), Emotional Functioning (four items), Social Functioning (three items), and School Functioning (three items). In addition to a total score, there are two summary scores: physical, comprised of the physical functioning items, and psychosocial, comprised of the emotional, social, and school items. Published normative values from healthy children for the Generic PedsQL Inventory were used for comparison.[16] The Short Form version was chosen to limit total administration time and to avoid redundancy with certain items on the Cerebral Palsy Module. The PedsQL 3.0 Cerebral Palsy Module includes 35 items addressing Daily Activities (nine items), School Activities (four items), Movement and Balance (five items), Pain and Hurt (four items), Fatigue (four items), Eating Activities (five items), and Speech and Communication (four items). No total score exists for the Cerebral Palsy Module. Each module has parallel child self-report and parent proxy-report versions. Child self-report forms are available for ages 5–7, 8–12, and 13–18 years. Parent proxy-report forms cover ages 2–4, 5–7, 8–12, and 13–18 years. The 2- to 4-year version Cerebral Palsy Module has no School or Speech module, and has fewer items on the Daily Activities and Eating scales. In past studies, the PedsQL has demonstrated internal consistency, construct validity, and discriminant validity between patient groups.[16,17]

Each item on both measures is phrased to ask how much of a problem the child has had in a specific area for the past month. For parents and children older than 8 years there is a five-item Likert scale (0 = never, 1 = almost never, 2 = sometimes, 3 = often, and 4 = almost always). For ease of use, the 5- to 7-year-old self-report uses a three-item Likert scale (0 = not at all a problem, 2 = sometimes a problem, 4 = a lot of a problem) used in conjunction with a faces scale. Questions cover the same content areas for all ages, with developmentally appropriate language. For analysis, items are reverse-scored and linearly transformed to a 0–100 scale (0 = 100, 1 = 75, 2 = 50, 3 = 25, and 4 = 0). Administration of both modules lasts approximately 10 minutes per subject.

An intelligence test was administered to provide an independent and standardized assessment of cognitive function. The Wechsler Preschool and Primary Scale of Intelligence–Third Edition[18] was administered to children ages 5 years and younger, and the Wechsler Abbreviated Scale of Intelligence[19] was administered to children ages 6–18 years.

### Clinical outcome

Degree of hemiparesis and current diagnosis of epilepsy were recorded based on both parent and child reports at the time of testing and clinic notes from the child's most recent neurology outpatient visit. Hemiparesis was scored as 0 if absent, 1 when weakness was measurable on the neurologist's examination or reported by the parent or child but did not lead to functional impairment, and 2 if weakness was moderate to severe and did lead to functional impairment. Epilepsy was defined as two or more seizures occurring more than 24 hours apart, excluding acute symptomatic seizures occurring within the first 7 days after stroke.[20,21]

## Statistical methods

STATA version 11.1 (Stata Corp, College Station, TX) was used to perform all statistical analyses. One-sample *t* tests were used to compare children with stroke with those in the general population with respect to total scores and scale scores on the Generic Module. *t* tests were also used to compare children with left-sided stroke with those with right-sided strokes, children with AIS with those with IPH, and children with epilepsy with those without epilepsy. To compare scores among stroke patients with varying levels of hemiparesis, an analysis of variance appropriate for a one (independent) factor design was applied. Subsequent pairwise comparisons among the three hemiparesis levels were assessed by applying a Sidak adjustment to preserve the overall type I error rate of $\alpha = 0.05$. Intra-class correlation coefficients (ICC) for parent versus child scores were calculated using a large one-way analysis of variance. Agreement was classified as poor if ICC<0, slight if ICC 0–0.2, fair if ICC 0.21–0.4, moderate-good if ICC 0.41–0.6, substantial if ICC 0.61–0.8, and almost perfect if ICC >0.8.[22] Multivariable linear regression was used to evaluate the relationship between degree of hemiparesis and total scores on the generic parent, generic child, cerebral palsy parent, and cerebral palsy child scales, controlling for the presence of epilepsy and age at time of event. The number of factors that could be assessed with multivariable regression was limited by sample size. Therefore adjustment was made for age at stroke onset and for epilepsy. Linear regression was used to evaluate the relationship between full scale, verbal, and performance intelligence quotients and the total scores on the

parent and child version of the Generic Inventory. A two-sided probability value ≤0.05 was considered statistically significant.

## Results

Seventy-two children ages 2 to 18 years with unilateral AIS or IPH participated in the study of visuospatial attention from which subjects for the current study were recruited. By the time of the current study, one of the subjects had died and one patient was older than 18 years. The remaining subjects were contacted to complete the survey. Ten subjects' families could not be reached, and one family declined to participate. Surveys were completed for 59 subjects, which included 57 parents and 42 children. Children younger than age 5 years could not complete a self-report survey. All but two of the parent surveys were from mothers; two of the older teenagers came for their clinic visit without a parent so no parent-proxy form was completed. Surveys were conducted between June 2007 and September 2009. Results from an intelligence test were available for 47 subjects. Forty-four children were age 6 years or older at the time of testing, so the Wechsler Abbreviated Scale of Intelligence was administered. Three subjects completed the Wechsler Preschool and Primary Scale of Intelligence Third Edition. Subject characteristics are summarized in Table 1. Twenty-eight subjects had a stroke in the perinatal period or had presumed perinatal stroke, and 31 had a stroke during childhood; median age of those who presented in childhood was 11 years, 6 months [interquartile range 6 years, 5 months to 13 years, 5 months]. Median time from stroke to health status evaluation was 3 years, 11 months (interquartile range 1 year, 8 months to 8 years, 7 months). Median age at the time of the survey was 10.5 years (interquartile range 8.4 to 14.5 years). Children with stroke had significantly lower mean scores on the Generic PedsQL Inventory than healthy children[16] (Table 2). This was true for parent and child-reported total scores, school scale and psychosocial summary scores as well as parent-reported emotional scale scores. Child reported physical and emotional scale scores were also lower in children with stroke than in healthy children, but this finding did not reach statistical significance.

Tables 3 and 4 compare summary statistics for parent and child ratings of health status on the Generic Inventory and Cerebral Palsy Module among children with varying degrees of hemiparesis. Specifically, parent-reported health status was worse on the total score and physical scale score of the Generic Inventory for children with hemiparesis; however, child-reported health status did not differ with respect to the presence of hemiparesis. On the Cerebral Palsy Module, parent-reported health status was worse for children with hemiparesis on the speech, school, movement, eating, and activities of daily living dimension scores, but there was not a significant difference in scores on pain and fatigue dimensions. Children with hemiparesis reported worse health status on movement, activities of daily living (ADL), and eating dimension scores of the Cerebral Palsy Module. Agreement between parent and child scores measured by intra-class correlation coefficients was moderate to good on the majority of dimensions on the Cerebral Palsy Module, but only fair for the Generic Inventory total, psychosocial summary, and social and emotional scale scores. Overall, parent ratings of health status were lower than child ratings.

In univariable analyses of parent and child versions of the Generic Inventory and Cerebral Palsy Module, no significant difference in health status existed between children with AIS versus those with IPH. On the child Cerebral Palsy Module ADL dimension, children with right-sided stroke had worse health status than those with left-sided stroke ($P = 0.03$); however, no other statistically significant differences between children with left versus right-sided stroke were observed. Epilepsy was associated with worse health status on the parent Generic Inventory total score ($P = 0.0006$), physical scale ($P = 0.0007$), social scale ($P = 0.004$), school scale ($P = 0.018$), and psychosocial summary score ($P = 0.006$) as well as on the parent Cerebral Palsy Module ADL dimension ($P = 0.037$), movement dimension ($P = 0.03$), and fatigue dimension ($P = 0.0002$). In the child versions of the Generic Inventory and Cerebral Palsy Module, the only dimension in which children with epilepsy had worse health status was on the eating dimension of the Cerebral Palsy Module ($P = 0.006$).

After controlling for presence of epilepsy and age at event, children with moderate-severe hemiparesis had significantly worse scores than children without hemiparesis on the following parent-reported scores: Parent Generic total (11.8 points lower, $P = 0.03$), Parent Generic physical (21.3 points lower, $P = 0.001$), Parent Cerebral Palsy Module ADL scale (20.7 points lower, $P = 0.001$), Parent Cerebral Palsy Module movement scale (20.8 points lower, $P < 0.001$), Parent Cerebral Palsy Module eating scale (13.8 points lower, $P < 0.001$), and Parent Cerebral Palsy Module speech scale (19.1 points lower, $P = 0.004$). Children with moderate severe hemiparesis did not score lower on the Child Generic total than children without hemiparesis ($P = 0.34$). However, scores were significantly lower on several child-reported scales of the Cerebral Palsy Module, including ADL scale (11.3 points lower, $P = 0.0454$), school scale (16.6 points lower, $P = 0.042$), movement scale (24 points lower, $P < 0.001$), and eating scale (10.2 points lower, $P = 0.003$). Children with mild hemiparesis had worse health status than children without hemiparesis measured by the Parent Cerebral Palsy Module movement score (10.7 points lower, $P = 0.01$).

Using linear regression, full-scale intelligence quotient did not predict child reported total scores on the Generic Inventory. However, the parent total scores on the Generic Inventory decreased by three points ($P = 0.026$) for every 10-point decrease in full-scale intelligence quotient. Verbal intelligence quotient also predicted total score on the parent-reported Generic Inventory; for every 10-point decrease in verbal intelligence quotient, there was a 2.6-point decrease in total score. Performance intelligence quotient did not predict total scores on the child Generic Inventory Module, but did predict parent reported scores. For every 10-point decrease in performance intelligence quotient, there was a 3.3-point decrease in total score on the Generic Module ($P = 0.019$).

## Discussion

Measurement of patient- and parent-reported health status provides insight into the perceived impact of childhood stroke on daily functioning. Our study demonstrated that children experience worse health status than healthy children months to years after unilateral stroke. Additionally, the parent version of the Generic Inventory and the parent and child versions of the Cerebral Palsy Module were sensitive to differences in health status

associated with degree of hemiparesis. Agreement between parent and child scores was slight to fair on the Generic Inventory, but was moderate-good on several dimensions of the Cerebral Palsy Module. Moderate to severe hemiparesis was predictive of a clinically and statistically significant reduction in health status, measured on the Generic Inventory and Cerebral Palsy Module. Additionally, children with a diagnosis of epilepsy had worse parent-reported health status than those without this diagnosis, as did children with a lower intelligence quotient. In our study, health status did not differ based on stroke mechanism (arterial ischemic stroke versus intraparenchymal hemorrhage), and stroke laterality distinguished health status on just a single dimension of the child-reported Cerebral Palsy module, consistent with past research that did not show an effect of hemisphere.[7]

Our findings are largely consistent with previous studies of health status and quality of life following stroke in children.[4–12] Supporting the findings of a recent study by Neuner and colleagues, both parents and children reported worse health status in many domains compared with healthy controls, and more severe hemiparesis was strongly associated with worse health status, though the assessment tool was different in that study.[8] Just as was reported in the 2004 Friefeld study[5] in which child and parent reported-health status was assessed with the PedsQL Generic Inventory in children with perinatal and childhood ischemic stroke, we found that psychosocial health status scores were lower than physical health status scores. This difference may reflect the specific content of the Generic Inventory of the PedsQL, which is relatively insensitive to the impairments in motor function resulting from hemiparesis. In contrast to the 2004 Friefeld study, we found no significant difference in the physical scale score of the Generic Inventory between children with stroke and healthy children.[5] This difference may reflect the milder degree of neurological impairment seen in our study because, when subjects were classified by degree of hemiparesis, we detected differences in parent-reported health status on the physical scale of the Generic Inventory. In our study, 44% of subjects had no hemiparesis, so the effect of hemiparesis on health status measured by the Generic Inventory physical scale score may have been muted when the entire subject group was analyzed together.

Whether a specific tool measures health status or health-related quality of life may account for some differences in results, as Friefeld and colleagues found that degree of neurological impairment measured by the Pediatric Stroke Outcome Measure predicted impaired health status on the PedsQL,[5] whereas a subsequent study using the Centre for Health Promotion's Quality of Life Profile found that neurological outcome did not affect quality of life.[11] Similar to the O'Keeffe study,[23] which also used the PedsQL Generic Inventory and the Wechsler Abbreviated Scale of Intelligence, we found that lower intelligence quotient was associated with worse health status. Friefeld and colleagues found a similar effect of verbal intelligence quotient on parent-reported quality of life, although they did not find an association between performance intelligence quotient or total intelligence quotient and health status.[11] Because our study measured health status whereas their study measured quality of life, it is possible that verbal intelligence quotient impacts quality of life out of proportion to other cognitive domains, whereas health status is more uniformly affected by any type of cognitive impairment.

Degree of agreement between parent and child was similar to that found in other studies.[5,8] No intraclass correlation coefficients were moderate-good on the Generic Inventory; however, agreement on four Cerebral Palsy dimension scores was moderate-good or substantial. Although intraclass correlation coefficients cannot be directly compared for the Generic Inventory and Cerebral Palsy Module, agreement between parents and children seemed to be greater on the Cerebral Palsy Module.

There are several unique features of this study that add to understanding of the impact of childhood stroke on health status. This study is the first to use the Cerebral Palsy Module for health status assessment following stroke in children. Those with perinatal stroke and hemiparesis have cerebral palsy by definition, so use of the Cerebral Palsy Module in this population is consistent with prior applications in the literature.[24] We extended the Cerebral Palsy Module's use to children with stroke occurring after the neonatal period because the resulting deficits are often similar to those in children with cerebral palsy. Although not precisely the use for which the Cerebral Palsy Module tool was intended, our data suggest that the Cerebral Palsy Module may provide important information about activities of daily living (feeding, dressing, writing, typing) that require bimanual and fine motor control and are impaired by unilateral weakness. These skills are queried on the Cerebral Palsy Module but are not adequately assessed on the Generic Inventory. Other investigators may want to consider use of the Cerebral Palsy Module in future studies of childhood stroke.

Furthermore, we evaluated the impact of symptomatic epilepsy on health status following stroke and found that epilepsy contributes to poorer parent reported health status measured by both the Generic Inventory and Cerebral Palsy Module. Consistent with epilepsy literature,[25,26] epilepsy impairs health status and quality of life in children and is important to consider in the childhood stroke population. More study is warranted to understand the reasons for epilepsy's negative effect on health status after childhood stroke (for example, anticonvulsant medication side effects or seizure burden). In the current study, we included patients with unilateral stroke and did not include those with preexisting neurological comorbidities. Therefore, the study population is more homogeneous than the populations in some prior studies.

There are several limitations to our study. The subjects were a convenience sample from a tertiary care center. They were recruited from a larger study of visuospatial function following stroke, so it is possible that patients with worse health status participated, thereby magnifying differences between healthy children and children with stroke. A recent study found that perinatal stroke survivors had better health status than did childhood stroke survivors,[8] but our sampling method precluded a valid comparison between perinatal and childhood stroke subjects because the perinatal stroke subjects who were old enough to participate in the larger cognitive study are still followed in the neurology department. This suggests that, in our study, the perinatal stroke subjects in particular may have worse health status than the perinatal stroke population at large who no longer are followed by a neurologist. Although there was not a statistically significant difference in health status between children with AIS versus those with IPH, the number of subjects in the study, especially with IPH, was small, limiting our power to detect a difference. More study of

health status following different types of stroke is necessary to understand fully the impact of stroke type on health status.

Despite its limitations, our study provides useful information for parents and medical providers of children with unilateral stroke. In particular, administration of the Cerebral Palsy Module of the PedsQL may provide information on impairments in fine motor and bimanual skills for which the Generic Inventory is not sensitive. Additionally, child and parent proxy reports have only fair agreement on the Generic Inventory and moderate-good agreement on the Cerebral Palsy Module, emphasizing that administration of health status measures to both the parent and the child is necessary to understand the full impact of the stroke. As suggested in other studies,[8] degree of hemiparesis predicts worse health status, providing clinicians with a group of stroke survivors who many need additional emotional and psychosocial support. Symptomatic epilepsy and impaired cognitive function after stroke also reduce health status in pediatric stroke patients and deserve additional study in a larger cohort. More studies are needed to produce and validate a disease-specific stroke health status measure for children. However, in the absence of such a tool, coadministration of the Generic Inventory and Cerebral Palsy Module of the PedsQL to parents and children may provide the most information for clinicians.

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## TABLE 1

Subject Characteristics (n = 59)

| Characteristic | N | % |
|---|---|---|
| Male sex | 29 | 49 |
| Age at stroke | | |
| Perinatal stroke (newborn-28 days) | 28 | 47 |
| Childhood stroke (29 days-18 years) | 31 | 53 |
| Time since stroke (N = 59) | | |
| 6 months-1 year | 9 | 15 |
| 1–4 years | 21 | 36 |
| 4–8 years | 9 | 15 |
| 8–18 years | 20 | 34 |
| Stroke type | | |
| Perinatal AIS | 26 | 44 |
| *Presenting acutely* | 14 | 24 |
| *Presenting remotely* | 12 | 20 |
| Perinatal IPH | 2 | 3 |
| Childhood AIS | 21 | 36 |
| Childhood IPH | 10 | 17 |
| Stroke location | | |
| Left hemisphere | 35 | 59 |
| Right hemisphere | 24 | 41 |
| Degree of hemiparesis | | |
| None | 26 | 44 |
| Mild | 18 | 31 |
| Moderate-severe | 15 | 25 |
| Seizure data | | |
| Current diagnosis of epilepsy | 15 | 25 |
| Seizures in past 6 months | 11 | 19 |

Abbreviations:
AIS = Arterial ischemic stroke
IPH = Intraparenchymal hemorrhage

## TABLE 2

Mean Scores on Self and Parent Proxy-Reported Health-Related Quality of Life Generic Module Scales of Subjects with Stroke in Comparison with Published Norms of Healthy Controls

| | Stroke Subjects | | | Healthy Subjects (Published Data)[16,24] | | | *t*-Test *P*-Value | 95% CI for Stroke Subjects' Mean |
|---|---|---|---|---|---|---|---|---|
| | N | Mean | SD | N | Mean | SD | | |
| Parent proxy-report | | | | | | | | |
| Physical Functioning | 57 | 80.7 | 20.3 | 9430 | 84.5 | 19.5 | 0.16 | 75.3–86.1 |
| Psychosocial Functioning | 57 | 72.7 | 17.7 | 9430 | 81.7 | 15.2 | 0.0003* | 68.0–77.4 |
| Emotional Functioning | 56 | 73.7 | 19.0 | 9430 | 81.3 | 16.5 | 0.0041* | 68.6–78.8 |
| Social Functioning | 57 | 80.4 | 25.5 | 9430 | 83.7 | 19.4 | 0.33 | 73.6–87.2 |
| School Functioning | 57 | 63.7 | 23.4 | 9430 | 78.8 | 19.6 | <0.0001* | 57.5–69.9 |
| Total score | 57 | 75.7 | 17.1 | 9430 | 82.7 | 15.4 | 0.0031* | 71.2–80.2 |
| Child self-report | | | | | | | | |
| Physical Functioning | 42 | 82.4 | 16.7 | 5480 | 87.5 | 13.5 | 0.055 | 77.2–87.6 |
| Psychosocial Functioning† | 42 | 75.2 | 17.9 | 5480 | 81.9 | 14.1 | 0.02* | 69.6–80.8 |
| Emotional Functioning | 42 | 72.0 | 23.9 | 5480 | 79.3 | 18.2 | 0.055 | 64.6–79.4 |
| Social Functioning | 42 | 81.9 | 22.2 | 5480 | 85.2 | 16.8 | 0.34 | 75.0–88.8 |
| School Functioning | 42 | 72.6 | 21.9 | 5480 | 81.1 | 16.5 | 0.016* | 65.8–79.4 |
| Total score | 42 | 78.0 | 14.5 | 5480 | 83.8 | 12.7 | 0.01* | 73.5–82.5 |

Abbreviations:
CI = 95% confidence interval
SD = Standard deviation

*Statistically significant.

†Note that psychosocial functioning is a summary score comprised of emotional, social, and school functioning.

**TABLE 3**

Differences among Hemiparesis Severity Classes on Generic Module

| Scale For Functioning | None (N) Mean Score | Mild (M) Mean Score | Moderate-Severe (S) Mean Score | ANOVA *P*-Value | Pairwise Comparison *P*-Value | Intraclass Correlation Coefficient Between Parent and Child Scale (*P*-Value) |
|---|---|---|---|---|---|---|
| Parent Physical | 90.5 | 81.2 | 64.6 | 0.0002 | N/S < 0.001<br>M/S 0.030 | 0.06 (0.35) |
| Child Physical | 84.6 | 84.7 | 74.4 | 0.28 | NA | |
| Parent Psychosocial* | 77.6 | 71.1 | 66.9 | 0.17 | NA | 0.29 (0.34) |
| Child Psychosocial* | 75.2 | 79 | 70 | 0.54 | NA | |
| Parent Emotional | 77.4 | 71.2 | 70.8 | 0.47 | NA | 0.37 (0.009) |
| Child Emotional | 69.3 | 80.7 | 66.7 | 0.32 | NA | |
| Parent Social | 84.4 | 82.4 | 71.7 | 0.30 | – | 0.37 (0.008) |
| Child Social | 84.9 | 81.9 | 75 | 0.55 | NA | |
| Parent School | 71.2 | 59.7 | 56.7 | 0.11 | NA | 0.19 (0.12) |
| Child School | 73.4 | 73.6 | 69.4 | 0.89 | NA | |
| Parent Total Score | 82.6 | 75.1 | 65.5 | 0.0079 | N/S 0.006 | 0.33 (0.017) |
| Child Total Score | 78.8 | 80.4 | 72.8 | 0.47 | NA | |

Abbreviations:
ANOVA = Analysis of variance
ICC = Intraclass correlation coefficient for parent and child agreement
M/S = Pairwise comparison between mild and moderate-severe hemiparesis groups
NA = Pairwise comparison not applicable due to non-statistically significant ANOVA *P*-value
N/S = Pairwise comparison between none and moderate-severe hemiparesis groups

*Note that psychosocial functioning is a summary score comprised of emotional, social, and school functioning.

**TABLE 4**

Differences among Hemiparesis Severity Classes on Cerebral Palsy Module

| Scale For Activities | None (N) Mean Score | Mild (M) Mean Score | Moderate-Severe (S) Mean Score | ANOVA *P*-Value | Pairwise Comparison *P*-Value* | Intraclass Correlation Coefficient between Parent and Child Dimension (*P*-Value) |
|---|---|---|---|---|---|---|
| Parent Daily | 95.7 | 89.9 | 71.4 | 0.0004 | N/S < 0.0001<br>M/S 0.01 | 0.60 (0.014) |
| Child Daily | 94.8 | 97.1 | 82.4 | 0.03 | M/S 0.04 | |
| Parent School | 92.9 | 80.5 | 82.2 | 0.04 | NA | 0.34 (0.015) |
| Child School | 92 | 88 | 76.4 | 0.14 | NA | |
| Parent Movement and Balance | 97.4 | 86.1 | 75.2 | <0.0001 | N/S < 0.0001<br>N/M 0.017<br>M/S 0.049 | 0.33 (0.017) |
| Child Movement and Balance | 97.6 | 95.6 | 74.4 | <0.0001 | N/S < 0.0001,<br>M/S 0.001 | |
| Parent Pain and Hurt | 87.2 | 87.5 | 85 | 0.91 | NA | 0.61 (<0.001) |
| Child Pain and Hurt | 82.4 | 79.2 | 75.7 | 0.74 | NA | |
| Parent Fatigue | 79.1 | 71.9 | 74.6 | 0.72 | NA | 0.57 (<0.001) |
| Child Fatigue | 78.6 | 72.4 | 72.9 | 0.62 | NA | |
| Parent Eating | 97.9 | 95.3 | 83 | <0.0001 | N/S < 0.0001,<br>M/S 0.001 | 0.57 (<0.001) |
| Child Eating | 95.5 | 97 | 82.8 | 0.0005 | N/S 0.001<br>M/S 0.001 | |
| Parent Speech and Communication | 92.3 | 83.5 | 71.3 | 0.003 | N/S 0.002 | 0.06 (0.35) |
| Child Speech and Communication | 85.1 | 87 | 72.9 | 0.31 | NA | |

Abbreviations:
ANOVA = Analysis of variance
ICC = Intraclass correlation coefficient for parent and child agreement
M/S = Pairwise comparison between mild and moderate-severe hemiparesis groups
NA = Pairwise comparison not applicable due to non-statistically significant ANOVA *P*-value
N/M = Pairwise comparison between none and mild hemiparesis groups
N/S = Pairwise comparison between none and moderate-severe hemiparesis groups

*Only statistically significant pairwise comparisons are shown.