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[Correction added on 20 May 2016, after issue publication: Values in Figure S2 of Supporting Information have been rectified].

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AIM The aim of this study was to test a model of determinants of gross motor function of young children with cerebral palsy (CP).
METHOD Four hundred and twenty-nine children with CP (242 males, 187 females; mean age 3y 2mo, SD 11mo) representing all levels of the Gross Motor Function Classification System (GMFCS) participated. Children in levels I to II and III to V were classified as Groups 1 and 2 respectively. Distribution of CP was quadriplegia, 44%; hemiplegia, 24%; diplegia, 23%; triplegia, 6%; and monoplegia, 2% (data not available for 1%). Impairment and motor function data were collected by reliable assessors; parents completed questionnaires on health conditions and adaptive behavior. Seven months later, parents were interviewed about family life and services received. One year after the study onset, motor function was re-evaluated. Analysis involved structural equation modeling.
RESULTS The well-fitting model explained 58% and 75% of the variance in motor function at study completion for Groups 1 and 2 respectively. Primary impairments (spasticity, quality of movement, postural stability, and distribution of involvement; β=0.52–0.68) and secondary impairments (strength, range of motion limitations, and reduced endurance; β=0.25–0.26) explained the most variance. Adaptive behavior was a significant determinant only for Group 2 (β=0.21) and participation in community programs was significant only in Group 1 (β=0.13).
INTERPRETATION Motor function is supported by optimizing body structures and function for all children and enhancing adaptive behavior for children with greater motor challenges.

Cerebral palsy (CP) is a complex condition resulting from damage to the immature brain with the primary features of movement limitations and impairments of postural control.[1] A fundamental goal of therapy early in life for children with CP is to optimize gross motor function (hereafter referred to as 'motor function') with the longer-term goal of supporting participation in education, employment, leisure, and social roles.[2] Knowledge of foundational determinants of early motor function can assist with decisions about services and interventions.

A dilemma facing rehabilitation practitioners working with children with CP and their families is that knowledge of child, family, and services determinants that support motor function is limited. In a recent review, we reported a range of factors associated with the motor function of children with CP (see Chiarello et al.[2]). Bivariate relationships between primary impairments of spasticity, aspects of quality of movement, postural control, and distribution of involvement and motor function have been identified. Similarly, associations between secondary impairments of muscle extensibility, joint contractures, and reduced force production, as well as with associated health conditions such as visual and cognitive impairments, and motor function have been reported. No significant findings have been determined that relate to aspects of children that are unrelated to the diagnosis of CP or family characteristics. Furthermore, some of the statistically significant bivariate relationships became non-significant when used in simple multivariate analyses. The effectiveness of services, in the context of child and family aspects, has not been comprehensively investigated. In preparation for the study described here, using a large previously published database,[3] we determined that 7% of the variance of change in motor function of young children with CP over a 6-month period was attributable to the Gross Motor Function Classification System (GMFCS)[4] level and age, leaving 93% of the variance as yet unexplained. A priority need exists for a more comprehensive understanding of the influences of

personal and environmental factors on activity and participation outcomes,[5,6] as well as predictors of change in outcomes over time.[7]

In preparation for the study presented in this paper, we first developed a conceptual model to guide our study hypotheses.[2] The conceptual model is compatible with current conceptualizations of functioning, disability and health; systems theory; theories of human ecology; and a philosophical approach incorporating family-centered care, as well as being based on research literature, clinical expertise, and input from parent consultants.[2] The full conceptual model comprises outcomes of the acquisition of motor function (an activity-level construct, and the focus of this paper) and engagement in self-care and play (participation-level constructs and the focus of other papers). The model proposes relationships among determinants of these outcomes, including body structure and function (primary and secondary impairments), and associated health conditions, as well as contextual factors of the child (personal factors that are unrelated to CP), and the environment (family and service factors). In the model, we differentiate between primary impairments (which are present at the outset of a condition) and secondary impairments (which arise over time as a result of primary impairments). In keeping with the current international consensus definition of CP,[1] associated health conditions includes problems with seeing, hearing, learning and understanding, speaking and communicating, controlling emotions and behavior, seizures, mouth, teeth and gums, digestion, growth, sleeping, repeated infections, breathing, and skin, heart and pain. The key personal factor identified in the model is 'adaptive behavior' which is defined as 'behaviors used to meet personal needs and to respond to and interact with the physical and social environment'.[2] We refer to family factors as 'family ecology', which covers aspects of the family environment that support early childhood development. A detailed description on how the model and the proposed relationships underlying the hypotheses were developed has been reported;[2] a summary of the development of the conceptual model is available at http://www.canchild.ca/en/ourresearch/moveplay.asp. Figure S1 (online supporting information) contains a reproduction of the conceptual model; in this figure, thicker lines represent a stronger relationship.

With this as background, the purpose of our study was to identify determinants in the child, family, and service experiences that together explain change in motor function of young children with CP over a 1-year period. The following hypotheses, which were guided by compatible theoretical frameworks, the research literature, clinical expertise, and parent input, were tested: (1) the model will have a greater proportion of variance explained for children with a good prognosis for independent ambulation (i.e. children in GMFCS levels I and II) and less with children whose self-mobility is more limited (i.e. children in GMFCS levels III, IV and V); (2) children's primary impairments, secondary impairments, and associated health conditions will have a stronger relationship with change in motor function than will adaptive behavior, family ecology, and rehabilitation and community services; (3) children's secondary impairments will be significant mediators between primary impairments and change in motor function; and (4) rehabilitation and community services will be significant mediators between family ecology and change in motor function. Because the model explained only a small percentage of the variance in change in motor function, we also tested the ability of the model to predict motor function over a 1-year period (i.e. to ascertain the ability of the determinants to predict future motor function, rather than change in motor function). Knowledge about the associations among various determinants and motor function has the potential to inform decisions about specific interventions and service delivery.

What this paper adds

- A higher proportion of gross motor function is explained for children in GMFCS levels III to V compared with children in levels I to II.
- Both primary and secondary impairments are significant determinants of gross motor function among children with CP.
- Adaptive behavior is a significant determinant of gross motor function for children in GMFCS levels III to V.
- Determinants amenable to change (postural stability, strength, and adaptive behavior) are reasonable areas for intervention.

METHOD

Design

This was a multi-site prospective longitudinal cohort study to test a model of determinants of motor function of young children with CP using structural equation modeling. Structural equation modeling is a confirmatory analytic approach that has been recommended for rehabilitation outcomes research.[6,8] The direct and indirect effects of multiple constructs are simultaneously tested and models can include latent variables that are not measured directly. We used model testing techniques similar to that outlined by Palisano et al.[9] by first specifying the conceptual model to be tested[2] and describing the measurement model[6] before testing the model statistically.

Participants

Children were eligible to participate if they had a diagnosis of CP, or gross motor delay with impairments consistent with CP, and if their parents could speak English, French, or Spanish. Children with a predominant dual diagnosis were excluded. Statistical estimation involving a sample of 200 typically results in stable estimates of various fit indices used to determine the degree of fit between the pattern of relationships in the data and proposed model.[10,11] We initially aimed for equal numbers in each of the following GMFCS groups: levels I and II, level III, and levels IV and V.

Participants were a convenience sample of 429 children (242 males, 187 females) and their caregivers recruited from children's rehabilitation centers in six provinces in Canada and four regions in the USA between July 2007

and February 2009. At the outset of the study, children ranged in age from 18 to 60 months (mean of 3y 2mo, SD 11mo). Children's abilities varied across all five levels of the GMFCS[4] and across all distributions of involvement. Child and parent participant demographics are contained in Table I. This distribution is representative of GMFCS levels in population-based studies around the world.[12] We were able to recruit a sufficient number of children in GMFCS levels I and II (n=204) and levels II, IV, and V (n=226) to test the model on two groups of children. We retained 90% of the sample over the observation period of 1 year; data collection was completed in March 2010. Families who remained in the study had significantly higher incomes than families who withdrew or were lost to follow-up (however, the magnitude of this difference is not significant); no other child and family demographics differed between groups (Table I).

Table I: Child and parent demographic characteristics

Characteristics		Participants enrolled n=429 (%)	Participants retained after 1 year n=389 (%)
Child GMFCS Level	I	154 (36)	145 (37)
	II	50 (11)	45 (11)
	III	53 (12)	49 (13)
	IV	75 (18)	66 (17)
	V	97 (23)	84 (22)
Child distribution of involvement	Monoplegia	10 (2)	8 (2)
	Hemiplegia	102 (24)	98 (25)
	Diplegia	100 (23)	88 (23)
	Triplegia	25 (6)	24 (6)
	Quadriplegia	190 (44) (n=427)[b]	169 (44) (n=387)[b]
Child ethnicity	African American	32 (8)	25 (7)
	Asian or Pacific Islander	19 (4)	17 (4)
	Hispanic/Latino	18 (4)	16 (4)
	Native American	11 (3)	9 (2)
	White	299 (70)	272 (70)
	Other	50 (11)	50 (13)
Parent age, years: months	Mean (SD)	34:4 (6:9)	34:6 (6:6)
Parent relationship to child	Mother	393 (92)	364 (94)
	Father	21 (5)	21 (5)
	Other	15 (4)	4 (1)
Parent education	High school or less	134 (31)	115 (30)
	Community College/ Associate's Degree	114 (27)	101 (26)
	University	181 (42)	173 (44)
Family income[a] (CA$ or US$)	≥$75 000	164 (38)	157 (40)
	$60 000–74 999	49 (11)	48 (12)
	$45 000–59 999	59 (14)	52 (13)
	$30 000–44 999	54 (13)	45 (12)
	≤$30 000	88 (21) (n=413)	74 (19) (n=376)
Family composition	Adults (mean, SD)	2.2 (0.8)	2.2 (0.8)
	Children (mean, SD)	2.2 (1.1)	2.2 (1.1)

[a]Report based on the available information. [b]The assessor did not provide the distribution of involvement for two children. GMFCS, Gross Motor Function Classification System Level; CA$, Canadian dollars; US$, United States dollars.

Measures

Outcome

We used the basal and ceiling approach of the Gross Motor Function Measure (GMFM-66-B&C).[13] This abbreviated version relies on administration of a minimum of 15 items from the original GMFM-66,[14] ordered in difficulty order, and containing a basal level of three consecutive scores of 3 ('completes' item as described) through to a ceiling level of three consecutive scores of 0 ('does not initiate'). As for the GMFM-66, total scores were obtained using the Gross Motor Ability Estimator.[14] Intraclass correlation coefficients (ICC [2,1]) reflecting concurrent validity with the full GMFM-66 and test–retest reliability were both 0.99.[13]

Independent variables/determinants

A list of measures used to reflect the constructs of primary and secondary impairments, associated health conditions and comorbidities, adaptive behavior, family ecology, and rehabilitation and community services are contained in Table II. The GMFM-66-B&C, the Early Clinical Assessment of Balance (ECAB), Functional Strength Assessment (FSA), Early Activity Scale for Endurance (EASE), and Health Conditions and Services Questionnaires were all developed in the context of the Move & PLAY study. Details of the psychometric properties of these measures are contained in Table SI (online supporting information).

Procedures

At the beginning of the study, trained and reliable assessors collected data on the GMFCS, GMFM-66-B&C, Modified Ashworth Scale, selected attributes from the Gross Motor Performance Measure, the Pediatric Balance Scale and the automatic reactions section of the Movement Assessment of Infants (selected items of which comprise the ECAB), distribution of involvement, the Spinal Alignment and Range of Motion Measure (SAROMM), and the FSA, in home or clinic settings. Typically, data collection was completed within 90 minutes. Either before or during this data collection point, parents completed the Early Coping Inventory, the EASE, the Health Conditions Questionnaire and a family demographic questionnaire, usually within 45 minutes. At an average of 7 months after the first data collection point, parents were interviewed primarily by phone to provide data on the Family Environment Scale, the Family Expectations of their child measure, and the Services Questionnaire. One year after the first data collection point, therapists again collected data on the GMFM-66-B&C.

Statistical analyses

Our interest is in testing the conceptual model, with latent constructs measured by underlying indicators. Accordingly,

Table II: List of measures[a]

Construct	Indicator	Measure	Respondent
Primary impairments	Spasticity	Modified Ashworth Scale[15]	Assessor
Primary impairments	Quality of movement	Four items from the Gross Motor Performance Measure[16]	Assessor
Primary impairments	Postural stability	Early Clinical Assessment of Balance[17]	Assessor
Primary impairment	Distribution of involvement	Monoplegia, hemiplegia, diplegia, triplegia, quadriplegia	Assessor
Secondary impairment	Strength	Functional Strength Assessment	Assessor
Secondary impairment	Range of motion	Spinal Alignment and Range of Motion Measure[18]	Assessor
Secondary impairment	Endurance	Early Activity Scale for Endurance[19]	Parent
Associated health conditions and comorbidities	Associated conditions	Health Conditions Questionnaire[12]	Parent
Child adaptive behavior	Sensorimotor organization Self-initiated behaviors Reactive behaviors	Early Coping Inventory[20]	Parent
Family ecology	Family relationships Social integration	Part of the Family Environment Scale[21]	Parent
Family ecology	Expectations	Family's Expectations of Child (developed by team, in collaboration with parents)	Parent
Rehabilitation and community services	Intensity of therapy Family-centered services Number of community programs Services meeting needs	Services Questionnaire[22]	Parent

[a]These measures are described in detail in Tables SI and SII (online supporting information). Constructs in the model are linked with the following levels of the International Classification of Functioning, Disability and Health: primary and secondary impairments – body structures and function; child adaptive behavior – personal factors; family ecology and services – environmental factors.

we simplified the measurement model such that the measures of a given construct (single item questions and subscales) were combined to produce a single indicator. Table SII (online supporting information) contains details of how the measures were used in this analysis. For body structures and functions (i.e. primary impairments), all scores were adjusted to be aligned with the ECAB scores (i.e. higher scores reflect 'better' structures and functions). All scores were scaled to the same metric (0–10) and averaged to produce one indicator. Confirmatory Factor Analysis (CFA) provides evidence that balance (factor loading of 0.95), distribution of involvement (0.82), quality of movement (0.77), and spasticity (0.68) all contribute to the construct of primary impairments. For secondary impairments, all scores were adjusted to the metric of the SAROMM (i.e. higher scores reflect more impairment and scaled 0–4 and averaged to produce one indicator). Again, CFA confirms that impairments in strength (0.95), range of motion (0.74), and endurance (0.66) all contribute to the construct of secondary impairments, as evidenced by their factor loadings. The indices for health conditions and child adaptive behavior were simply the mean scores of scale components. The indicator for family ecology involved combining three components based on factor loadings (family relationships, social integration, and families' expectations of child); the final score was scaled from 0 to 1. Four service measures (intensity of therapy, family-centered services, number of community programs, and services meeting needs) were each treated as separate indicators in the model, and scaled as in the original data collection (note that a full description of the services received by the participants has been described[22]). When using structural equation modeling, the data input is the variance-covariance matrix representing relationships among the latent constructs. Person-level means were used to impute missing values on each scale. Full information maximum likelihood was used to estimate the models when some of the indicators had missing values. Full information maximum likelihood produces unbiased estimates under 'missing at random' assumptions, an assumption that is supported by no clinically significant differences between those recruited and retained.

The model was tested simultaneously for children in GMFCS levels I and II (Group 1) and children in GMFCS levels III to V (Group 2) with multi-group structural equation modeling using the software MPLUS 5 (Muthén & Muthén, Los Angeles, CA, USA), permitting testing of the proposed hypotheses. We examined: (1) overall model fit; (2) proportion of variance in the outcome variable explained by the model for each group; and (3) the standardized β coefficients of the significant pathways, followed by testing of differences between groups. The fit of the data to the model for both groups was examined using χ^2 ($p<0.05$), the comparative fit index (CFI, ≥ 0.95), the Tucker Lewis Index (TLI, approximating 0.95), and the Root Mean Square Error of Approximation (RMSEA, <0.05). For details of these terms, please see Palisano et al.[9] Meeting minimum criteria indicates adequacy of the model fit. The criterion for whether the hypothesized paths were significant was a standardized path coefficient (β) with an alpha level of ≤ 0.05. Differences in the magnitude of path coefficients between the groups (i.e. GMFCS

groupings) were tested using the likelihood ratio test with an alpha level of ≤0.05.

Ethical approval was provided by the health sciences research ethics board at Western University and 20 additional agencies across all participating sites;[6] all ethical recommendations have been adhered to. Signed informed consent was obtained from each parent participant before data collection; all consented to data being used in publications.

RESULTS

The initial and outcome data for the GMFM-66-B&C are contained in Table III.

The structural models for the initial analyses of *change* in motor function over 1 year are contained in Figures S2 and S3 (online supporting information). Fit statistics indicated a good fit between the covariance matrix of the data and the covariance matrix predicted by the model (χ^2=41.3, df=26, p=0.03; CFI=0.974; TLI=0.921; RMSEA=0.052). The model explained only 8.9% and 12.8% of the variance of change in motor function for Groups 1 and 2 respectively.

The analyses were repeated using the GMFM-66-B&C score at 1 year as the outcome. These structural models are contained in Figures 1 and 2. Fit statistics indicated a good fit between the data and models (χ^2=41.4, df=26, p=0.03; CFI=0.984; TLI=0.953; RMSEA=0.052). The model explained 57.6% of the variance in motor function for Group 1 and 74.9% of the variance in motor function for Group 2. Beta weights were significant (p<0.05) for

Table III: Initial and outcome data for the Gross Motor Function Measure (Basal and Ceiling Approach)

GMFCS Group	Initial GMFM-66-B&C Score	Final GMFM-66-B&C Score	Change Score (based on final *n*)
Group 1 (levels I and II)	63.4 (10.2) (*n*=204)	69.5 (9.9) (*n*=190)	6.0 (4.6) (*n*=190)
Group 2 (levels III, IV and V)	28.2 (11.6) (*n*=226)	33.3 (13.2) (*n*=199)	4.9 (6.0) (*n*=199)

GMFCS, Gross Motor Function Classification System; GMFM-66-B&C, Gross Motor Function Measure (Basal and Ceiling Approach).

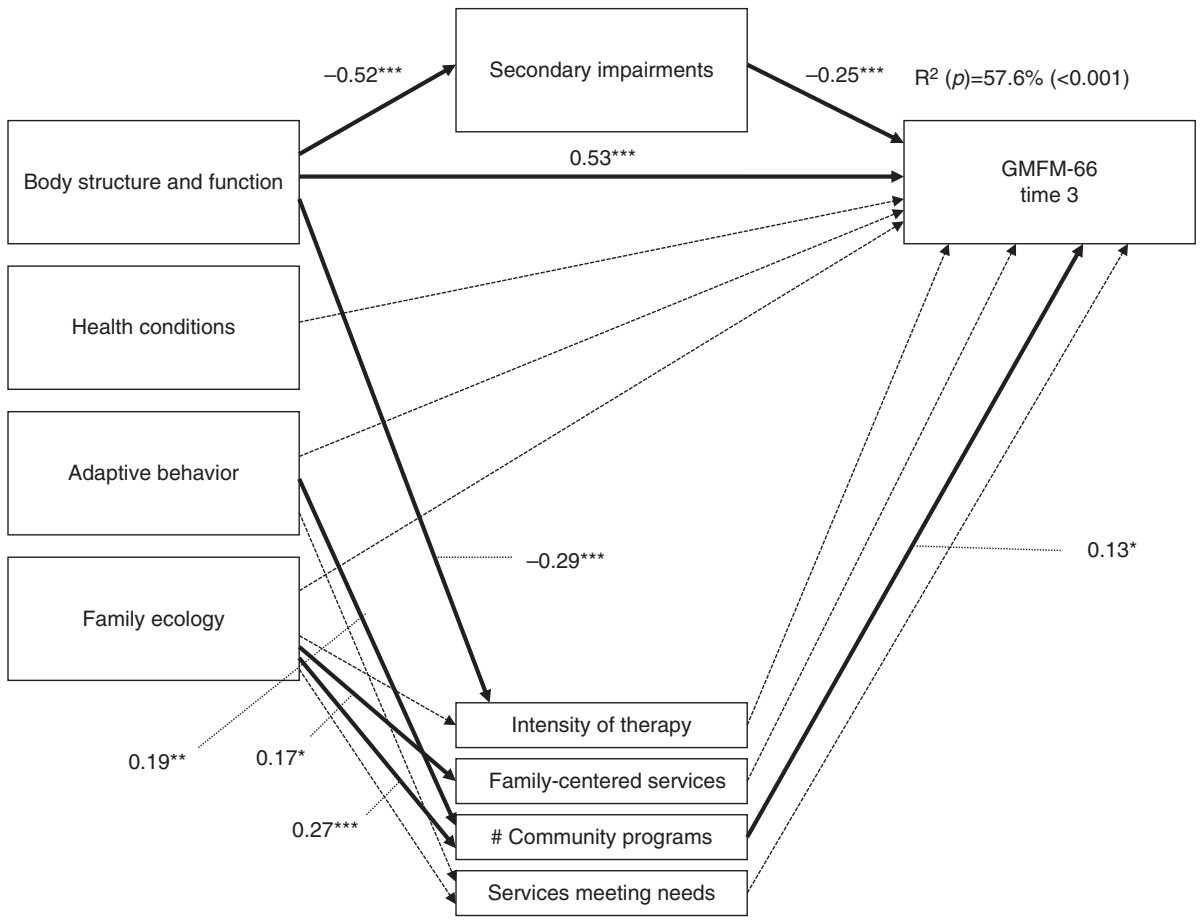

Figure 1: Determinants of motor function of young children with cerebral palsy in Gross Motor Function Classification System levels I and II. (Note: solid lines indicate significant pathways; dashed lines indicate non-significant pathways.) *p<0.05, **p<0.01; ***p<0.001.

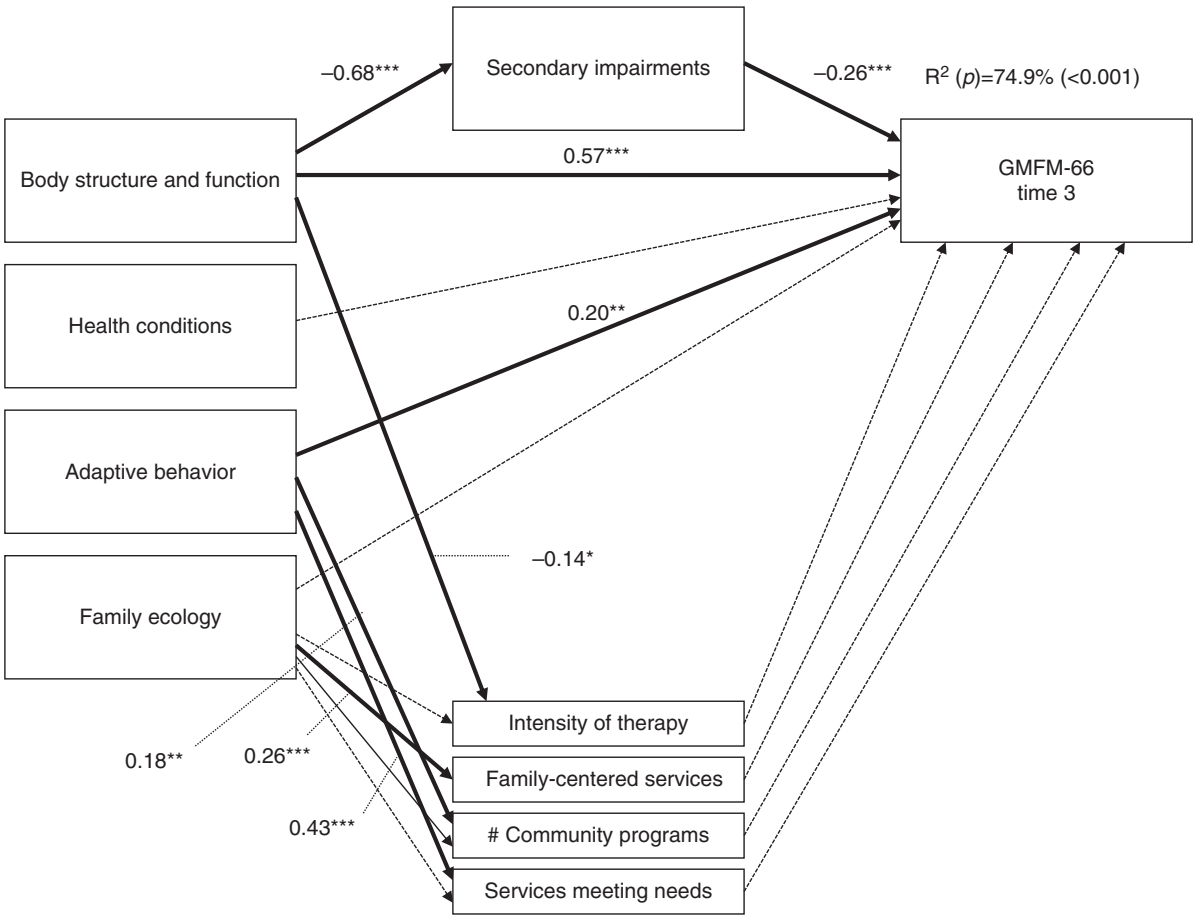

Figure 2: Determinants of motor function of young children with cerebral palsy in Gross Motor Function Classification System levels III, IV, and V. (Note: solid lines indicate significant pathways; dashed lines indicate non-significant pathways.) *p<0.05; **p<0.01; ***p<0.001.

direct paths between body structure and function (0.53, 0.57) and secondary impairments (−0.25, −0.26) and motor function, for both Groups 1 and 2. The total of direct and indirect effects for body structure and function was 0.67 and 0.74 for Groups 1 and 2 respectively. For Group 1, there was a small but significant association between the number of community programs (0.13) and motor function, and for Group 2, between adaptive behavior (0.20) and motor function. Better performance in body structure and function, fewer limitations in secondary impairments, more involvement in community programs, and higher adaptive behavior were associated with higher motor function. The only significant difference between the groups was a stronger association with adaptive behavior for children in Group 2 but not in Group 1 The addition of services to the child and family models added only 1.1% and 0.1% of the variance explained in motor outcome for Groups 1 and 2 respectively.

DISCUSSION

The primary purpose of this study was to identify the child, family, and service determinants that together explain change in motor function of young children with CP over a 1-year period. Our initial analyses explained only about 9% and 13% of the variance of change in motor function, not much more than our preliminary analysis from a different database based on GMFCS and age alone. This unexpected finding is probably not caused by lack of variability in the change in motor function scores, averaging about five points, with an interquartile range of approximately eight points across all GMFCS levels. Instead, this result might be attributable to the nonlinearity of developmental phenomena,[23] with respect to both determinants and outcomes. It is well recognized that child development across a number of domains does not occur at a steady pace, but instead progresses in spurts and plateaus over time,[24,25] with typically a lack of correspondence in rate of development among trajectories of various domains.[26] Also, a unit of change in a determinant is not necessarily associated with a unit change in outcome; a small incremental change in a determinant, such as muscle strength, can lead to significant motor function advances.[23] As others have speculated,[23] it is also possible that developmental change is not a generalizable phenomenon, especially for children with CP who demonstrate wide individual variation. These results are similar to others'

findings that it is difficult to ascertain predictors of developmental change.[7] Consequently, we modified our model to test determinants of motor function 1 year after the initial assessment and tested our hypotheses about predictors of future motor function accordingly.

Our first hypothesis (that the modified model would have greater proportion of variance explained for children with a good prognosis for independent ambulation [Group 1] and less with children whose self-mobility was more limited [Group 2]) was not supported. We anticipated that children in Group 1 would experience fewer constraints because of less impairment of body structures and functions; however, the proportion of variance explained was greater for children in Group 2 (75%) than Group 1 (58%). Although the explained variance for motor function was higher for children in Group 2, the only significant difference in determinants was the effect of adaptive behavior. The finding that adaptive behavior (how children behave in real-life situations) was a significant determinant of motor function for children in GMFCS levels III to V suggests that among children with limited mobility, those with higher adaptive behavior may be more self-motivated or have more opportunities for movement throughout the day.

The second hypothesis (that primary and secondary impairments and associated health conditions would have a stronger relationship than adaptive behavior, family ecology, and services) was supported for primary and secondary impairments but not health conditions. Although both primary and secondary impairments were more strongly associated with motor function than adaptive behavior, family ecology, and services, the impact of health conditions was not significant in either group. Based on the magnitude of the standardized β coefficients, our results affirm the prevailing assumption in the clinical community of the importance of the primary impairments associated with CP.[27] Of the primary impairments measured in this study, postural stability had the highest β weight, followed by distribution of involvement, quality of movement, and spasticity. These weightings are interesting in the context of the international consensus definition of CP being a disorder of both movement and posture.[1]

The third hypothesis (that secondary impairments will be significant mediators between primary impairments and motor function) was supported in both groups of children. The more modest association of secondary impairments to motor function in young children with CP supports the second of three fundamental goals for therapy: prevention of secondary conditions that have an impact on lifelong health.[2]

The final hypothesis (that services will be significant mediators between family ecology and motor function) was supported only for Group 1 in which involvement in community programs was a significant mediator between family ecology and motor function. Furthermore, the mediating role of services was not strongly supported by the very small proportion of variance added.

The methods used in this study cannot definitively establish causality;[6] instead, we rely on epidemiological principles of temporality, strength of relationship, consistency, and plausibility[28] to suggest potential causal relationships. All identified determinants were collected at a time-point before the motor outcome, satisfying the criterion of temporality (which is necessary, but not sufficient). The primary impairments, with the strongest association, meet the criterion of strength of relationship. Primary and secondary impairments have been identified as being associated with motor function in many previously reviewed studies[2] providing evidence of consistency with other reports. Finally, all of the identified determinants are plausibly associated with motor function, and most are amenable to change, and are, therefore, reasonable areas for intervention. A second potential limitation of this work is that participants were primarily mothers, to whom the results are most generalizable. Nonetheless, we were recruiting the primary caregivers, whom we believe are mostly mothers.

Predicting change in motor function of young children with CP is challenging, primarily, we believe, because both determinants and outcomes are non-linear in their trajectories and there are unlikely to be patterns that are consistent across groups of children. Based on our findings, in the context of previous work,[3] we believe that predicting future motor function is a more reasonable goal than predicting change. For all children with CP, enhancing postural stability and preventing secondary impairments of muscle weakness, range of motion limitations, and poor endurance through activity-based interventions[29] might contribute to optimal motor function. For children in GMFCS levels III to V, focusing on enhancing adaptive behavior might result in improved motor function. This could involve facilitating self-awareness, adaptability, motivation, exploration, problem solving, persistence, taking risks, and interaction with people in a variety of situations in daily life routines, with the understanding that development and learning are contextual.[30–32] Finally, encouraging participation in community programs might enhance motor function of children who are able to ambulate without mobility aides.

Using a large sample of children with CP, we evaluated a model proposing determinants of future gross motor function (1y later). Findings supported the relationship of primary and secondary impairments, adaptive behavior, and participation in community services to motor function. Knowledge obtained from this study provides information to assist with prognostic discussions with clients and families, establishment of realistic and attainable goals, and selection of effective interventions to enhance motor function.

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CONFLICTS OF INTEREST

The authors have stated that they had no interests which might be perceived as posing a conflict or bias.

SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Table SI: Psychometric details of measures used

Table SII: Details of how data were summarized for analysis

Figure S1: The multivariate model of determinants of change in motor abilities and participation in daily activities for children with cerebral palsy.

Figure S2: Determinants of change in motor function of young children with cerebral palsy in Gross Motor Function Classification System levels I and II. (Note: solid lines indicate significant pathways; dashed lines indicate non-significant pathways.)

Figure S3: Determinants of change in motor function of young children with cerebral palsy in Gross Motor Function Classification System levels III, IV, and V. (Note: solid lines indicate significant pathways; dashed lines indicate non-significant pathways.)

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