

# Factors Influencing the Motor Development of Children with Cerebral Palsy: Differences in Pediatric Physical Therapists' Perceptions

The Journal of Korean Society of Physical Therapy



- 김장곤
- 가톨릭대학교 보건학과

Factors Influencing the Motor Development of Children with Cerebral Palsy: Differences in Pediatric Physical Therapists' Perceptions

Jang-Gon Kim, PT. MSc

Department of Health Science, Catholic University of Korea

**Purpose:** The purpose of this article is to identify whether the physical therapists perceive the important factors influencing the motor development in children with cerebral palsy differently.

**Methods:** Study participants included 58 pediatric physical therapists. They were recruited from the internet communities for physical therapists. The data was collected through a web-based questionnaire using Google Documents tool. Questionnaire was focused on the importance (10-point scale) of each factor influencing the motor development in children with cerebral palsy. The mean scale of each factor was compared by itself and according to the participants' career characteristics.

**Results:** The personality characteristics received the least importance rating (6.77) in comparison with other domains (healthcare service: 7.70, family ecology: 7.53, secondary impairment: 7.53, primary impairment: 7.45). In the detailed items, home exercise (8.33) received the highest mean importance rating, while sociability (6.03) received the lowest mean importance rating. Comparing the importance of factors by the type of work institution, subjects working in the welfare institutions perceived the contextual factors (personality characteristics, family ecology, healthcare service) as more important than those working in the medical institutions.

**Conclusion:** The authors suggest that pediatric physical therapists should try to have an identical approach by reaching a consensus. Also, the support for family-centered service to children with cerebral palsy should be strengthened.

**Keywords:** Cerebral palsy, Conceptual model, Motor outcomes

논문접수일: 2011년 4월 30일

수정접수일: 2011년 6월 15일

게재승인일: 2011년 7월 15일

교신저자: 김장곤, catty@naver.com

## 1. Introduction

Cerebral palsy (CP) is the most common motor disability of childhood.<sup>1-3</sup> The definition of cerebral palsy is that "Cerebral palsy describes a group of disorders of the development of movement and posture, causing activity limitation, that are attributed to non-progressive disturbances that occurred in the developing fetal or infant brain. The motor disorders

of cerebral palsy are often accompanied by disturbances of sensation, cognition, communication, perception, and/or behaviour, and/or by a seizure disorder".<sup>4</sup> The prevalence of CP in South Korea was 2.3 per 1000 children. The attributable medical cost of South Korea was calculated to be 26,383 US dollars, which is 1.8 times the basic lifetime medical cost of the general population (14,579 US dollars).<sup>5</sup> At the time of diagnosis, parents usually want to know its

severity and whether their child will ever be able to walk. Standardized measurement tools can help to answer parents' questions about prognosis.<sup>6,7</sup> However, Physical therapists (PTs) are not always confident when selecting, administering, and interpreting these tools.<sup>8</sup> Also knowledge of factors that can be used to predict motor outcomes in children with CP is limited.<sup>9,10</sup>

Bartlett and Colleagues<sup>9</sup> described a multivariate model of determinants of motor change for children with cerebral palsy (Figure 1). This model was developed to provide physical therapists with information to assist with prognosis, establishment of realistic and attainable goals, and direction for interventions. Recent research suggests that the acquisition of basic motor abilities plateaus by 6 or 7 years of age in children with CP.<sup>11</sup> Accordingly, the focus of the model is on children younger than 7 years of age. Development of the model was guided by compatible theoretical frameworks (the disablement process using the International Classification of Functioning, Disability, and Health (ICF),<sup>12</sup> systems theory, and family-centered care), research on prognostic factors for motor outcome in children with cerebral palsy, literature on motor development of infants, and literature on the general health and developmental outcomes of

children who are at risk for a developmental disability.

Physical therapists' perceptions have much influence on decision making of parents of children with CP. Generally, parents have their children managed in different medical institutes. So, consistent information offering among physical therapists is needed. Physical therapists' perceptions about importance should be almost identical.

The purpose of this article is to identify that physical therapists perceive important factors influencing the motor development in children with cerebral palsy. These are found out by using a conceptual framework model composing of factors.

## II. Methods

### 1. Subject

This study used a web based cross sectional design. 58 participants were recruited from internet communities for physical therapist from July 2010 to August 2010. The author got electronic data collection using Google Documents tool. All participants had pediatric physical therapy career.

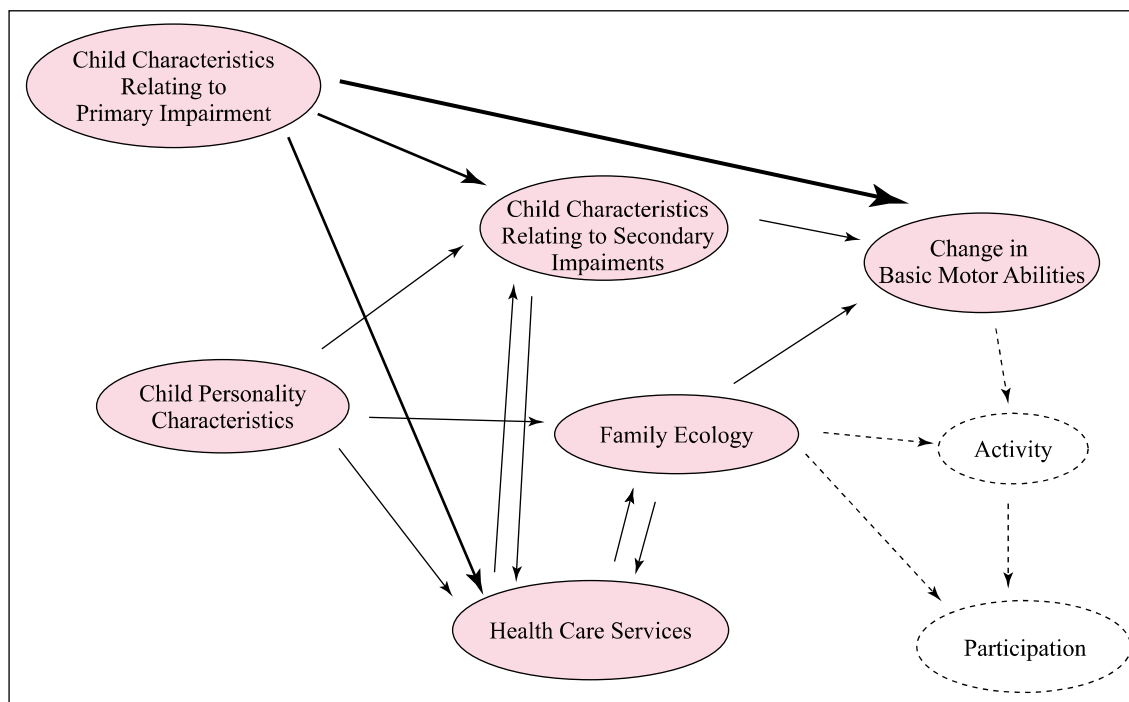


Figure 1. A multivariate model of determinants of motor change for children with cerebral palsy.

## 2. Procedures

All participants completed a questionnaire that was developed for this study. Questions were focused on the importance of each determinant in influencing the motor development. The questionnaire was composed of 6 queries on demographic and career characteristics, 22 items for assessment of factors' importance. Participants were asked to rate the question about the importance of each item on a 10-point scale, with 10 being "very important" and 0 being "unimportant."

The 22 items is sub-queries about the multivariate model of determinants of motor change for children with cerebral palsy. The model contains 5 domains (primary impairments, secondary impairments, child personality characteristics, family ecology and health care services) that are proposed to interact to explain and predict the acquisition of basic motor abilities among children with CP. Primary impairments were defined as organ-or system-level deficits that were apparent at the time of diagnosis. An example of a primary impairment is hyper-tonicity. Secondary impairments were defined as organ-or system-level deficits occurring over time. Contractures are an example of secondary impairments. Child personality characteristics were defined as any personality attributes that are largely independent of having a diagnosis of cerebral palsy (ie, relates to a description of children, regardless of diagnosis); temperament is an example of a personality attribute. Family ecology was defined as anything related to the environment of families, such as resources and supports.<sup>9,13</sup>

## 3. Statistical analysis

The data were analyzed with SPSS for Windows (version 15.0) to describe the importance of factors. For the comparison of importance among factors, means and standard deviations were described.  $\chi^2$  test was conducted to verify the difference of the importance of factors depending on career characteristics. The alpha level for significance was set at 0.05.

## III. Results

### 1. Importance of factors

Seeing the means of importance of the 5 domains, among

them, the importance of health care services was 7.70, which was the greatest, followed by that of family ecology and that of secondary impairment, which were 7.53. And then, The importance of primary impairment was 7.45. The importance of personality characteristics was 6.77, which was the lowest (Figure 2).

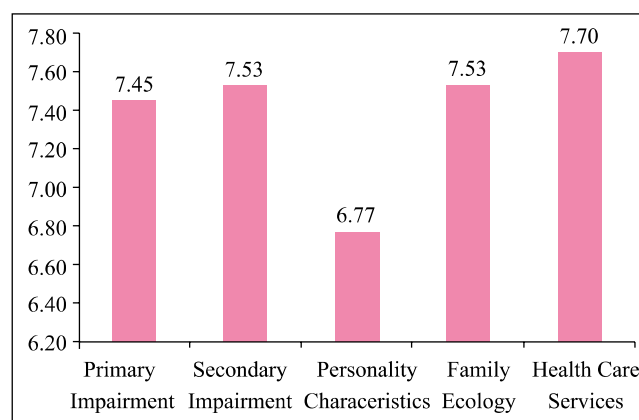


Figure 2. Importance of each domain.

Seeing the factors with comparatively great importance in detail, home exercise of health care service had the highest mean of importance (8.33), while sociability was the lowest mean of importance (6.03). Among the factors with more than 7.50 means, there were muscle ton/movement patterns (7.57), cognition (7.95), and sensory impairment (7.76) in primary impairments, and there were muscle and joint contractures/skeletal malalignment (7.50), general health/respiratory status(7.64), and force production (7.55) in secondary impairments. Motivation (8.02) in child personality characteristics was the only one that was more than 7.50. And support to child (7.81), family functioning (7.84), and family resources (7.86) were more than 7.50 in family ecology. Finally, therapist's expertise (7.84) and home exercise (8.33) were more than 7.50 in health care service (Table 1).

### 2. Importance by subjects' characteristics

To see the difference of importance depending on subjects' characteristics, we divided the 5 domains into "impairment" and "context" as ICF has two parts the "function" and "context".<sup>12</sup> The subject that perceives primary impairments and secondary impairments more important was classified as "impairment" and the subject that perceives child person

**Table 1.** Determinants for Each Domain Rated by 58 Physical Therapists in Phase

Domain	Determinant	Estimate of Importance	
		X	SD
Primary impairments	Muscle ton/movement patterns	7.57	1.58
	Cognition	7.95	1.65
	Distribution of involvement	7.00	1.94
	Balance/postural reactions	6.97	1.72
	Sensory impairment	7.76	1.78
Secondary impairments	Muscle and joint contractures/skeletal malalignment	7.50	1.67
	General health/respiratory status	7.64	1.54
	Force production	7.55	1.80
	Endurance/fitness/efficiency	7.43	1.81
Child personality characteristics	Motivation	8.02	1.76
	Temperament	6.90	1.47
	Separation anxiety	6.14	1.93
	Sociability	6.03	1.96
Family ecology	Expectations/beliefs	7.00	1.81
	Support to child	7.81	1.75
	Response to diagnosis	7.16	1.82
	Family functioning	7.84	1.82
	Family resources	7.86	1.66
Health care service	Frequency of therapy	7.47	1.77
	Expertise of health agency	7.17	1.87
	Therapist's expertise	7.84	1.91
	Home exercise	8.33	1.74

ality characteristics, family ecology and health care service more important was classified as “context”. As for the subject's characteristics, we surveyed 6 items, among which the question about the experience of pediatric physical

therapy was excluded because the answers were all yes. The 5 items excluding it were gender, career period, working area, type of work institutions, and course completion. We converted course completion to dummy variable and anal-

**Table 2.** Importance of PT's perception by subjects' characteristics(n=58)

Variables	Category	n (%)	distinguish		Chi-Sq	
			impairment	context		
Gender	Male	16(27.6)	6(37.5)	10(62.5)	0.90	
	Female	42(72.4)	15(35.7)	27(64.3)		
Career period	Below 3yr	23(39.7)	10(43.5)	13(56.5)	0.35	
	Over 3yr	35(60.3)	11(31.4)	24(68.6)		
Working area	Metropolitan area	36(62.1)	15(41.7)	21(58.3)	0.27	
	Local area	22(37.9)	6(27.3)	16(72.7)		
Type of work institutions	Medical Institutions	27(46.6)	14(51.9)	13(48.1)	0.02*	
	Welfare Institutions	31(53.4)	7(22.6)	24(77.4)		
Course Completion	Bobath	Completion	47(81.0)	14(29.8)	33(70.2)	0.08
		Not Completion	11(19.0)	7(63.6)	4(36.4)	
	Bojta	Completion	11(19.0)	3(27.3)	8(72.7)	0.73
		Not Completion	47(81.0)	18(38.3)	29(61.7)	
	NDT	Completion	14(24.1)	7(50.0)	7(50.0)	0.29
		Not Completion	44(75.9)	14(31.8)	30(68.2)	

\* p<0.05

† NDT: Neurodevelopmental Treatment

alyzed it because a subject sometimes completed several courses. The result of analyzing it showed no difference depending on gender. The analysis depending on career period showed that subjects over 3 years perceived context more important than those below 3 years, but the gap between them was not significant. The analysis depending on working area showed that subjects who work in local area perceived context more important than those who work in metropolitan area, but the gap between them was not significant as well. Regarding the types of work institutions, subjects who work for welfare institutions perceived context more important than those who work for medical institutions, and the gap between them was significant. Concerning course completion, subjects who had completed Bobath or Vojta course perceived context more important than those who had not, but the gap between them was not significant. Subjects who had completed neurodevelopmental treatment (NDT) course perceived context more important than those who had not, but the gap between them was not significant.

#### IV. Discussion

Conceptual models are useful devices for organizing complex material and examining interrelationships among variables.<sup>14-16</sup> The ICF framework holds great promise to provide a synthesis of earlier models of disablement and to provide the rehabilitation disciplines with a universal language with which to discuss disability and related phenomena.<sup>17</sup>

Several major schools of thought have influenced the definition of disablement concepts.<sup>17</sup> The first, called the medical model, views disability as a characteristic or attribute of the person, which is directly caused by disease, trauma, or other health condition and requires some type of intervention provided by professionals to “correct” or “compensate” for the problem. In contrast, the social model of disability views the phenomenon of disability as a socially created problem and not as an attribute of the person. In the social model of disability, the underlying problem is created by an unaccommodating or inflexible environment brought about by the attitudes or features of the social and physical environment itself, which calls for a political re-

sponse or solution. Finally, the third conceptual approach for examining the concept of disability, called the biopsychosocial model, attempts to integrate the medical and social models of disability. In the biopsychosocial model, disability is viewed as a consequence of biological, personal, and social forces. The interactions among these various factors result in disablement. The biopsychosocial model of disability represents the dominant perspective behind contemporary disablement frameworks in use today.<sup>17</sup>

The WHO released the ICF<sup>12</sup> which, like the disablement model, attempted to provide a coherent biopsychosocial view of health states from a biological, personal, and social perspective. The result of this study shows no significant gap in gender, career period, working area, and course completion. It shows some significant gap only in type of work institution. We lack any standard curriculum on pediatric physical therapy<sup>18,19</sup>. Consequently most pediatric physical therapists acquire knowledge and information through seminars of academic society after graduation. Nonetheless, no significant gap in gender, career period, working area, and course completion seems to have very positive phenomenon. The significant gap in type of work institutions shows that whether subjects work in medical institutions that have strong medical model concept or in welfare institutions that stress social model concept affects therapists' perception. Social functions between medical institutions and welfare institutions are different. Therefore, this difference may well exist. But, in the long term, they must have an identical approach through their agreement.

Subjects perceived motivation and home exercise relatively important among detailed factors, which show that they think highly of the importance of family support and home education. The medical environment in Korea lacks counseling for home education and community based approaches. Thus, support for family-centered service to children with cerebral palsy should be strengthened. Family-centered service is an approach to service delivery that is considered best practice in pediatric rehabilitation. The focus is on services that address child and family needs, priorities and preferences in settings where children live, learn and play. On top of that, development of guideline for effective home exercise is needed.<sup>20,21</sup>

## V. Conclusions

This study addressed which factors influencing motor development of children with cerebral palsy pediatric physical therapists perceive important. Multivariate model developed by Bartlett and Colleagues was used for this study. Among the 5 domains, only child personality characteristics have relatively low score, and the rest have relatively high score. As for factors, motivation and home exercise have relatively high score and separation anxiety and sociability have relatively low score. Dividing factors depending career characteristics into impairment and context shows that therapists who work for welfare institutions perceive context more important than those who work for medical institutions but as for the rest career characteristics, the gaps are not significant. But considering this research objects were recruited from internet communities, making this result generalize is a bit hard to consider. So author suggests that research is needed based on randomized sampling.

### Author Contributions

Research design: Kim JG

Acquisition of data: Kim JG

Analysis and interpretation of data: Kim JG

Drafting of the manuscript: Kim JG

Administrative, technical, and material support: Kim JG

Research supervision: Kim JG

### References

1. Pakula AT, Van Naarden Braun K, Yeargin-Allsopp M. Cerebral palsy: classification and epidemiology. *Phys Med Rehabil Clin N Am.* 2009;20(3):425-52.
2. Ko JY, Lee SM. Functions (Mobility, Self-care, Social Ability) and Health-related Quality of Life in Children with Cerebral Palsy. *J Kor Soc Phys Ther.* 2010;22(3):37-44.
3. Kwon MJ. Satisfaction of Utilization of Physical Therapy and Quality of Life for Caregivers of Cerebral Palsy Children. *J Kor Soc Phys Ther.* 2009;21(2):55-63.
4. Park MS, Kim SJ, Chung CY et al. Prevalence and lifetime healthcare cost of cerebral palsy in South Korea. *Health Policy.* 2011;100(2-3):234-8.
5. Bax M, Goldstein M, Rosenbaum P et al. Proposed definition and classification of cerebral palsy, April 2005. *Dev Med Child Neurol.* 2005;47(8):571-6.
6. Rosenbaum PL, Walter SD, Hanna SE et al. Prognosis for Gross Motor Function in Cerebral Palsy: Creation of motor development curves. *JAMA.* 2002;288(11):1357-63.
7. Song JY, Choi JS. The usability study for Gross Motor Function Classification System as Motor Development prognosis in Children With Cerebral Palsy. *J Kor Soc Phys Ther.* 2008;20(1):49-56
8. Russell DJ, Rivard LM, Walter SD et al. Using knowledge brokers to facilitate the uptake of pediatric measurement tools into clinical practice: a before-after intervention study. *Implement Sci.* 2010;5:92.
9. Bartlett DJ, Palisano RJ. Physical therapists' perceptions of factors influencing the acquisition of motor abilities of children with cerebral palsy: implications for clinical reasoning. *Phys Ther.* 2002;82(3):237-48.
10. Kwon MJ. Evidence-based practice, Physical therapy, Professional role behaviors. *J Kor Soc Phys Ther* 2006;18(3): 23-36.
11. Palisano RJ, Hanna SE, Rosenbaum PL, et al. The validation of a model of gross motor function for children with cerebral palsy. *Phys Ther.* 2000;80(10):974-985.
12. World Health Organization. *International Classification of Functioning, Disability and Health: ICF.* Geneva, World Health Organization, 2001:3-20.
13. Bartlett DJ, Palisano RJ. A multivariate model of determinants of motor change for children with cerebral palsy. *Phys Ther.* 2000;80(6):598-614.
14. Campbell SK. Are models of disability useful in real cases? *Pediatric case examples realized in research, clinical practice, and education.* *Phys Ther.* 2006;86(6):881-7.
15. Stucki G, Ewert T, Cieza A. Value and application of the ICF in rehabilitation medicine. *Disabil Rehabil.* 2002;24(17): 932-8.
16. Jette AM. Toward a common language for function, disability, and health. *Phys ther.* 2006;86(5):726-34.
35. Kim K, Park ES, Cho YH et al. A study on the development of standard curriculum for physical therapy in Korea. *J Kor Soc Phys Ther.* 2006;18(6):23-32.

17. Ahn SY, Ahn CS, Lee WH et al. The development of physical therapy educational goals and standard curriculum. The Korean Academy of Physical Therapy Science. 2007;14(4): 37-54.
18. King S, Teplicky R, King G et al. Family-centered service for children with cerebral palsy and their families: a review of the literature. *Semin Pediatr Neurol.* 2004;11(1):78-86.
19. Kuhlthau KA, Bloom S, Van Cleave J et al. Evidence for family-centered care for children with special health care needs: a systematic review. *Acad Pediatr.* 2011;11(2):136-43.