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Performance of Physical Activities by Adolescents With Cerebral Palsy

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Background and Purpose

Mobility and self-care are important considerations for successful transition of adolescents with cerebral palsy to adulthood. The purpose of this study was to characterize performance of physical activities from the perspective of adolescents themselves.

Subjects

The subjects were 156 adolescents with cerebral palsy, 11.6 to 17.7 years of age.

Methods

A therapist completed the Gross Motor Function Classification System (GMFCS). Adolescents completed the Activities Scale for Kids-Performance Version (ASK p) twice over a 1-year period.

Results

A repeated-measures analysis of variance indicated a main effect for GMFCS level. The main effect for time and the GMFCS level \times time interaction were not significant. *Post hoc* comparisons indicated that ASK p scores differed among all GMFCS levels.

Discussion and Conclusion

Performance of physical activities by adolescents with cerebral palsy differed based on GMFCS level and did not change over 1 year. The ASK p scores of adolescents in levels II through V suggest the need for physical assistance at times throughout the day. The results have implications for the role of the physical therapist in transition planning.

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Adolescence is a period of development that involves preparation for social roles associated with young adulthood, including postsecondary education, employment, and independent living. The transition to adulthood is thought to be particularly challenging for adolescents with cerebral palsy.^{1,2} Adolescents with disabilities demonstrate low rates of high school graduation and are less likely to pursue college education.³ Adults with cerebral palsy have low employment rates, have restricted participation in leisure and social activities, and are often dependent on family members for living arrangements.⁴⁻⁷ Many parents of adult children with severe disabilities are faced with lifelong responsibilities for care that can become more difficult as the child and parent get older.^{8,9}

The transition to adulthood is a future-oriented process in which adolescents express their desires and goals and begin planning for adult activities.¹⁰ In the United States, the importance of transition planning is recognized by the Individuals With Disabilities Education Improvement Act of 2004 (PL 108-446).¹¹ Preparation of students with disabilities for postsecondary education, employment (including supported employment), independent living, and community participation must begin no later than 16 years of age. The American Academy of Pediatrics, American Academy of Family Physicians, American College of Physicians, and American Society of Internal Medicine have published a consensus statement recommending that adolescents with disabilities have a written health care transition plan by age 14 years to identify appropriate health care professionals and provide guidelines for primary as well as preventive care.¹²

An inverse relationship between functional limitations and social participation has been demonstrated for

adolescents and adults with cerebral palsy; however, the mediating factors are not well understood.¹³⁻¹⁵ Research on mobility and self-care of adolescents with cerebral palsy consists mainly of results from small clinical samples, and often the data are retrospective. Adolescents and young adults with cerebral palsy have reported that they walk less compared with when they were children.^{4,16-19} These findings are consistent with the results of a retrospective study in which 46% of adults with cerebral palsy stated that their current gross motor function was one or more levels lower on the Gross Motor Function Classification System (GMFCS) compared with their function during childhood.²⁰ Anderson and Mattsson⁴ surveyed adults with cerebral palsy who did not have cognitive impairments. Fifty-four percent of the respondents indicated that they were not limited in their ability to transport themselves in the community regardless of whether they walked, suggesting that the inability to walk does not in itself necessarily restrict participation.

A high percentage of adults with cerebral palsy have reported needing physical assistance in self-care and activities of daily living.^{17,21,22} Turk et al¹⁷ reported that between 27% and 43% of women with cerebral palsy required "some" or "much" assistance for self-care. In a study of adolescents and young adults with cerebral palsy, 45% of the subjects were categorized as being independent in activities of daily living, 18% were considered to need assistance with some daily living tasks, and 37% required assistance for all daily living tasks.²¹ Senft et al²² surveyed 19 adults with cerebral palsy and reported that the need for caregiver assistance varied depending on the task and that the need was highest in adults with quadriplegia. Availability of people to provide physical assistance is a particular concern for adolescents with cerebral palsy, who frequently rely on others

for physical assistance in mobility, self-care, and transportation.

Secondary impairments in body functions and structures that develop over time are thought to contribute to changes in motor function of adolescents and adults with cerebral palsy.^{4,17,21,23,24} Factors hypothesized to contribute to secondary musculoskeletal impairments and pain include: physical growth, inability of muscle to lengthen in proportion to bone growth, excessive biomechanical forces through joints during weight-bearing activities, overuse syndromes, immobility, fatigue, obesity, stress and depression, and early joint degeneration.^{19,21,24,25} Proposed relationships among secondary impairments, health status, and changes in function are based primarily on retrospective cross-sectional clinical data.

Self-efficacy (a person's belief that he or she can successfully perform certain behaviors) is a personal factor that is associated with independence and persistence in adolescents with physical disabilities.^{26,27} A positive self-image is associated with greater autonomy and mastery motivation.²⁸ Adolescents with cerebral palsy have identified being believed in, believing in yourself, and being accepted by others as important for success in life.²⁹ Choosing from among a list of tasks, parents of adolescents and young adults with physical disabilities identified the following as most important to support the transition to adulthood: "Do not do for them what they can do for themselves," "Assign appropriate household chores," and "Help children interact with others in varied settings."³⁰

A supportive environment may improve performance of physical activities and increase social participation.^{6,31} Whiteneck et al³¹ proposed that accessibility, accommodation, resource availability, social support, and equality are characteristics of the environment that facilitate social

Table 1.

Gross Motor Function Classification System Level and Distribution of Motor Impairment of Adolescents With Cerebral Palsy in This Study

	Level I	Level II	Level III	Level IV	Level V	% by Distribution
Leg dominant	24	14	16	5	0	59 37.8%
Three-limb dominant	3	2	8	6	1	20 12.8%
Four-limb dominant	3	8	4	17	12	44 29.4%
Hemiplegia	26	3	0	0	0	29 18.6%
Total	56 36.8%	27 17.8%	28 18.4%	28 18.4%	13 8.6%	152 ^a 100.0%

^a Distribution was not reported for 2 adolescents in level I, 1 adolescent in level IV, and 1 adolescent in level V.

participation among people with disabilities. Instruction in independent living skills, accessible and reliable transportation, and independence in mobility outside the home have been identified as important factors for successful employment of young adults with disabilities.^{32,33} Accessibility and accommodations for physical restrictions, physical and emotional support of family and friends, availability of health and rehabilitation services, and opportunity for exercise are environmental factors that may be particularly relevant for mobility and self-care of adolescents with cerebral palsy.

The purpose of this study was to characterize performance of physical activities by adolescents with cerebral palsy from the perspective of the adolescents themselves. *Performance* refers to what a person “does do” in daily life and, therefore, involves person-environment interaction. Performance should be distinguished from *capability*, what a person “can do” when environmental conditions are controlled (eg, standardized measure administered in a clinical setting).^{34,35} We examined: (1) overall performance of physical activities by adolescents with cerebral palsy grouped by GMFCS level,³⁶

(2) change in overall performance over a 1-year period, and (3) performance of individual activities. We were particularly interested in activities related to tasks that parents of adolescents and young adults with physical disabilities identified as most important to support the transition to adulthood.³⁰ We hypothesized that adolescents’ overall performance would differ based on their GMFCS level but would not change over a 1-year period.

Method

Subjects

The subjects were 156 adolescents with cerebral palsy, ranging in age from 11.6 to 17.7 years, with a mean age of 14.8 years (SD=1.7), at the start of the study. There were 84 (54%) male and 72 (46%) female respondents. The subjects were a subset of 230 participants in an ongoing longitudinal study of mobility, self-care, quality of life, and exercise of adolescents with cerebral palsy.³⁷ Subjects previously participated in a population-based study of 657 children with cerebral palsy stratified by age and GMFCS level and randomly selected from 2,108 children who were receiving services through the Ontario Association of Children’s Rehabilitation Services in Canada.³⁸

From the original sample, 343 adolescents met the eligibility requirements for diagnosis and age (11 years or older as of October 1, 2002). Of the 312 adolescents who we were able to contact, 230 (74%) enrolled, 68 (22%) declined, and 14 (4%) agreed but were not enrolled (10 could not be reached subsequently, 2 died, and 2 changed their mind due to family circumstances). As part of the protocol,³⁷ the Activities Scale for Kids-Performance Version (ASK_p)³⁹ was completed by 156 adolescents who were able to answer the questions independently or with some assistance (from the larger study, 69 adolescents were not able to participate in the completion of the ASK_p, 4 families chose not to complete any of the self-report measures, and the summary score could not be completed for 1 adolescent because too many responses were rated as not applicable).

Table 1 presents a cross-tabulation of the number of subjects in each GMFCS level by limb distribution of motor impairment as determined by a physical therapist or an occupational therapist. The subset of adolescents in level V who completed the ASK_p (8.6% of the sample) underrepresents the percentage of ado-

Table 2.

Summary of Mobility of Children With Cerebral Palsy for the 6- to 12-Year-Old Age Band of the Gross Motor Function Classification System²⁸

Level	Abilities and Limitations
I	Walks without restrictions; limitations in more advanced gross motor skills
II	Walks without assistive devices; limitations walking outdoors and in the community
III	Walks with assistive mobility devices; limitations walking outdoors and in the community
IV	Self-mobility with limitations; children are transported or use power mobility outdoors and in the community
V	Self-mobility is severely limited even with the use of assistive technology

lescents in level V participating in the larger study (18.2% of entire sample). Based on information from 122 parents of the adolescents, 43.2% indicated that their adolescent was in a regular education program and 56.8% indicated that their adolescent received a special education program. The proportion of adolescents in regular versus special education programs was comparable across classification levels. All adolescents were living in the family home except for one adolescent who was living with a host family. A parent provided informed consent, and each adolescent provided informed consent or assent.

Measures

Gross Motor Function Classification System. The GMFCS³⁶ is a 5-level system developed to classify the functional abilities of children with cerebral palsy who are 12 years of age and younger. Table 2 summarizes methods of mobility for the 6- to 12-year-old age band. Distinctions among GMFCS levels are based on functional limitations, the need for assistive mobility devices (walkers, crutches, canes), wheeled mobility, and, to a lesser extent, quality of movement. Content validity of GMFCS scores was established through nominal group and Delphi survey consensus.³⁶ Construct validity is supported

by a Pearson correlation of $-.91$ between GMFCS levels and Gross Motor Function Measure⁴⁰ scores of 586 children with cerebral palsy.⁴¹

Interrater reliability between therapists is good ($\kappa=.75$).³⁶ Evidence of *stability*, defined as the extent to which children remain in the same classification level over time, is provided by the results of a study of 610 children with cerebral palsy classified an average of 4.3 times at 6- or 12-month intervals.⁴² Seventy-three percent of children remained in the same level for all ratings. For children at least 6 years of age, the weighted kappa coefficient between the first and last rating was $.89$, indicating excellent chance-corrected agreement. The descriptions validated for children 6 to 12 years of age were used to classify the adolescents' gross motor function. An aim of the larger study is to create a 13- to 18-year-old age band.

Activities Scale for Kids—Performance Version. The ASKp³⁹ is a self-report measure designed for completion by children 5 to 15 years of age with musculoskeletal disorders who are experiencing limitations in physical activity. The measure is unique for having included children's and parents' input into the content and wording of items. The 38 items in the ASKp

are presented in Table 3. The child indicates how often each activity was performed in the last week. As an example, item 1 is worded: "Last week, I put toothpaste on my toothbrush, then brushed my teeth by myself. . . ." The 5 response options are: "all of the time," "most of the time," "sometimes," "once in a while," and "none of the time." A sixth option—"not applicable" or "never had the opportunity"—is included for some of the activities. The ASKp can be completed in less than 30 minutes. Completion of at least 30 (79%) of the 38 items is necessary to compute a summary score. The summary score varies from 0 to 100.

Evidence of reliability, validity, and responsiveness of the ASKp is provided by analyses of scores of 200 children, 5 to 15 years of age, with musculoskeletal limitations.⁴³ Children's health conditions included: amputations, arthritis, cerebral palsy, fractures, muscular dystrophy, scoliosis, and spina bifida. Rasch item response analysis validated that the items measure a unidimensional construct and vary in difficulty. Intraclass correlations for internal consistency and test-retest, interrater, and intrarater reliability were $.94$ or greater. Summary scores changed by 1.73 standard deviations for a subsample of 34 children who had been predicted to make clinically important change by their clinicians.

Usual methods of mobility. A questionnaire on usual methods of mobility adapted from previous studies was completed by parents.^{34,44} The questionnaire instructs parents to "Please use an X to mark the box beside the one way your adolescent most often moves around for each setting: home (indoors), school or work (indoors), inside community buildings, and outdoors." The response options are: "carried by adult," "takes steps with adult assistance," "pushed in a wheelchair by an adult," "moves

Table 3.

Activities Scale for Kids—Performance Version: Performance of Adolescents With Cerebral Palsy Grouped by Gross Motor Function Classification System Level (Level I=58, Levels II–III=55, Levels IV–V=43)^a

Activity	I	II–III	IV–V	Activity	I	II–III	IV–V
Personal Care/Dressing				Locomotion/Stairs			
I brushed my teeth		+		I walked without any support	X		
I used the toilet	X	+		I got around inside my home without anyone to help	X	+	*
I washed my whole body		+		I walked/wheeled in crowded areas	X	+	*
I put my shirt on	X	+		I got around outside without anyone to help	X		*
I put my pants on	X	+		I walked/wheeled up a gentle hill	X	+	*
I fastened my clothes				I walked/wheeled on a rough surface			*
I put my shoes on				I kept up with my friends running/wheeling			*
I made a snack				I walked up and down stairs	X		
Miscellaneous				Standing Skills			
I did my usual job/chore			*	I carried drink/food			*
I worked carefully				I carried 2 things			
Took care of my medical needs				I stood still for 10 minutes			
I did my printing			*	I stretched to reach a high shelf			*
Play/Sports				Transfers			
I did the same sports				I got through heavy doors	X		*
I did activities I usually enjoy without getting tired			*	I got in/out of an automobile	X		
I did climbing activities				I got in/out of a chair	X	+	
I played some sports				I got in/out of bed	X	+	
I played team sports				I got down to ground and back up	X	+	
I played team sports in competitive leagues				I sat on the floor			
I kept my balance while playing rough games							
I ran in a race							

^a X indicates activities performed “all of the time” by $\geq 90\%$ of adolescents in level I; + indicates activities performed “all of the time” by $\geq 50\%$ of adolescents in levels II and III; * indicates activities performed “once in a while,” “sometimes,” “most of the time,” or “all of the time” by $\geq 50\%$ of adolescents in levels IV and V.

on floor,” “walks holding on to wall or furniture,” “walks with a walking aid,” “walks alone without any assistance,” “propels self in regular wheelchair,” and “operates a battery-powered motorized wheelchair.”

Procedure

A physical therapist or an occupational therapist classified gross motor function using the GMFCS and indicated distribution of motor impairment. Demographic informa-

tion and questions on usual mobility were included in a questionnaire booklet completed by parents. The ASKp was included in a questionnaire booklet completed by adolescents. The ASKp was completed by 156 adolescents at the first data collection point (time 1) and 132 adolescents at the second data collection point 1 year later (time 2). At time 1, 56 (36%) of the adolescents completed the questions on their own, 70 (45%) received assistance in

reading or marking the answers, and 30 (19%) had help in thinking about the answers. At time 2, 60 (46%) of the adolescents completed the questions on their own, 52 (39%) received assistance in reading or marking the answers, and 20 (15%) had help in thinking about the answers. To accommodate the accessibility and communication needs of as many of the adolescents as possible, the ASKp was available electronically through a secured Web site. The

Table 4.

Descriptive Statistics of 132 Adolescents With Cerebral Palsy Who Completed the Activities Scale for Kids—Performance Version at Time 1 and Time 2

GMFCS ^a Level	N	Time 1			Time 2		
		\bar{X}	SD	Range	\bar{X}	SD	Range
I	51	91.1	8.6	59.2-100	92.5	7.7	71.6-100
II	25	66.8	19.0	36.4-100	70.1	19.6	34.5-100
III	23	61.3	16.5	23.4-85.7	59.5	15.1	35.4-85.2
IV	20	34.4	18.0	5.4-71.6	35.4	15.2	5.4-61.8
V	13	20.3	11.9	0.7-37.5	19.2	11.9	2.6-46.3
Total	132	65.7	28.4	0.7-100	66.7	28.7	2.6-100

^a GMFCS=Gross Motor Function Classification System.

ASKp was completed online by 19% of the adolescents at time 1 and 23% of the adolescents at time 2.

Data Analysis

The ASKp summary scores were computed, and descriptive statistics were calculated. The ASKp scores for each GMFCS level and change in mean scores over the 1-year period were analyzed using a 5 × 2 (GMFCS level × time) mixed analysis of variance (ANOVA) for repeated measures on time. *Post hoc* multiple comparisons were performed using the least significant difference method with no adjustments. The .05 level of significance was used for all statistical tests.

Performance of each activity at time 1 was analyzed using descriptive statistics. The frequency of each response option was tabulated across the 5 GMFCS levels for each of the 38 activities. For personal care and mobility, we regarded the response option “all of the time” as indicating full independence based on the assumption that adolescents without musculoskeletal or neuromuscular impairments have the opportunity to perform these activities and do so without assistance. An activity performed “all of the time” by ≥90% of the adolescents in a GMFCS level was considered one that almost all adolescents perform independently

in daily life, while a percentage of ≥50% was considered an activity that most adolescents in a GMFCS level perform independently in daily life.

Results

Descriptive statistics for the 132 adolescents who completed the ASKp at times 1 and 2 are presented in Table 4. At time 1, mean ASKp scores varied from 91.1 (adolescents in level I) to 20.3 (adolescents in level V). At time 2, mean ASKp scores varied from 92.5 (adolescents in level I) to 19.2 (adolescents in level V). The mean scores of adolescents in levels II and III varied from 59.5 to 70.1, while mean scores of adolescents in levels IV and V varied from 19.2 to 35.4.

The repeated-measures ANOVA indicated a significant main effect for GMFCS level ($F=117.9$; $df=4,127$; $P<.001$). The main effect for time ($F=0.45$; $df=1,127$; $P=.51$) and the interaction between GMFCS level and time ($F=1.12$; $df=4,127$; $P=.35$) were not significant. *Post hoc* multiple comparisons indicated that ASKp scores differed among all GMFCS levels ($P<.05$).

Performance of individual activities within classification levels is presented in Table 3 and summarized in the following paragraphs. Given the

large differences in physical abilities among adolescents with cerebral palsy, the criterion used to characterize physical abilities varied with classification level. The responses of adolescents in levels II and III and levels IV and V were aggregated based on similar mean summary scores.

Adolescents in Level I

At least 50% of the adolescents in level I indicated that they performed each of the 38 activities “all of the time,” with the exception of 2 activities—“I played team sports in competition leagues” (39%) and “I ran in a race” (46%). Fourteen activities were performed “all of the time” by ≥90% of the adolescents (Tab. 3). The 14 activities included 9 of the 12 activities in the Locomotion/Stairs and Transfers categories. In contrast, only 1 of 5 items for the Standing Skills category and 3 of 8 items for the Personal Care/Dressing category were performed “all the time” by ≥90% of the adolescents. None of the activities in the Play/Sports category were performed “all of the time” by ≥90% of the adolescents in level I.

Adolescents in Levels II and III

None of the 38 activities was performed “all of the time” by ≥90% of the adolescents in levels II and III. Eleven activities were performed “all of the time” by ≥50% of the adolescents (Tab. 3). Four activities—“I did climbing activities,” “I kept my balance while playing rough games,” “I ran in a race,” and “I played team sports in competitive leagues”—were performed “none of the time” by ≥50% of the adolescents in levels II and III.

Adolescents in Levels IV and V

Two activities—“I got around inside my home without anyone to help me” (53%) and “I walked/wheeled in crowded areas” (60%)—were performed “all of the time” by ≥50% of

Table 5.Performance of Adolescents With Cerebral Palsy on Selected Physical Activities (Level I=58, Levels II–III=55, Levels IV–V=43)^a

Last week . . .	Response Options	Level I	Levels II–III	Levels IV–V
I got around inside my home without anyone to help me	All of the time	58 (100%)	48 (87%)	23 (53%)
	Most of the time, sometimes, once in a while	0	7 (13%)	15 (35%)
	None of the time	0	0	5 (12%)
	No need/opportunity	0	0	0
I got around outside without anyone to help me	All of the time	56 (98%)	24 (44%)	14 (33%)
	Most of the time, sometimes, once in a while	1 (2%)	26 (47%)	18 (42%)
	None of the time	0	5 (9%)	10 (23%)
	No need/opportunity	1 (2%)	0	1 (2%)
I took care of my medical needs	All of the time	29 (76%)	15 (37%)	4 (11%)
	Most of the time, sometimes, once in a while	8 (21%)	11 (26%)	6 (18%)
	None of the time	1 (3%)	15 (37%)	24 (71%)
	No need/opportunity	20 (34%)	14 (25%)	9 (21%)
I did my usual job or chores	All of the time	37 (71%)	9 (23%)	5 (20%)
	Most of the time, sometimes, once in a while	14 (27%)	28 (72%)	11 (44%)
	None of the time	1 (2%)	2 (5%)	9 (36%)
	No need/opportunity	6 (10%)	16 (29%)	18 (42%)
I played team sports with others in my class	All of the time	29 (73%)	8 (20%)	7 (19%)
	Most of the time, sometimes, once in a while	8 (20%)	17 (42%)	10 (28%)
	None of the time	3 (7%)	15 (38%)	19 (53%)
	No need/opportunity	18 (31%)	15 (27%)	7 (16%)
I played team sports in competitive leagues	All of the time	13 (39%)	6 (14%)	3 (8%)
	Most of the time, sometimes, once in a while	6 (18%)	8 (19%)	3 (9%)
	None of the time	14 (43%)	29 (67%)	30 (91%)
	No need/opportunity	25 (43%)	12 (22%)	7 (16%)

^a The percentage for each response option excludes adolescents who had no need or opportunity to perform the activity.

the adolescents in levels IV and V. Ten additional activities were performed “once in a while,” “sometimes,” or “most of the time” by $\geq 50\%$ of the adolescents in levels IV and V (Tab. 3). The remaining 26 activities were performed “none of the time” by $\geq 50\%$ the adolescents in levels IV and V.

Adolescents’ performance of 6 activities related to tasks that parents of

adolescents and young adults with physical disabilities identified as most important to support transition to adulthood³⁰ is presented in Table 5. Adolescents in levels II through V reported that they “got around without help” more often inside their home than outdoors. Among adolescents in levels IV and V, 53% reported that they “got around without help” inside their home and 33%

reported that they “got around without help” outdoors.

Among the adolescents in level I who had the need or opportunity, more than 70% reported that they took care of their medical needs, did chores or jobs around the house, and played team sports with classmates “all of the time.” In contrast, between 11% and 37% of the adolescents in levels II through V who had

Physical Activity Performance by Adolescents With CP

Table 6.

Usual Mobility Methods of Adolescents With Cerebral Palsy

Adolescents in level I (n=58)	Home	School	Community	Outdoors
Walks alone	57	56	55	56
Walks with support or device	1	1	1	1
Self-propels wheelchair	0	1	2	1
Adolescents in level II (n=26)	Home	School	Community	Outdoors
Walks alone	23	20	18	15
Walks with support or device	3	5	8	6
Self-propels wheelchair	0	0	0	1
Power wheelchair	0	0	0	1
Transported in wheelchair	0	0	0	3
Adolescents in level III (n=28)	Home	School	Community	Outdoors
Walks alone	1	0	0	0
Walks with support or device	23	18	16	20
Moves on floor	3	0	0	0
Self-propels wheelchair	1	7	5	3
Power wheelchair	0	1	1	4
Transported in wheelchair	0	2	6	1
Adolescents in level IV (n=29)	Home	School	Community	Outdoors
Walks with support or device	3	0	0	0
Moves on floor	8	1	0	0
Carried by adult	1	0	0	0
Self-propels wheelchair	2	1	0	0
Power wheelchair	13	24	17	23
Transported in wheelchair	1	3	12	6
Adolescents in level V (n=14)	Home	School	Community	Outdoors
Power wheelchair	7	10	8	9
Transported in wheelchair	7	4	6	5

the need or opportunity performed these activities “all of the time.” Twenty-nine percent of the adolescents in levels II and III and 42% of the adolescents in levels IV and V reported that they did not have a job or chore in the last week. Thirty-eight percent of the adolescents in levels II and III and 53% of the adolescents in levels IV and V indicated that, in the last week, they played team sports with other classmates “none of the time.” Forty-three percent of the adolescents in level I, 67% of the adolescents in levels II and III, and 91% of the adolescents in

levels IV and V reported that in the last week they played team sports in competitive leagues “none of the time.” Between 16% and 43% of the adolescents reported that they had no opportunity to play team sports with other classmates or in competitive leagues.

Usual methods of mobility from parent report are presented in Table 6. Most adolescents in level I and II walked in all environmental settings, although several adolescents in level II used wheeled mobility outdoors. Most adolescents in level III walked

with a mobility device at home, while 29% to 39% used some form of wheeled mobility at school, in the community, and outdoors. Thirty-four adolescents (79%) in levels IV and V used power mobility in one or more settings. Those who did not use power mobility were transported in a wheelchair outdoors and in the community.

Discussion and Conclusions

As hypothesized, overall self-sufficiency in performance of physical activities by adolescents with cerebral palsy differed based on GMFCS level and did not change significantly over the 1-year period. The finding that GMFCS level discriminates the ability to perform physical activities independently among adolescents with cerebral palsy was anticipated given the large number of gross motor activities on the ASKp and evidence that the GMFCS discriminates gross motor capability.^{38,39} The finding that performance of physical activities did not change over 1 year is not surprising. Activities on the ASKp are performed independently by children 5 to 15 years of age without motor impairments. Consequently, age-related change in summary scores was not expected. Improved performance among adolescents with cerebral palsy is more likely to occur in specific activities as a result of instruction and practice, accommodations, assistive technology, environmental modifications, or some combination of these factors. The finding that summary scores did not *decrease* is encouraging given concerns about the potential for loss of function among adolescents and young adults with cerebral palsy.¹⁷⁻¹⁹

Level I was the only classification level where most of the adolescents reported that they performed physical activities by themselves all of the time. Mean ASKp summary scores of adolescents in level I (time 1=91.1, time 2=92.5) are comparable to

the mean score of 122 children 5 to 15 years of age without musculoskeletal impairments (\bar{X} =93.1, SD =6.5) and higher than the mean score of 71 children 5 to 15 years of age classified by their physicians as having mild disabilities (\bar{X} =85.9, SD =13.8).⁴⁵ The high percentage of adolescents in level I with hemiplegia (46.4%) most likely explains why personal care and dressing activities that require bilateral arm and hand control were performed independently less often than locomotion and transfer activities.

The finding that adolescents in levels II and V did not perform most of the personal care and mobility activities by themselves all of the time suggests the need for physical assistance at times throughout the day. The finding is consistent with the results of a study by Lepage et al¹⁵ in which children and adolescents with cerebral palsy reported that activity limitations were most pronounced in the areas of personal care and mobility. Need for personal assistance appears to be particularly high for adolescents in levels IV and V. Hemmingson and Borell⁴⁶ reported that adolescents with disabilities in a regular education program with a personal assistant reported fewer unmet needs compared with adolescents who did not have a personal assistant.

The relatively high percentage of adolescents in levels IV and V who performed locomotion activities by themselves is attributed to the use of power mobility. Between 33% and 60% of adolescents in levels IV and V responded "all of the time" for the activities "I got around inside my home without anyone to help me," "I walked or wheeled in crowded areas," and "I got around outside without anyone to help me." The adolescents' responses correspond with parent reports that power mobility is the usual method of mobility in one or more environmental settings for 73% of the adolescents in

levels IV and V. The finding represents an increase from the 5% to 13% use of power mobility reported by parents of children at 6 to 12 years of age in our previous study.⁴⁴ Fifty of the 74 adolescents who were unable to complete the ASKp were in levels IV and V. Only 3 (6%) of their parents reported that they used power mobility, suggesting that cognition may be a determinant of use of power mobility.

The responses of adolescents who indicated that they performed physical activities "most of the time" or "sometimes" may reflect a gap between capability and performance. The responses "most of the time" or "sometimes" suggest that the physical capability is restricted and performance is dependent on personal and environmental factors. For example, time and distance requirements may have determined at what points throughout the week adolescents performed locomotion activities by themselves. Analysis of personal and environmental factors is recommended when making decisions on an individual's potential to improve performance of an activity. Personal factors that potentially influence performance include preference, motivation, and self-efficacy. Environmental factors that potentially influence performance include accessibility, accommodation, assistive technology, positive attitudes of others, and social supports.

The adolescents' less frequent performance of play and sport activities may reflect a lack of interest or opportunity for participation. As opposed to self-care and mobility activities that are integral to daily life, play and sports are leisure activities. Performance of leisure activities is dependent on personal interest and opportunities for participation. The distinction between the response options "none of the time" and "I never had the opportunity" is important. Adolescents who

responded "none of the time" presumably had the opportunity to participate. It is not known whether adolescents who indicated that they "never had the opportunity" were interested in participating. Adolescents and young adults with cerebral palsy and their parents report less satisfaction with community recreational services compared with youths without disabilities and their parents.⁴⁷ Factors identified as affecting participation in community programs include challenges with inclusion, access to information, disability awareness, program cost, and transportation. Limited availability and accommodations and difficulties in planning and coordinating services are other barriers to participation that have been reported by parents of children with disabilities.⁴⁸

The results for the activities "I took care of my medical needs" and "I did my usual job or chores" have implications for transition planning and self-efficacy of adolescents with cerebral palsy. Only 37% of the adolescents in levels II and III and 11% of the adolescents in levels IV and V indicated that they took care of their medical needs "all of the time." Twenty-nine percent of the adolescents in levels II and III and 42% of the adolescents in levels IV and V reported that they did not have a job or chore in the last week. The responses most likely reflect limitations in physical capability to manage medical needs and perform household chores. To support development of self-efficacy, therapists and educators are encouraged to collaborate with adolescents and their families to problem solve how adolescents can be more self-sufficient in managing their health condition and assume more responsibility at home and school.

Several considerations are important for interpretation of the results. First, we recognize as an irreconcilable limitation of this design is that adolescents with more severe cognitive

impairments are underrepresented because these individuals are not able to complete the ASKp. Second, we considered the perspectives of the adolescents realizing that these may not coincide with those of their parents. Third, subjects selected for this cohort are representative of children with cerebral palsy in Ontario, Canada, who were receiving rehabilitation services in 1996.³⁸ Yet, the sample size of this subset for each GMFCS level is small, especially levels IV and V where 50 adolescents could not complete the ASKp. Descriptive statistics were used to characterize performance of individual activities. Percentages should be interpreted cautiously given the small sample size. Fourth, evidence of reliability, validity, and responsiveness of the ASKp has been demonstrated for children with various musculoskeletal conditions.⁴³ Apart from discriminant validity of the ASKp scores by GMFCS level reported here, psychometric properties were not examined in this study.

Implications for Transition Planning

The results have implications for the role of the physical therapist in transition planning. Clinical implications are based on the assumption that providing adolescents the opportunity to participate actively in decision making is important for transition planning. Therapists are encouraged to problem solve with adolescents and their families on how adolescents can be more self-sufficient and assume more responsibility despite limitations in physical capability. Active participation of adolescents is recommended when making decisions on task accommodations and adaptations including assistive technology and environmental modifications. Physical therapists can consult with adolescents and their families on health promotion, including prevention of secondary musculoskeletal impairments and educational and community per-

sonnel on participation in recreation and sports activities.

Client-centered measures such as the ASKp are recommended to engage adolescents in assessment of strengths and needs. The Canadian Occupational Performance Measure (COPM)⁴⁹ is a semistructured interview instrument in which an adolescent identifies self-care, productivity, and leisure activities that they want, need, or are expected to perform and are currently having problems performing. The ASKp and COPM facilitate identification of individualized outcomes for mobility and self-care that are specific to performance in home, school, and community settings. Client-centered functional goals⁵⁰ and goal attainment scaling⁵¹ are 2 methods for documentation of individualized outcomes.

For adolescents with limited physical ability, intervention may include problem solving and practice in how to ask for help and instruct others to correctly and safely assist in performance of activities. Adolescents should be encouraged to identify movement strategies, task adaptations, and environmental modifications that optimize performance of physical activities. For adolescents interested in participation in recreation and sports activities, therapists can consult with instructors and coaches to address questions and provide suggestions to maximize performance.

There is a growing recognition of the importance of wellness and secondary prevention among people with physical disabilities. Therapists can play an active role in health promotion by encouraging adolescents with cerebral palsy to participate in some form of physical fitness and providing instruction in secondary prevention of musculoskeletal impairments. Therapists working in the public schools have the opportunity to collaborate with physical educa-

tors, and therapists working in clinical settings can serve as a resource for community fitness programs and consult with personnel.

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