Correlation between physical functioning and gait measures in children with cerebral palsy

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The primary aim of this investigation was to assess the correlation between the POSNA Musculoskeletal Functional Health Questionnaire (POSNA) and gait analysis in children with cerebral palsy (CP). POSNA and computerized gait analysis were used to evaluate individuals with CP. Correlations were investigated between POSNA scales, gait parameters, and the Gillette Functional Assessment Questionnaire (FAQ) in 63 children (31 males, 32 females; mean age 9.17 years [SD 3.06], age range 3.75 to 16.44 years) with spastic CP. Twelve participants had hemiplegia, 29 diplegia, 12 quadriplegia, and 10 triplegia. The result of backwards stepwise multiple regression analysis indicated that the Log normalcy index (NI) was a significant predictor of the POSNA Global Function and Comfort scale. Energy expenditure (EE) did not add significantly to the prediction. The POSNA scales differentiated between the different topographical types of CP. The POSNA scale is a valid and useful clinical measure. Used in conjunction with the NI, EE, and FAQ, the POSNA scale provides a more complete appraisal of change in functioning.

The goal of orthopedic intervention is to improve the functional health of individuals, particularly physical functioning (Daltroy et al. 1998). The challenge is to determine objectively whether or not this goal has been met, especially in children who present with complex gait abnormalities such as cerebral palsy (CP). Standard gait analysis techniques or standard assessments of gross motor ability may not sufficiently describe mobility status or change with intervention. A recent outcome measure, the POSNA Musculoskeletal Functional Health Questionnaire (POSNA; Daltroy et al. 1998) was designed to measure more complex physical functioning in children with physical disabilities. POSNA was explicitly designed to measure functional health outcomes in children and adolescents focusing on musculoskeletal health. It is important to evaluate the merits of the concurrent use of instruments like POSNA and gait analysis as complementary measures in the functional assessment of outcomes. Such an exercise may help assess the effects of therapeutic interventions such as soft-tissue surgery, physical therapy, medication, or orthotics on motor functioning in CP.

Gait analysis includes all the methods of measuring and studying an individual's walking patterns (movement in sports, movements in the upper extremity, balance; Miller 1998). Computer-assisted video-based motion analysis is a clinically effective evaluation tool for patients with CP (DeLuca 1991; Gage et al. 1991, 1995; Damiano et al. 1996; Drouin et al. 1996). Traditional parameters of gait analysis have included a limited number of specific measures of gait such as time and distance, excursion in the sagittal plane, and peak joint moments and powers. Such analyses ignore the high degree of correlation between various aspects of an individual's gait.

Recently, it has been posited that summary measures such as energy expenditure (EE) and normalcy index (NI) may be more representative methods of determining the amount by which function and gait deviate from normative values. (Koop et al. 1989, Schutte et al. 2000, Schwartz et al. 2001). Locomotion involves smooth body movement through space with minimal EE. Physiological EE is a reliable assessment of energy requirements and can be used as a method to determine an individual's functional performance (Waters 1999). The NI is a numeric calculation that reflects the amount an individual's gait deviates from typical, normal gait. It is calculated from 16 key kinematic values routinely obtained during computerized motion analysis and is sensitive to gait changes. An increasing index score corresponds to increasing clinical involvement (Schutte et al. 2000). The relation between the NI and the functional performance of children with spasticity has not been investigated although Schutte recommends that the NI be used in conjunction with other outcome measures of functional improvement. The NI has been used to validate other functional measures (Novacheck et al. 2000).

Another measure used concurrently in computerized gait analysis is the Gillette Functional Assessment Questionnaire (FAQ; Novacheck et al. 2000). The FAQ includes a 10-level parent-report walking scale that has been shown to be a reliable and valid scale. The FAQ is quick and very easy to use. It can assist clinicians in documenting functional change in children with neuromuscular conditions. It is strongly correlated with other instruments such as the WeeFIM and POSNA. FAQ scores are inversely correlated with the NI and oxygen consumption (Novacheck et al. 2000). The FAQ is specific to the task of walking, therefore it does not appraise

other clinically significant functions that are a consequence of intervention and that may affect the quality of life of the children and their families.

The primary aim of this investigation was to assess the correlations between POSNA and gait analysis in children with CP. Specifically, the correlations between the FAQ, energy EE, NI, and physical functioning in children with CP were studied. It was hypothesized that NI, FAQ, and EE would predict functioning.

Method

PARTICIPANTS

Participants were sixty-three children with CP (32 males, 31 females; mean age 9.2 years [SD 3.06], age range 3.7 to 16.4 years), presenting as consecutive assessments to the Motion Analysis Laboratory.

The diagnostic categories within CP were based on the nature and distribution of the child's neuromuscular impairment. All participants exhibited spasticity, which is increased velocity-dependent response to passive muscle stretch, due to pyramidal tract pathology. Patients with extrapyramidal signs (athetosis or ataxia) were excluded. Children with diplegia had lower limbs more involved than upper limbs. Those with hemiplegia had impairment of their upper and lower limb on one side of their bodies. Children with quadriplegia had all four limbs involved about equally. Those with triplegia were children whose presentations were asymmetrical and had primarily three limbs involved.

All children were referred to the Motion Analysis Laboratory for a clinical evaluation regarding the need for surgical or orthotic intervention or for a baseline assessment of their ambulatory status. The study group was a sample of consecutive children with CP, spanning a range of ages and ambulatory abilities observed in a general population of children with CP who were able to walk. Parents were invited to assist in gathering information and consent was obtained before any data collection.

Table I: Scores of children with CP (n=63)

	Mean	*SD*
Age (y)	9.17	3.06
POSNA Global Function and Comfort[a]	68.65	17.21
Upper Extremity Function	70.89	20.74
Transfers and Mobility	73.88	21.34
Physical Function and Sports	46.62	23.26
Comfort (pain free)	83.18	21.87
Energy Expenditure (%)[b]	205.65	56.85
Log Normalcy Index[c]	2.50	0.36
Functional Assessment Questionnaire[d]	7.87	1.89

[a] POSNA subscales were scored from zero to 100, where 100 represents best functioning, least pain, etc. POSNA Global Function and Comfort scale, scored 0 to 100, was formed by averaging four other scales, upper extremity function, transfers and mobility, physical function and sports, and comfort (pain free), provided at least three subscales had valid scores.
[b] Energy expenditure was calculated as a percentage above mean normal for individual's self-selected velocity.
[c] A log transformation was used to normalize the normalcy index (NI) data as the distribution was skewed. NI is a numeric calculation of how close a given gait is to a gait pattern of typical children without disabilities. Result is a dimensionless number. Normal mean value is 15.9 (range 8.2 to 26.9). The higher the number the greater deviation from typical gait.
[d] FAQ is a 10-level, parent-report walking scale encompassing a range of walking abilities from non-ambulatory to ambulatory in all community settings and terrains. Community ambulation levels are 6 to 10 on scale.

MEASUREMENTS

Parents provided information regarding demographic characteristics and completed the assessment measures.

Gait-analysis data

All children had a routine 3-D gait analysis with a VICON 370 system (Vicon Motion Systems, Lake Forest, CA, USA) and a Med Graphics CPX-D (MedGraphics Corportion St Paul, MN, USA) measurement of metabolic oxygen consumption.

Normalcy index

NI was calculated as described by Schutte and coworkers (2000) from 16 key 3-D kinematic parameters. NI is a numerical calculation of how close a given gait pattern is to a normal gait pattern typical of children without disabilities. The result is a dimensionless number where the normal mean value is 15.9 (range 8.2 to 26.9). The higher the number the greater the deviation from typical gait. A set of parameters is chosen which describes the gait, then the distance is calculated between the assessed pattern and the mean of the same set of parameters from the group without disabilities. Multivariate statistical analysis techniques were used to account for how the variables correlate with each other. The 16 gait parameters chosen for inclusion in the index are listed in Appendix I.

Energy expenditure

Oxygen consumption is a measure of EE. The rate of oxygen consumption, oxygen cost, and velocity for level ground walking were determined from the metabolic data. EE (calculated as the rate of oxygen consumption above the mean that is normal for the individual's self-selected velocity and weight in percent) was used for comparison. Typical EE is considered to be 100%. A more complete description of the methodology used for EE and analysis can be found elsewhere (Koop et al. 1989).

POSNA Musculoskeletal Functional Health Questionnaire

Physical functioning was assessed using the POSNA. The Pediatric Outcomes Data Collection Package (version 2.0; American Academy of Orthopaedic Surgeons et al. 1996) was used for collection. POSNA subscales include Upper-Extremity Function, Physical Function and Sports, Transfers and Mobility, and Comfort (pain free). The average of the four subscales forms the POSNA Global Function and Comfort scale scored from 0 to 100, based on scoring algorithms associated with the scale tool (Daltroy et al. 1998).

Gillette Functional Assessment Questionnaire

A subsection of the FAQ includes a 10-level parent-report measure that audits a range of walking abilities from non-ambulatory to ambulatory in all community settings and terrains. It is a reliable and valid measure specific to the task of walking. It can help document functional change in children with chronic neuromuscular conditions (Novacheck et al.

2000). The scale is presented in Appendix II.

STATISTICAL ANALYSIS

SPSS (version 10.1) was used for data analysis. Pearson's correlations were used to assess the associations between gait parameters and POSNA subscale scores. ANOVAs with Bonferroni post-hoc analyses were performed to compare mean scale scores between children with CP in the different topographical groups. All tests were two-tailed. Backward stepwise multiple regression analysis was used to determine which combination of parameters best predicted global functioning.

Results

Scores for all children are summarized in Table I. The topographical classifications of the children are presented in Table II. NI, EE, and FAQ scores for each topographic type of CP are presented in Table III. Initial analysis of the NI revealed non-normal distribution of scores. Therefore, a log transformation of the scores was used in subsequent analyses involving the NI.

CORRELATIONS BETWEEN POSNA, EE, AND NI

Significant moderate correlations were obtained between the POSNA Global Function and Comfort scale and EE (r=–0.582, p=0.0001) and the NI (r=–0.678, p=0.0001; Table IV). EE had moderate correlations with the Upper Extremity Function (r=–0.421, p=0.007), Transfers and Mobility (r=–0.571, p=0.0001), and the Physical Function and Sports scales (r=–0.628, p=0.0001). NI had moderate correlations with the Upper Extremity Function scale (r=–0.535, p=0.0001), Transfers and Mobility (r=–0.599, p=0.0001), Physical Function and Sports (r=–0.622, p=0.0001), and Comfort subscales (r=–0.378, p=0.002; see Table IV).

CORRELATION BETWEEN POSNA AND FAQ

A significant high correlation was obtained between the POSNA Global Function and Comfort scale and the FAQ (r=0.795, p=0.0001). The FAQ had moderate to high correlations with Upper Extremity Function (r=0.612, p=0.0001), Transfers and Mobility (r=0.757, p=0.0001) and the Physical Function and Sports scales (r=0.751, p=0.0001). The FAQ was found to be minimally correlated with the Comfort subscale (r=0.394, p=0.002; see Table IV).

COMPARISON OF SCORES FOR DIFFERENT CLINICAL GROUPS

Figure 1 presents a box and whisker plot of POSNA Global Function and Comfort scores for each topographical type of

Table II: Classification of the children with CP

Diagnosis	*n=63*	*%*
Hemiplegia	12	19
Diplegia	29	46
Quadriplegia	12	19
Triplegia	10	16

Table III: Gait laboratory scores by topographical type

	Topographical type							
	Hemiplegia		*Diplegia*		*Quadriplegia*		*Triplegia*	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Log Normalcy Index[a]	2.02	0.32	2.11	0.33	2.50	0.25	2.32	0.38
Energy Expenditure (%)[b]	162.09	58.70	218.94	50.11	236.40	35.93	220.00	52.44
Functional Assessment Questionnaire[c]	9.17	0.94	8.28	1.58	6.09	1.87	7.10	2.02

[a] A log transformation was used to normalize the normalcy index (NI) data as distribution was skewed. NI is a numeric calculation of how close a given gait is to a gait pattern of typical children without disabilities. Result is dimensionless number. Normal mean value is 15.9 (range 8.2 to 26.9). The higher the number the greater deviation from typical gait.
[b] Energy expenditure was calculated as a percentage above mean normal for individual's self-selected velocity.
[c] The FAQ is a 10-level, parent-report walking scale encompassing a range of walking abilities from non-ambulatory to ambulatory in all community settings and terrains. Community ambulation levels are 6 to 10 on scale.

Table IV: Correlation between POSNA scores, Log Normalcy Index, Energy Expenditure, and Functional Assessment Questionnaire

	Log NI (n=63)		*EE (n=40)*		*FAQ (n=62)*	
	Pearson's correlation	*p (2-tailed)*	*Pearson's correlation*	*p (2-tailed)*	*Pearson's correlation*	*p (2-tailed)*
POSNA Global Function and Comfort	–0.678[a]	0.0001	–0.582[a]	0.0001	0.795[a]	0.0001
Upper Extremity Function	–0.535[a]	0.0001	–0.421[a]	0.007	0.612[a]	0.0001
Transfers and Mobility	–0.599[a]	0.0001	–0.571[a]	0.0001	0.757[a]	0.0001
Physical Function and Sports	–0.622[a]	0.0001	–0.628[a]	0.0001	0.751[a]	0.0001
Comfort (pain free)	–0.378[a]	0.002	–0.245	0.127	0.394[a]	0.002

[a]Correlation is significant at 0.01 level (2-tailed). Note all POSNA subscales are significantly correlated with Log NI, EE and the FAQ with exception of the Comfort (pain-free) subscale and EE.

CP. Children with quadriplegia and triplegia were found to have poorer functioning than the children with hemiplegia or diplegia (see Table III).

One-way univariate ANOVA

POSNA Global Function and Comfort and subscale scores of the physical functioning of children with CP differed by topographical classification except for Comfort (pain free): POSNA Global Function and Comfort ($F[59,3]=6.048$, $p=0.001$); Upper Extremity Function ($F[59,3]=4.104$, $p=0.010$); Transfers and Mobility ($F[59,3]=10.744$, $p=0.0001$); Physical Function and Sports ($F[59,3]=6.235$, $p=0.001$); and Comfort (pain free) ($F[59,3]=0.115$, $p=0.951$; Table V). Post-hoc comparisons using the Bonferroni test showed children with quadriplegia had poorer POSNA Global Function and Comfort scores than those with hemiplegia ($p=0.002$) and diplegia ($p=0.007$). Upper Extremity Functioning in children with quadriplegia was poorer than those with hemiplegia ($p=0.08$) and diplegia ($p=0.018$). Transfers and Mobility scores were lower in quadriplegia than in hemiplegia ($p=0.0001$) or diplegia ($p=0.0001$) and lower in triplegia than hemiplegia ($p=0.009$). Children with quadriplegia had poorer Physical Function and Sports scores than those with hemiplegia ($p=0.002$) and diplegia ($p=0.006$). These results suggest that the POSNA discriminates among children with CP based on their topographical classification.

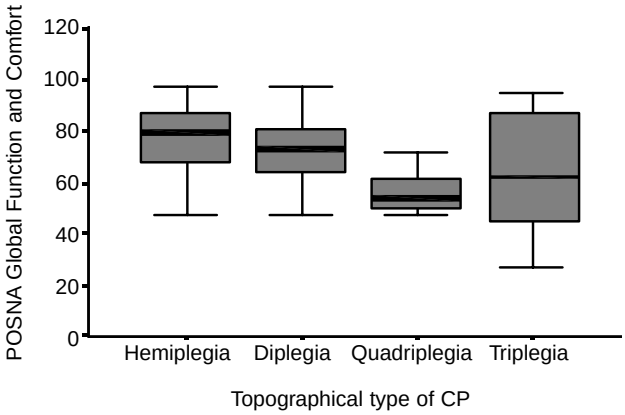

Figure 1: *Box covers interquartile range, square indicates median, whiskers extend to minimum and maximum values; hemiplegia, n=12; diplegia, n=29; quadriplegia, n=12; triplegia, n=10.*

PREDICTIVE EQUATION

Log NI and EE were variables in the backwards stepwise multiple regression procedure. Results indicated that the log NI was a significant predictor of the POSNA Global Function and Comfort score. The predictive equation is:

POSNA Global Function and Comfort = –31.049 Log NI + 136.864

Log NI predicts global functioning and its contribution is independent and significant ($p=0.0001$) to the predictive equation. For every unit change in Log NI there is a change of –31.049 units on the POSNA Global Function and Comfort scale. The model accounts for 46.9% of the variance (R= 0.685).

Case studies

As examples, two children with contrasting results are presented. The first child is a 9-year-old male with a diagnosis of spastic hemiplegic CP. He walked without assistive devices. His log NI score was low 1.884 (76.58 NI). The equation predicted a high POSNA score of 78.36. His actual POSNA Global Function and Comfort score was 97.92. His FAQ rating was 10 and his EE was 1.42 × normal or 142%. He was shown to be a high functioning child. In contrast, the second child, a 9-year-old female with spastic triplegic CP, walked without assistive devices but had greater difficulty walking than the first child. This was documented by a log NI score of 2.70 (503.25 NI). In this patient, the equation predicted a lower POSNA score of 53.83. Her actual POSNA score was 62.41. As the child with triplegia had greater difficulty with walking than the child with hemiplegia, one would have anticipated a lower FAQ rating (her rating was 4) and a higher EE (her rating was more than 2 × normal at 229%). In both cases the predicted POSNA values were lower than the actual scores. This is probably related to the variance that the model does not explain.

Discussion

A functional outcome measure and gait analysis are commonly used to assess children with CP, but it is uncertain how one test relates to the other in the overall evaluation of function in these children. The primary aim of this investigation was to assess the relation between POSNA and gait analysis in children with CP.

The findings support the hypothesis that the NI is predictive

Table V: POSNA Musculoskeletal Functional Health Questionnaire scores by topographical type of CP

	Topographical type							
	Hemiplegia (n=12)		*Diplegia (n=29)*		*Quadriplegia (n=12)*		*Triplegia (n=10)*	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Upper Extremity Function[a]	76.50	18.11	77.21	17.66	56.65	16.76	62.92	27.18
Transfers and Mobility[b]	90.09	11.26	78.92	15.98	52.84	21.62	65.08	22.55
Physical Function and Sports[c]	60.01	23.36	51.78	20.86	27.10	12.93	39.01	24.59
Comfort (pain free)[d]	86.30	16.67	82.39	23.06	81.48	23.01	83.78	25.17
POSNA Global Function and Comfort[e]	78.28	14.45	72.57	1.58	54.49	12.91	62.70	22.43

ANOVA. Two-tailed p value. [a]$p=0.001$; [b]$p=0.10$; [c]$p=0.001$; [d]$p=0.951$; [e]$p=0.001$.

of global physical functioning. Regression procedures established the NI as the primary predictor of global functioning. These findings highlight the potential importance of the NI in the evaluation of children with CP.

It is interesting to observe that the POSNA scale discriminates between the children based on their topographical presentation. The POSNA indicates that a simple yet thorough clinical examination and subsequent topographical classification provides an easy way to delineate different functional groups of children with CP without the need to consider multiple gait parameters or mathematical discrimination. Not surprisingly, children with quadriplegia have more limited functioning as reflected in lower Global and Comfort, Upper Extremity Function, Transfers and Mobility, and Physical Function and Sports scores. The Comfort (pain free) scale, reflecting a distinct construct, did not differ among the groups. As a valid scale, the POSNA should make evident known group differences.

When evaluating the effects of therapeutic intervention on gait, results from this study predict the direction of change in gait parameters, i.e. NI and EE should be the opposite of the POSNA scores. In this instance, an inverse correlation was observed. As expected, the poorer a child's physical functioning, the higher the NI and EE. It is conceivable that any of the observations could be used to evaluate the effects of treatment.

The FAQ is specifically used for walking ability. The POSNA is a measure that provides insight into a child's functional performance ability. The POSNA may be a preferred instrument to gauge the benefits of therapeutic exercise and conditioning or interventions that improve walking efficiency such as surgery or orthoses. Further studies are needed to assess the predictive validity of the scales.

Not explored in the study is the relative sensitivity of the POSNA and other measures to changes. Improvement in the POSNA may require acquisition of new skills. The gait analysis and the FAQ are multiple measures of walking ability and may detect smaller changes. The POSNA may detect changes that are clinically significant and affect quality of life. Therefore, the use of multiple measures may enhance the responsiveness of the evaluation process to significant changes.

Conclusions

These findings suggest that the NI may be used to predict global motor functioning as measured by the POSNA. The POSNA scale is a valid and useful clinical measure to evaluate the outcomes of surgical and therapeutic intervention in children with CP. Used in conjunction with the NI and EE, the POSNA Musculoskeletal Functional Health Questionnaire provides a more complete appraisal of change. The predictive validity and the relative sensitivities of these measures have yet to be determined.

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References

American Academy of Orthopaedic Surgeons, Pediatric Orthopaedic Society of North America, American Academy of Pediatrics, Shriners Hospitals. (1996) *Outcomes Data Collection Questionnaires: Pediatric Musculoskeletal Questionnaire. Version 2.0*

Daltroy LH, Liang MH, Fossel AH, Goldberg M. (1998) The POSNA Pediatric Musculoskeletal Functional Health Questionnaire: report on the reliability, validity, and sensitivity to change. *Journal of Pediatric Orthopedics* **18:** 561–71.

Damiano DL, Abel MF. (1996) Relation of gait analysis to gross motor function in cerebral palsy. *Developmental Medicine & Child Neurology* **38:** 389–96.

DeLuca PA. (1991) Gait analysis in the treatment of the ambulatory child with cerebral palsy. *Clinical Orthopedics and Related Research* **64:** 65–75.

Drouin LM, Malouin F, Richards CL, Marcoux S. (1996) Correlation between the gross motor function measure scores and gait spatiotemporal measures in children with neurological impairments. *Developmental Medicine & Child Neurology* **38:** 1007–19.

Gage JR. (1991) *Gait Analysis in Cerebral Palsy. Clinics in Developmental Medicine, No. 121.* London: Mac Keith Press.

— DeLuca PA, Renshaw TS. (1995) Gait analysis: principles and applications. *Journal of Bone and Joint Surgery* **77A:** 1607–23.

Koop SE, Stout JL, Starr R. (1989) Oxygen consumption during walking in children with cerebral palsy. *Developmental Medicine & Child Neurology* **31** (Suppl. 59)**:** 6. (Abstract).

Miller F. (1998) Gait analysis in cerebral palsy. In: Dormans JP, Pellegrino L, editors. *Caring for Children with Cerebral Palsy: A Team Approach.* Baltimore, MD: Paul H Brookes. p 169–91.

Novacheck TF, Stout JL, Tervo RC. (2000) Reliability and validity of the Gillette Functional Assessment Questionnaire as an outcome measure in children with walking disabilities. *Journal of Pediatric Orthopedics* **20:** 75–81.

Schutte LM, Narayanan U, Stout JL, Selber P, Gage JR. (2000) An index for quantifying deviations from normal gait. *Gait and Posture* **11:** 25–31.

Schwartz M. (2001) The effect of gait pathology on the energy cost of walking. *Gait and Posture* **13:** 260. (Abstract).

Waters RL, Mulroy S. (1999) The energy expenditure of normal and pathological gait. *Gait and Posture* **9:** 207–31.

Appendix I: List of all 16 parameters used to calculate Normalcy Index (Schutte et al. 2000)

Parameter
Time of toe off
Walking speed
Cadence
Mean pelvic tilt
Range of pelvic tilt
Mean pelvic rotation
Minimum hip flexion
Range of hip flexion
Peak abduction in swing
Mean hip rotation in stance
Knee flexion at initial contact
Time of peak knee flexion
Range of knee flexion
Peak dorsiflexion in stance
Peak dorsiflexion in swing
Mean foot progression angle

Appendix II: Gillette Functional Assessment Questionnaire: functional walking scale (Novacheck et al. 2000)

Choose **one** answer below that best describes your child's typical walking ability **(with the use of any needed assistive devices)**.

1. Cannot take any steps at all.
2. Can do some stepping on his/her own with the help of another person. Does not take full weight on feet; does not walk on a routine basis.
3. Walks for exercise in therapy and less than typical household distances. Usually requires assistance from another person.

4. Walks for household distances, but makes slow progress. Does not use walking at home as preferred mobility (primarily walks in therapy).
5. Walks more than 15–50 feet but only inside at home or school (walks for household distances).
6. Walks more than 15–50 feet outside the home, but usually uses a wheelchair or stroller for community distances or in congested areas.
7. Walks outside the home for community distances, but only on level surfaces (cannot perform curbs, uneven terrain, or stairs without assistance of another person).
8. Walks outside the home for community distances, is able to perform curbs and uneven terrain in addition to level surfaces, but usually requires minimal assistance or supervision for safety.
9. Walks outside the home for community distances, easily gets around on level ground, curbs, and uneven terrain, but has difficulty or requires minimal assistance with running, climbing, and/or stairs. Has some difficulty keeping up with peers.
10. Walks, runs, and climbs on level and uneven terrain without difficulty or assistance.