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Preliminary study of novel, timed walking tests for children with spina bifida or cerebral palsy

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Abstract

Objective: Walking assessment is an important aspect of rehabilitation practice; yet, clinicians have few psychometrically sound options for evaluating walking in highly ambulatory children. The purpose of this study was to evaluate the validity and reliability of two new measures of walking function—the Obstacles and Curb tests—relative to the 10-Meter Walk test and Timed Up and Go test in children with spina bifida or cerebral palsy.

Methods: A total of 16 ambulatory children with spina bifida (n=9) or cerebral palsy (n=7) (9 boys; mean age 7years, 7months; standard deviation 3years, 4months) and 16 age- and gender-matched typically developing children participated. Children completed the walking tests, at both self-selected and fast speeds, twice. To evaluate discriminative validity, scores were compared between typically developing and spina bifida/cerebral palsy groups. Within the spina bifida/cerebral palsy group, inter-test correlations evaluated convergent validity and intraclass correlation coefficients evaluated within-session test–retest reliability.

Results: At fast speeds, all tests showed discriminative validity (p<0.006 for typically developing and spina bifida/cerebral palsy comparisons) and convergent validity (*rho*=0.81–0.90, $p \leq 0.001$, for inter-test correlations). At self-selected speeds, only the Obstacles test discriminated between groups (p=0.001). Moderately strong correlations (*rho*=0.73–0.78, $p \leq 0.001$) were seen between the 10-Meter Walk test, Curb test, and Timed Up and Go test. Intraclass correlation coefficients ranged from 0.81 to 0.97, with higher test–retest reliability for tests performed at fast speeds rather than self-selected speeds.

Conclusion: The Obstacles and Curb tests are promising measures for assessing walking in this population. Performing tests at fast walking speeds may improve their validity and test–retest reliability for children with spina bifida/cerebral palsy.

Keywords

Orthopedics, rehabilitation, occupational therapy, assessment, gait, children

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Introduction

For many children with neurological conditions, such as spina bifida (SB) and cerebral palsy (CP), walking is a means to independence and participation in daily activities. Distinct from gross motor skill, walking is a multifaceted construct, comprising quantifiable entities such as walking ability, gait speed, functional mobility, endurance, dynamic balance, and activity participation.[1] As such, many approaches to gait assessment exist, ranging from laboratory-based measures to more clinically feasible, time-based walking tests[2] and mobility classifications.[3,4] While many options exist for adult populations, few have been validated or shown to be responsive or reliable in children.[1,5,6]

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The ability to objectively quantify a child's walking ability affords clinicians and researchers the opportunity to monitor development, response to treatment, and maintenance or decline of function over time; however, recommendations for walking measurement in children are unclear.[6] The 10-Meter Walk Test (10 mWT) and the Timed Up and Go (TUG) test have been used in children. Few studies to date have examined the psychometric properties of the 10 mWT in children with CP.[7,8] One study reported excellent inter-rater and intra-rater reliabilities;[7] however, Thompson et al.[8] challenge its clinical usefulness, particularly for children with higher functional mobility levels. They found that test–retest reliability was especially poor for children in Gross Motor Function Classification Scale (GMFCS)[3] levels I and II, likely due to small between-participant variability among these higher functioning children.[8] Reports of discriminative validity of the 10 mWT for children at GMFCS levels I and II are inconsistent, although the test has been shown to differentiate between children in level III and those in higher functional classifications.[7,8] Finally, the ecological validity of the 10 mWT is questionable as it overestimates walking speeds used in the community.[9]

The TUG has good psychometric properties in children with SB and CP.[10–14] It has excellent test–retest[10,11] and inter-rater reliabilities[13] and differentiates between children with SB or CP at GMFCS levels I, II, and III.[11] TUG scores have also been shown to correlate with scores on the Gross Motor Function Measure (GMFM),[10,11] 10 mWT,[10] Timed Up and Down Stairs test,[13] and the Pediatric Evaluation of Disability Inventory.[12] The TUG, however, tests basic balance and mobility skills rather than walking in isolation. A better measure of walking ability is needed for pediatric populations, especially those with higher skill levels, such as GMFCS I and/or II.[10,13]

As children's daily activities generally involve more than walking on a straight path over level ground,[15] measures involving more complex walking demands may be informative to clinicians. For adults with spinal cord injury (SCI), the Spinal Cord Injury Functional Ambulation Profile (SCI-FAP)[16] was developed to evaluate performance on common functional walking tasks. For example, the SCI-FAP includes an Obstacle test that involves stepping over and around standardized obstacles and a Curb test that involves stepping on and off of a platform to mimic negotiating a curb. Such measures of everyday walking tasks may also be useful in pediatric populations, especially in those children with greater walking function. Laboratory assessments of obstacle clearance have found that children with CP approach and cross obstacles more slowly than typically developing children.[17]

Likewise, in adult populations, timed walking tests like the 10 mWT are often performed at multiple speeds (i.e. self-selected and fastest), since the ability to modulate speed is of value for community ambulation.[18,19] Walking speed affects the gait patterns of children with CP[20–22] and likely also in children with SB; however, this has not been studied to date. For example, in children with CP, walking quickly increases the variability of electromyographic recordings from lower limb muscles,[20] results in greater co-activation of lower limb antagonistic muscles,[21] and alters the velocity of calf muscle lengthening,[22] compared with walking at self-selected speeds. The psychometric properties of timed walking tests may therefore be affected by speed.

There may be value in developing timed walking tests for children that involve more complex walking demands. As a first step, we chose to examine the feasibility of two items from the SCI-FAP, the Obstacles and Curb tests, in children. The objectives of this study were to (1) perform a preliminary assessment of the validity and test–retest reliability of the Obstacles and Curb tests (modified from the SCI-FAP) in children with SB or CP, (2) compare the psychometric properties of these new tests to the previously established 10 mWT and TUG, and (3) determine whether the validity and test–retest reliability of timed walking tests are affected by walking speed. We expected this preliminary analysis to suggest that (1) the Obstacles and Curb tests would be valid measures of walking ability and show high test–retest reliability, (2) the discriminative validity of the Obstacles and Curb tests would be greater than that for the less challenging 10 mWT and TUG, and (3) the test–retest reliability and validity for the four tests would be greater when performed at self-selected speeds compared to fast speeds.

Methods

This was a cross-sectional study involving children with SB or CP and typically developing children. The study was approved by the Research Ethics Board of the University of Saskatchewan. Prior to participation, children provided verbal assent, and a parent/legal guardian provided informed written consent.

Participants

Participants with SB or CP (SB/CP group) were recruited over 6 months in 2014 from the two major pediatric rehabilitation centers in the province of Saskatchewan and through flyers posted at the offices of a province-wide support organization for children with disabilities. The desired sample size was ⩾15 children with SB or CP based on a sample size calculation completed a priori. Assuming an intraclass correlation coefficient (ICC) ⩾0.9,[11] two observations/participant, and a confidence interval width of 0.2, 15 participants per group were required.[23,24]

Children with a diagnosis of SB or CP participated if they met the following inclusion criteria: (1) were aged 2–13 years, (2) were able to walk at least 14 m (with or without aids or braces), and (3) had no other injury or condition that affected balance or walking ability. Although study inclusion was not based on GMFCS level, most children were GMFCS levels I or II due to the requirement to walk ⩾14 m. The majority of children with SB or CP were referred to the study by their regular physical therapist. Two children with CP self-referred (i.e. their parents responded to a study flyer). For these two children, the diagnosis was not confirmed in their medical records; however, a licensed physical therapist (K.J.K. or K.E.M.) completed the screening assessment. Typically developing children were recruited through email notices sent to the University of Saskatchewan community. To be included, typically developing children met the following criteria: (1) born at term (⩾37 weeks gestation), (2) were an age and gender match to a child with SB or CP, and (3) had no injuries or health conditions that impacted balance or walking ability. For both groups, children were excluded if they had attention difficulties that would prevent them from following directions, or if they could not follow simple instructions in English.

Study procedures

All children attended one testing session where they performed four timed walking tests at two speeds—self-selected (ss) and fastest (fast). The eight tests were performed in the following order: 10 mWT ss, 10 mWT fast, TUG ss, TUG fast, Obstacles ss, Obstacles fast, Curb ss, and Curb fast. The testing order was not randomized. This was done to ensure consistency in what data were collected, should fatigue prevent the children from completing all tests. The 10 mWT was performed on a 14-m walkway, and the middle 10 m was timed. Young typically developing children have been reported to have a 10 mWT score of 13 s (0.77 m/s) that decreases to ⩽10 s (<1.0 m/s) after the age of 6 years.[25] In a group of 30 children with various neurological conditions aged 5–20 years, the average speeds observed on the 10 mWT ss and 10 mWT fast were 0.97 ± 0.33 s and 1.52 ± 0.49 s, respectively.[26] The TUG was performed according to recommendations[11] for use with children. In a previous study, typically developing children aged 3–9 years scored 5.9 ± 1.3 s on the TUG, while seven children with SB scored 8 ± 1.5 s.[11]

The Obstacles test involves stepping over two Styrofoam obstacles and walking around one garbage bin. The Curb test involves stepping onto and off of a platform that is meant to mimic a curb.[16] See Appendix 1 for a full explanation of the Obstacles and Curb tests.[16] Normative scores on these two tests are not known for children. Able-bodied adults completed the Curb test in 3.7 ± 0.5 s and the Obstacles test in 11.4 s;[16] however, the Obstacles test used with adults involves a longer walking distance than the version used in this study. Another difference between the Obstacles tests developed for adults and children is that in the pediatric version, the dimensions of the Styrofoam obstacles were normalized to each child's leg length. By doing this, we hoped that each child would be presented with a walking task that was roughly equal in difficulty level across differing heights and ages. It was not feasible to vary the height of the wooden platform used in the Curb test; however, curb heights in the community show less variation in size than do obstacles in the walking path.[27] The height of the wooden platform used in the Curb test is similar to the heights encountered in the community.[16]

To evaluate the within-session test–retest reliability, all tests were repeated in the same order. At least 15 min separated the first and second administration of each test. Between administrations, children sat down for a 10-min rest break. A licensed physical therapist with experience in pediatrics (K.J.K. or K.E.M.) administered the tests. The testing physical therapist was kept consistent for each child. For tests performed at self-selected speeds, children were asked to walk at their "usual or comfortable" speed, the way they would normally walk at school or home. For tasks performed at their fastest speed, children were asked to walk as fast as possible without running. Children who habitually wore ankle–foot orthoses (AFOs) and/or used a walking aid were permitted to use them for testing.

The GMFCS was used as an indicator of general motor function.[3] This five-point ordinal scale rates a child's motor function from level I (least severe) to V (most severe). Although it was designed for children with CP, it has also been used to describe the functional mobility levels of children with SB.[11] The modified Hoffer Functional Ambulation scale[4] was also used. It is a five-point, ordinal scale that rates a child's functional ambulation level as follows: normal, community, household, non-functional, and non-ambulator. It is commonly used for research involving children with SB.[6]

Statistical analysis

Scores are reported for the two groups (SB/CP and typically developing children) as median and interquartile range or descriptively in the case of the GMFCS and Hoffer scale. Assumptions of normality were tested with the Shapiro–Wilk test. For each timed walking test, a one-tailed paired *t*-test or Wilcoxon signed-rank test was used to compare performance at ss and fast speeds within each group. To evaluate discriminative validity, a one-tailed independent *t*-test or Mann–Whitney *U* test was used to compare performance on each test between groups. One-tailed tests were used as we expected the SB/CP group to score lower (i.e. walk at slower speeds) than typically developing children. To evaluate convergent validity for the SB/CP group, correlations between tests were evaluated using Spearman's rank correlation, with the ss and fast tests being correlated separately. Absolute Spearman's *rho* values were interpreted as follows: ⩽0.35 = low/weak, 0.36–0.67 = moderate/modest, 0.68–0.89 = strong/high, and ⩾0.9 = very strong.[28] Within-session test–retest reliability was examined using a one-way random effects ICC for the SB/CP group. ICCs were calculated for each of the four timed walking measures at ss and fast speeds. Values ⩾0.75 were considered to meet the minimum

Table 1. Characteristics of the participants with cerebral palsy (CP) or spina bifida (SB).

Participant	Age (years)	Gender	Diagnosis	GMFCS level	Hoffer classification	Walking aid/ AFO
1	2.1	M	Hemiplegic CP	I	Normal	None
2	9.8	M	Hemiplegic CP	I	Normal	None
3	2.1	M	SB, L2/3 lipoma	I	Community	1 AFO
4	8.0	F	SB, L3 dermoid cyst	I	Community	None
5	9.2	M	SB, sacral MMC	I	Normal	None
6	12.7	F	SB, L4/5 MMC	II	Normal	2 AFOs
7	3.6	M	SB, L5/S1 MMC	I	Community	None
8	7.0	F	Diplegic CP	I	Community	None
9	8.5	M	Diplegic CP	I	Community	2 AFOs
10	10.6	F	SB, L5/S1 MMC	I	Normal	None
11	5.6	M	Diplegic CP	I	Normal	None
13	7.8	F	Diplegic CP	I	Community	2 AFOs
14	5.6	F	SB, sacral MMC	I	Normal	None
15	13.3	M	Diplegic CP	III	Community	2 AFOs, 4WW
16	9.2	F	SB, L5/S1 MMC	III	Community	2 AFOs, 2 FCs
18	6.0	M	SB, L5 MMC	II	Community	2 AFOs

GMFCS: Gross Motor Function Classification System; AFOs: ankle–foot orthoses; MMC: myelomeningocele; 4WW: four-wheeled walker; FCs: forearm crutches; M: male; F: female.

standard for clinical usefulness.[23] Analyses were done using PASW Statistics 17 (SPSS, Chicago, IL, USA). Alpha was set to 0.01 due to the large number of statistical tests planned.

Results

In total, 18 children with SB or CP participated, and data from 16 were included in the analysis (9 boys, 9 SB, 7 CP, mean age = 7.6 ± 3.3 years, height = 125.4 ± 18.8 cm, and weight = 31.7 ± 20 kg; Table 1). Two participants who met the inclusion criteria were unable to complete the majority of testing procedures and were excluded from the analysis. Both had tetraplegic CP (Hoffer classification: one non-functional ambulator (GMFCS IV) and one household ambulator (GMFCS III)). In all, 16 age- and gender-matched typically developing children participated (mean age = 7.8 ± 3.4 years, height = 126.7 ± 22.9 cm, and weight = 27.7 ± 12.9 kg).

Discriminative validity

Median scores for all tests were faster for the typically developing group in comparison to the SB/CP group (Figure 1). Generally, the largest group differences were for the Obstacles and Curb tests. Three children in the SB/CP group (one 2-year-old and two children at GMFCS level III) sustained penalties for contacting an obstacle on the Obstacles test. Significant differences were found between the groups for all four tests at fast speeds (Obstacles: $U = 9.00$, $p < 0.001$; Curb: $U = 20.00$, $p < 0.001$; 10 mWT: $t(27) = 4.76$, $p < 0.001$; and TUG: $U = 35.50$, $p = 0.006$), and for the Obstacles ss ($U = 33.00$, $p = 0.001$). The Curb ss test approached significance ($U = 50.00$; $p = 0.016$). The difference between the groups was not significant for the 10 mWT ss ($t(30) = 1.352$, $p = 0.186$) and TUG ss ($U = 55.00$, $p = 0.085$). For both groups, scores for each ss test were significantly lower than for the same test at fast speeds ($p \leqslant 0.006$) (Figure 1).

Convergent validity

Analyses of convergent validity revealed stronger relationships between test scores at fast speeds than ss speeds (Table 2). All correlations between the fast tests were statistically significant and strong or very strong ($|rho| = 0.81$–0.90, $p \leqslant 0.001$). At ss speeds, significant moderate correlations were observed between the 10 mWT and Curb ($rho = -0.73$, $p \leqslant 0.001$), 10 mWT and TUG ($rho = -0.76$, $p \leqslant 0.001$), TUG and Curb ($rho = 0.78$, $p \leqslant 0.001$), and Obstacles and Curb ($rho = 0.63$, $p < 0.01$). Interestingly, correlations between the Obstacles ss and the TUG or 10 mWT performed at ss speeds were not significant, suggesting no correlation (Obstacles and TUG ($rho = 0.360$, $p = 0.107$); Obstacles and 10 mWT ($rho = -0.29$, $p = 0.149$)).

Test–retest reliability

Test–retest reliability for all four tests was high at both speeds (Table 3). The lowest ICCs (0.81–0.89) were observed for the 10 mWT ss, 10 mWT fast, and Obstacles ss. Test–retest reliability was highest for the TUG, both at ss (ICC = 0.97 (95% confidence interval (CI) = 0.91–0.99)) and fast speeds (ICC = 0.97 (95% CI = 0.90–0.99)). Test–retest reliability was greater at fast speeds than ss speeds, with the exception of the TUG which was similar at both speeds. ICCs for the Curb and TUG tests were higher than for the

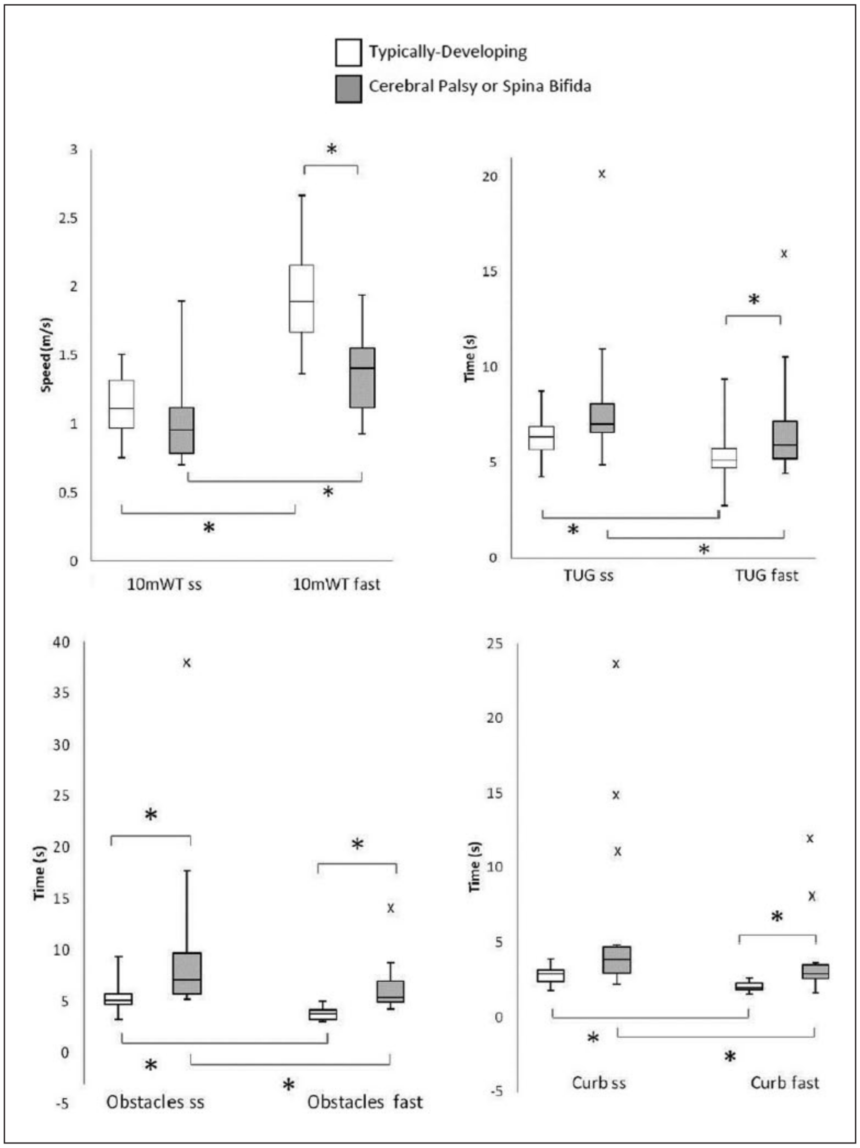

Figure 1. Comparison of results on the four timed walking measures at self-selected (ss) and fast speeds between groups.
10mWT: 10-Meter Walk Test; TUG: Timed Up and Go.
*p<0.01; x: extreme outlier (i.e. >median+3×interquartile range).

Table 2. Results of convergent validity analysis: Spearman's rank correlation coefficients (ρ) for the timed walking tests at self-selected (ss) and fastest (fast) speeds.

Inter-test correlation	Correlation coefficient	
	ss	fast
10mWT and TUG	−0.76**	−0.90**
10mWT and Obstacles	−0.29	−0.86**
10mWT and Curb	−0.73**	−0.86**
TUG and Obstacles	0.36	0.85**
TUG and Curb	0.78**	0.90**
Obstacles and Curb	0.63*	0.81**

10mWT: 10-Meter Walk Test; TUG: Timed Up and Go.
*$p \leq 0.01$; **$p \leq 0.001$.

10 mWT and Obstacles test, although the Obstacles fast test also demonstrated high test–retest reliability (ICC = 0.94 (95% CI = 0.79–0.98)).

Discussion

This study conducted a preliminary evaluation of the psychometric properties of the Obstacles and Curb tests in ambulatory children with SB or CP. According to our findings, these tests have promise as a means to collect valid and reliable walking data in children and warrant further study with a larger sample. Both tests showed greater discriminative validity than the 10 mWT and TUG, while all tests demonstrated convergent validity with the exception of the

Table 3. Results of test–retest reliability analysis: Intraclass correlation coefficients (ICCs) and 95% confidence intervals (CIs) for the four timed walking measures at self-selected (ss) and fastest (fast) speeds, for the group of children with cerebral palsy or spina bifida.

Test	Speed	ICC (95% CI)
10mWT	ss	0.81 (0.48–0.93)
	fast	0.89 (0.67–0.96)
TUG	ss	0.97 (0.91–0.99)
	fast	0.97 (0.90–0.99)
Obstacles	ss	0.87 (0.58–0.96)
	fast	0.94 (0.79–0.98)
Curb	ss	0.94 (0.81–0.98)
	fast	0.95 (0.85–0.99)

10mWT: 10-Meter Walk Test; TUG: Timed Up and Go test.

Obstacles test performed at a self-selected speed. Since performance on the ss Obstacles test did not correlate with performance on the TUG or 10 mWT, the ss Obstacles test may be measuring a construct or walking entity that differs from the other tests. Furthermore, the test–retest reliability of the Obstacles and Curb tests was superior to that of the 10 mWT, and reliability was greater when the tests were performed at fast speeds. Our findings suggest that timed walking tests performed at fast speeds and those involving functional walking tasks, such as negotiating obstacles and curbs, may be more appropriate than the TUG or 10 mWT for highly ambulatory children with SB or CP.

Typically developing children and children with SB/CP showed the greatest differences in performance on the Obstacles and Curb tests, and the SB/CP group took approximately twice as long as the typically developing group to complete these tests. While this suggests that the Obstacles and Curb tests were the most challenging tests for the SB/CP group, it should also be noted that these measures were still feasible for this population. The majority of participants (16/18) were able to complete the Obstacles and Curb tests without physical assistance from another person. Furthermore, the motor challenge imposed by these measures may enhance their measurement properties. As a comparable example, Zaino et al.[13] deemed the Timed Up and Down Stairs test a better measure of mobility, strength, and balance than the TUG because it produced a wider range of scores across functional levels in children with CP.

The Obstacles test may measure a relatively unique aspect of walking, lending further support to its value as a new walking test. At self-selected speeds, the correlations between the Obstacles test and the other three tests were either moderate in strength or not significant. It is possible that negotiating objects in the walking path requires greater postural control and/or distal precision than the other tests. As the Curb test has the most similar task requirements, it is not surprising that the Obstacles test showed a correlation with the Curb test at self-selected speeds.

With respect to within-session consistency, our results support the use of the TUG, Obstacles fast, or Curb tests rather than the 10 mWT for pediatric populations. The test–retest reliability was strong to very strong for these tests. While the ICCs for the 10 mWT were acceptable at both speeds, this test had the lowest ICCs of the four we compared. Furthermore, in agreement with previous research,[8] the lower bounds of the 95% CIs for the 10 mWT were below the cut-off for clinical usefulness. Similarly, the point estimate for the Obstacles ss indicated strong test-retest reliability, but the lower bound of the 95% CI was also below the cut-off.

Several factors are thought to influence the variability of walking speed in children, including age,[29] test distance,[7,8] environment,[30] and distractibility or mood.[31] This study is among the first to examine reliability and validity of timed walking measures at different speeds;[26] although in adults, there are conflicting results regarding which speed has greater reliability.[32,33] Contrary to our hypothesis, the psychometric properties of the four timed tests tended to be greater when performed at fast speeds. This may be related to the relatively greater degree of motor challenge imposed by fast walking compared to self-selected speeds. As hypothesized, the tests differentiated between groups (i.e. showed discriminative validity), but this was particularly true at fast speeds. At self-selected speeds, only the Obstacles scores were significantly different between groups. Likewise, the within-session test–retest reliability of the timed tests was generally higher at fast speeds.

The sample size of this study was small; however, the findings identify areas worthy of further research. This preliminary study's sample size precluded analysis of discriminative validity by ambulatory classification. The majority of participants were highly functional ambulators (GMFCS level I). The two children classed as GMFCS level III performed the tests much more slowly than other participants, and it is possible that other children in this classification would have performed similarly. No children classified as GMFCS level IV or V participated in this study, likely because they were not deemed appropriate by the referring therapists (i.e. could not achieve the inclusion criterion of walking $\geqslant$14 m). It would be reasonable for future studies to limit inclusion to GMFCS levels I–III. Future research may also explore inter-session measurement properties with longer test–retest intervals and more than two test repetitions or examine the effect of age on timed scores and gait speed variability in larger samples. Measures of responsiveness should also be included for a thorough evaluation.[5]

In conclusion, the Obstacles and Curb tests are valid and reliable for highly ambulatory children with SB/CP. They may offer a more appropriate challenge and a more ecologically valid assessment than level-ground walking measures. Walking at fast speeds may also provide a more suitable challenge to this population and improve the measurement properties of timed tests.

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Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethics approval

Ethical approval for this study was obtained from the Research Ethics Board of the University of Saskatchewan (Bio 14-21).

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Informed consent

Written informed consent was obtained from legally authorized representatives before the study, and verbal assent was obtained from the children participants.

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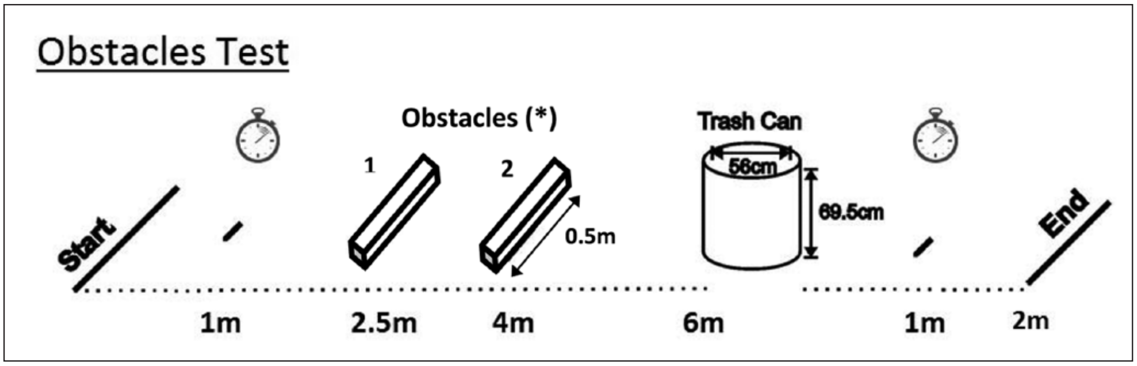
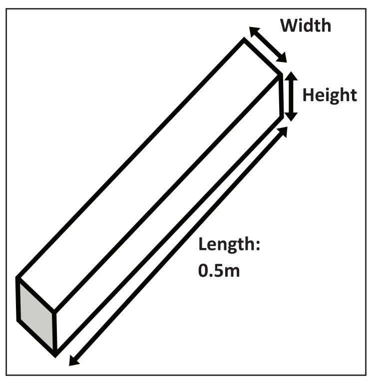
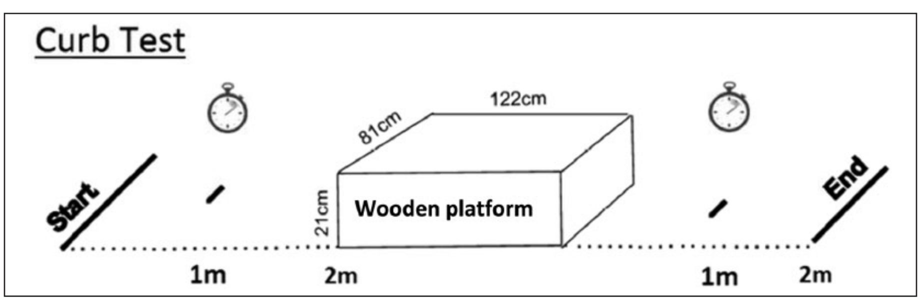
Appendix 1



Procedure: Obstacle pathway is set up as seen in the diagram. The walking pathway is 6 m in length before the trash can and 2 m in length after the trash can, resulting in a total pathway length of 8.56 m (includes length of trash can). Participant stands behind the "Start" line. When the examiner says "go," the child steps over the obstacles*, walks around one side of the trash can, and continues walking in a straight path to cross the "End" line. Timing starts 1 m after the "Start" line (stopwatch symbol 1) and ends 1 m before the End line (stopwatch symbol 2), allowing 1 m for acceleration and deceleration. The score is the time taken to walk this section of the walkway. A 10% time penalty is added if a child contacts one or more obstacles with his or her body or walking aid.



*Obstacles were a selection of Styrofoam blocks, 0.5-m long (or 0.25 m for children using walkers). Their height/width varied by 2.5 cm increments. The height and width of obstacle 1 and obstacle 2 were chosen such that they were 10%–15% and 20%–25% of the child's leg length, respectively.



Procedure: Curb pathway is set up as seen in the diagram. The walking pathway is 2 m in length before the wooden platform and 2 m in length after the wooden platform, resulting in a total pathway length of 5.22 m (includes length of wooden platform). Participant stands behind the "Start" line. When the examiner says "go," the child walks 2 m toward a wooden platform, steps onto it, walks across, steps down onto the ground, and continues walking for 2 m to cross the "End" line. The first and last meters of the test are not timed, allowing for acceleration and deceleration (stopwatch symbols indicate where to start and stop timing). Children may get on and off the platform in any manner (e.g. step or crawl). The score is the time taken to complete the test.