Psychometric Properties of the Activities-Specific Balance Confidence Scale Among Individuals With a Lower-Limb Amputation

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ABSTRACT. Miller WC, Deathe AB, Speechley M. Psychometric properties of the Activities-Specific Balance Confidence Scale among individuals with a lower-limb amputation. Arch Phys Med Rehabil 2003;84:656-61.

Objective: To evaluate the internal consistency, test-retest reliability, and construct validity of the Activities-specific Balance Confidence (ABC) Scale among people who have a lower-limb amputation.

Design: Retest design.

Setting: A university-affiliated outpatient amputee clinic in Ontario.

Participants: Two samples of individuals who have unilateral transtibial and transfemoral amputation. Sample 1 (n=54) was a consecutive and sample 2 (n=329) a convenience sample of all members of the clinic population.

Interventions: Not applicable.

Main Outcome Measures: Repeated application of the ABC Scale, a 16-item questionnaire that assesses confidence in performing various mobility-related tasks. Correlation to test hypothesized relationships between the ABC Scale and the 2-minute walk (2MWT) and the timed up-and-go (TUG) tests; and assessment of the ability of the ABC Scale to discriminate among groups based on amputation cause, amputation level, mobility device use, automatic stepping ability, wearing time, stair climbing ability, and walking distance.

Results: Test-retest reliability (intraclass correlation coefficient) of the ABC Scale was .91 (95% confidence interval [CI], .84–.95) with individual item test-retest coefficients ranging from .53 to .87. Internal consistency, measured by Cronbach α, was .95. Hypothesized associations with the 2MWT and TUG test were observed with correlations of .72 (95% CI, .56–.84) and −.70 (95% CI, −.82 to −.53), respectively. The ABC Scale discriminated between all groups except those based on amputation level.

Conclusions: Balance confidence, as measured by the ABC Scale, is a construct that provides unique information potentially useful to clinicians who provide amputee rehabilitation. The ABC Scale is reliable, with strong support for validity. Study of the scale's responsiveness is recommended.

Key Words: Amputation; Balance; Rehabilitation; Reliability and validity.

INDIVIDUALS WHO HAVE had a lower-limb amputation have an increased risk of falling. In fact, 52% of community living persons with a major (transtibial or transfemoral) lower-extremity amputation reported that they had fallen at least once within the past 12 months.[1] A potential consequence of falling is fear of falling, which in turn may lead to a reduction in participation in both daily and social activity.[2]

Recently, there has been a trend to measure fear of falling using scales that assess self-efficacy, or confidence, by using response formats that capture data at a continuous level.[3,4] These scales are reported to be an improvement over simply asking if one has a fear of falling because they are activity specific, less threatening to men who prefer not to acknowledge fear, and more sensitive to measuring change than a binary scale.[3,4]

The Activities-specific Balance Confidence (ABC) Scale is a 16-item measure of self-efficacy designed to assess fear of falling. This scale, which takes about 5 minutes to complete has recently received increased attention from clinicians and researchers.[2,4-9] Although the measurement properties of the ABC Scale have principally been assessed among the frail elderly and older adult populations, there are no known studies reporting the reliability and validity of this scale among individuals who have a lower-limb amputation. The purpose of the present study was to assess and report the internal consistency, 4-week test-retest reliability, and construct validity of the ABC Scale among individuals who have a unilateral lower-limb amputation.

METHODS

Design and Participants

To assess the measurement properties of the ABC Scale, we used data from 2 separate samples. Data from sample 1 (n=50) were used to assess reliability, and data from sample 2 (n=329) were used to assess validity. The reliability sample of 50 people exceeds the minimum number (42) of subjects needed to test the hypothesis that the reliability coefficient is minimally acceptable ($r>0.6$)[10] when α is .05 and β is .20. Further, the 329 individuals in sample 2 (the validity sample) enabled us to determine significant differences ($P<.005$) among 3 groups at an effect size of .22 and a conventional power value of 0.8 (see Analyses for a more detailed discussion of why the conservative P value was selected).

All participants were drawn from a university-affiliated regional outpatient amputee clinic in London, ON, Canada. The outpatient clinic provides regular follow-up by the amputee rehabilitation team at 6 weeks and 3, 6, and 12 months after discharge from the inpatient program and yearly thereafter. For the purposes of the study only individuals who had completed inpatient rehabilitation at least 6 months before the start of the

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study were included. This criterion was set to select a group of individuals who would be relatively comfortable about their ability to use their prostheses. Additional inclusion criteria were unilateral transfemoral or transtibial amputation; using their prosthesis to walk at least 3 times a week; more than 20 years old; community living; and able to read, write, and speak English. Because stability or test-retest reliability was a primary objective, sample 1 consisted of individuals who were prosthetically and medically stable, in the opinion of the attending physiatrist. We also attempted to monitor change in the interest period by adding items querying health and prosthetic change on the follow-up questionnaire. The Research Ethics Board for Health Sciences Research Involving Human Subjects at the University of Western Ontario reviewed and approved the study.

Procedure

Sample 1 participants completed the ABC Scale and provided other self-report data while sitting in the waiting room of the outpatient clinic. Participants were then seen for their scheduled outpatient visit with the rehabilitation team. If the participant was deemed medically and prosthetically stable, they completed the 2-minute walk (2MWT) and the timed up-and-go (TUG) tests in a quiet hallway just outside the clinic area. The 2MWT and TUG test were conducted in accordance with the standardized protocol for these scales (see Measurement section). The 2MWT was conducted over a 20-m section of the hallway. Four weeks later, each participant received a second copy of the ABC Scale with a self-addressed, stamped return envelope. Two questions were appended to the end of the questionnaire to inquire about changes in medical and prosthetic stability over the test-retest interval.

Data from sample 2 participants were collected as part of a large follow-up study conducted in 1998.[1,2] Participants were sent a package containing an introductory letter and a questionnaire. Data collection was closed after all potential respondents had been sent 3 reminders, one of which included a second questionnaire.

Measurement

The ABC Scale is a 16-item self-report measure of the perceived balance confidence an individual has while completing various ambulatory activities.[4] Participants estimate on a scale of 0% to 100% how confident they are that they could perform activities such as picking a slipper up off of the floor or walking on a slippery surface without losing their balance. The item scores are then summed and divided by 16 to provide an overall mean balance confidence score. The internal consistency (α=.96), 2-week test-retest reliability (ICC=.92), and convergent and discriminant validity of this measure among the elderly have been reported to be strong.[4-6]

To evaluate construct validity, we assessed the correlation of the ABC Scale to 2 observer-scored measures that have a strong balance component: the 2MWT and the TUG test. The 2MWT is a measure of the distance an individual is able to walk at his/her "usual" pace. This measure, which is often used clinically to determine the progress of prosthetic walking performance, is a shortened version of the original 12-minute walk test.[11] Six- and 2-minute versions were developed and tested to provide clinicians with a test that took less time to complete.[12] The 2MWT has been found to correlate highly with the 12- (r=.86) and 6- (r=.89) minute versions.[12]

The TUG test—a performance-based measure of many of the components of basic mobility—includes balance, transfers, walking, and turning while walking.[13,14] The time it takes for an individual to stand from a sitting position, walk a 3-m distance, turn, walk back to the chair, and sit down is recorded. The TUG test was found to have excellent test-retest (ICC=.93) and interrater (ICC=.96) reliability and evidence of convergent and divergent validity among a sample of lower-limb amputees.[14]

Several variables were used to assess the ability of the ABC Scale to discriminate between clinically important groups. These factors included amputation level, amputation cause, mobility device use (cane, crutches, walker), reported walking distance, automatic stepping ability, ability to climb stairs independently, and prosthesis wearing time. Information on automatic stepping (automatism), prosthesis wearing time, and stair climbing was determined by using items from the Prosthetic Profile of the Amputee[15] (PPA). Automatism was assessed by asking whether the subject was required to concentrate on each step when walking, responses were recorded as yes, no, or I don't know. Wearing time was measured by asking the subject how many days a week and how many hours a day the prosthesis is worn. The final value was calculated by multiplying the 2 together, providing a range of 0 to 168 hours a week. Data for stair climbing were taken from a Locomotor Capabilities Index of the PPA in which the subject is asked whether he/she can presently walk upstairs with the prosthesis on by using a handrail. Subjects respond by indicating whether they are "unable," "able with help from someone," able "by myself if someone is near," or able "by myself."

Analyses

Before beginning data collection, we decided to group into a single category those individuals who had their amputation for nonvascular causes. Therefore, those who had their limb removed for reasons related to congenital malformation, cancer, or trauma were considered distinct from those who had an amputation related to vascular disease. The decision to define amputation cause this way was based on clinical experience, which suggests that individuals who have their amputation for nonvascular reasons are generally younger when they lose their limb and less likely to have the multiple chronic diseases that often accompany aging. This strategy also eliminated small cell numbers that might arise from having a long list of categories of etiology.

Three aspects of reliability were assessed in the study. First, the internal consistency of the ABC Scale was determined by calculating the Cronbach α. Second, intraclass correlation coefficients (ICCs) were calculated to determine the relative reliability of the test-retest reliability of the summary score and the individual items. ICCs were derived using 1-way analyses of variance[16] (ANOVAs). Absolute reliability[17] or the measure of how an individual score varies on repeated measurement was estimated by the standard error (SE) of measurement. We also used the Bland-Altman method[18] to provide a visual assessment of within-test repeated measurement of agreement and bias, as others[19] have recently done. To do this, the average of the first and second ABC Scale test scores were plotted against the difference between the first and second test scores. We then calculated the mean and standard deviation (SD) of the mean difference as well as the true value of the mean, by using 95% confidence intervals (CIs) to further assess the existence of bias.[18]

Validity of the ABC Scale was assessed by examining the degree to which the scale converged with 2 walk tests and how it discriminated between variables perceived to be of clinical importance. We hypothesized that a statistically significant positive correlation between the ABC Scale and the 2MWT and a statistically significant negative correlation between the ABC Scale and the TUG test would exist. The Pearson prod-

Table 1: Sample Demographics

Characteristics	Sample 1 (n=50) n	Sample 1 (n=50) %	Sample 2 (n=329) n	Sample 2 (n=329) %
Sex				
Male	35	70	243	74
Female	15	30	86	26
Amputation cause				
Vascular	29	58	155	47
Nonvascular	21	42	174	53
Level				
Transtibial	38	76	243	74
Transfemoral	12	24	86	26
Mean age ± SD (y)	58.0±15.8		59.9±16.7	
Mean years since amputation	7.1±3.4		16.0±15.4	
Mean wearing time (h/wk)	82.8±35.0		86.6±31.8	

uct-moment correlation coefficient was calculated in both cases. Finally, clinical experience suggested that the ABC Scale would discriminate between individuals with transtibial and transfemoral amputations and those with vascular versus nonvascular amputations. We expected the mean ABC scores to be higher among individuals who did not use a mobility device and among those who did not have to think about stepping. Differences in mean ABC scores between these groups were tested using independent *t* tests. To examine the ability of the ABC Scale to distinguish among multiple levels of wearing time, walking distance, and independence in climbing stairs, we collapsed the response categories for these variables into 3 distinct groups. Wearing time was split based on tertiles (<84h, 84–104.9h, ≥105h), whereas walking distance was based on whether the subject walked less than 1 block, at least 1 block, or much more than 1 block. Groups for stair climbing were collapsed according to whether the participant was unable to climb, able to climb but with help or supervision, or totally independent. We hypothesized that individuals who wore their prostheses longer, were able to independently walk up stairs, and could walk longer distances would have higher ABC scores. Statistical differences were also anticipated between levels. One-way ANOVA with Student-Newman-Keuls post hoc testing was used to assess our hypotheses. Results for analyses testing the differences between groups were considered statistically significant at *P* less than .005. This conservative level of significance is based on the Bonferroni correction, to adjust for any possible effects related to multiple testing. All data entry and analyses were conducted by using SPSS, version 8,[a] for Windows.

RESULTS

A total of 78 individuals were approached between May and September 1999 to obtain the participants for sample 1. Ten declined, 9 were considered ineligible because of medical or prosthetic instability, 5 did not return the follow-up questionnaire, and 4 indicated that they experienced changes in their health or prosthetic status during the retest interval. Complete information was received from 50 of the 56 (89%) eligible individuals who agreed to participate.

The demographics for both samples are presented in table 1. Overall, the 2 samples are generally similar, with the majority of the participants being men and having a transtibial amputation. Mean age for the samples were similar (58y vs 60y); however, sample 1 consisted of individuals who on average had their amputation for fewer years and wore their prosthesis for about 4 hours fewer a week. Finally, the cause of amputation was primarily related to vascular insufficiency (58%) in sample 1 and nonvascular etiology (53%) in sample 2.

Table 2: Descriptive Statistics for ABC Scale Time 1 and Time 2, the 2MWT, and TUG Test of Lower-Limb Amputees (n=50)

Variable	Median	Mean ± SD	SE*	Range
ABC Scale 1	75.6	74.8±21.1	6.3	18.1–100
ABC Scale 2	73.8	74.6±20.0	6.0	22.4–100
2MWT (ms)	100.7	98.8±36.9	—	13.2–158.2
TUG test (s)	14.5	19.4±15.5	—	6.9–95.0

* SE of the measurement (where $SE=SD\sqrt{1-r}$).

Sample 1 participants varied widely in their ability to perform the mobility tests (table 2). Recorded distances for the 2MWT ranged from 13 to 158m with a mean ± SD of 98.8±36.9m. Time to complete the TUG ranged from 6.9 to 95 seconds, with a mean of 19.4±15.5 seconds. Most (n=31, 57%) individuals used no mobility aid, whereas 15 (28%) used a cane and 9 (18%) used a walker.

Reliability

Mean scores for each application of the ABC Scale were almost identical (ABC time 1 mean, 74.8±21.1 vs ABC time 2 mean, 74.6±20.0), as can be seen in table 2. Review of individual responses revealed that 1 participant recorded a substantial increase (40 points) from initial to follow-up ABC scores (fig 1) with no indication that he had a change in medical or prosthetic condition between the test intervals. The internal consistency of the ABC Scale resulted in a Cronbach α of .93. Scaling by stepwise deletion of each item resulted in Cronbach α ranging from .92 to .93, indicating that the overall α did not improve with the exclusion of any individual item. The 4-week test retest reliability of the summary score was an ICC of .91 (F=.08; 95% CI, .84–.95). Interitem test-retest reliability ranged from .53 (F=.03; 95% CI, .30–.70) for confidence walking around the house to .87 (F=1.61; 95% CI, .78–.90) for riding an escalator. None of the F values for the retest ICCs were statistically significant (all *P*>.05). The SE of measure-

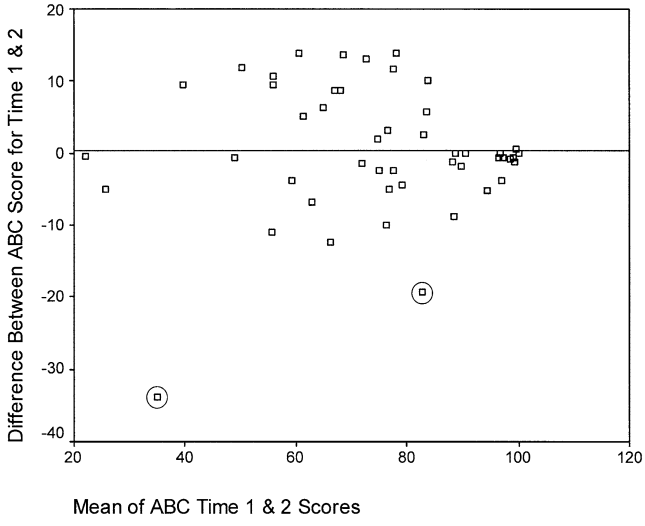

Fig 1. Bland-Altman plot of scores difference in ABC scores at times 1 and 2 versus average of ABC scores from times 1 and 2.

Table 3: Discrimination Between Clinically Important Factors (n=329)

Groups	n	Mean ABC Score	*t* Statistic	95% CI
Amputation level				
Transtibial	243	64.9*	0.569	−5.0 to 9.1
Transfemoral	86	62.9		
Amputation cause				
Vascular	153	50.6	8.96	20.1–31.4
Other	176	76.4		
Mobility device use				
No device	158	82.6	14.2	30.1–39.8
Device used	171	47.6		
Automatic stepping				
No	124	40.7	24.0	33.0–43.2
Yes	205	78.8		

* Groups not statistically different at $P<.005$.

ment for the initial and follow-up ABC scores, 6.3 and 6.0, respectively, were very similar (see table 2).

The Bland-Altman plot (see fig 1) shows that the majority of the data points were closely distributed around the zero line, suggesting strong reliability. Further, the points appear to be approximately equally distributed above and below the line, which indicates minimal bias; however, 2 points (circled) are more than 17.6 units (or 2 SDs) away from the zero line. The mean difference ($mean_{diff}$) ± SD between tests 1 and 2 was .341±8.8. The closer the mean difference is to 0, the better the reliability. The true value of the mean difference will lie somewhere between −2.158 and 2.84. The inclusion of 0 in the CIs provides additional evidence of minimal bias between the measurements. Observation of figure 1 reveals a clustering of high scores with zero difference along the right side of the zero line. Were repeatability of the ABC Scale perfect, we would expect to see a rectangular plot indicating equal reliability across the range of the scale. This plot suggests that the lowest reliability exists in the middle of the scale.

Validity

The relationship observed between the ABC Scale and the 2MWT was a positive association ($r=.72$, $P<.001$; 95% CI, .56–.84). A negative association ($r=-.70$, $P<.001$; 95% CI, −.82 to −.53) was observed between the ABC Scale and the TUG (see table 3). These correlations indicate that the ABC score accounted for approximately 49% of the variance in both of the mobility tests. The scattergrams for these relationships (figs 2, 3) showed a linear relationship between these measures. Furthermore, the correlation with the 2MWT and TUG test improved only marginally when the scores were log-transformed, suggesting that the relationships with the ABC Scale are not curvilinear. Evidence of a ceiling effect between the TUG and the ABC Scale is apparent given the cluster of data points at the lower right-hand corner of figure 3.

No statistical difference was observed for mean ABC scores according to amputation level, as evidenced by the inclusion of 0 in the CI (see table 3). The ABC Scale did discriminate between groups defined on the basis of other clinical factors. Large and statistically significant mean differences were evident for amputation cause, mobility device use, and automatic stepping ability. Similar results were seen for the multigroup comparisons in table 4. Moreover, the differences between each of the group levels for prosthesis wearing time, stair climbing ability, and walking distance differed statistically, as evidenced by the nonoverlapping 95% CIs.

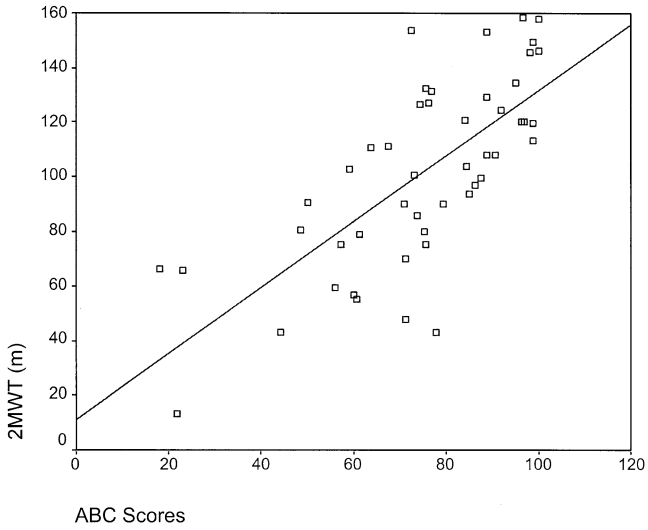

Fig 2. Scatterplot comparing 2MWT and ABC scores.

DISCUSSION

Self-efficacy is defined as an individual's perceived ability or self-confidence.[20] The ABC Scale is a self-efficacy measure that assesses confidence across 16 situation-specific activities that require varying amounts of balance. It has been postulated that individuals with low self-efficacy may participate in fewer activities.[4] Measures of self-efficacy have been correlated with measures of activities of daily living, of instrumental activities of daily living,[5] and, more recently, of social activities among individuals who have a lower-limb amputation.[2] Given that the ultimate goal of rehabilitation of individuals with impairments and disabilities is to return them to participation in social activities,[21] the ABC Scale may provide useful clinical information about patients. In the present study, we investigated the measurement properties of the ABC Scale among community-living individuals who have had a lower-limb amputation.

Overall reliability of the ABC Scale in the present study was excellent[22-24] and matches reports from studies of other popu-

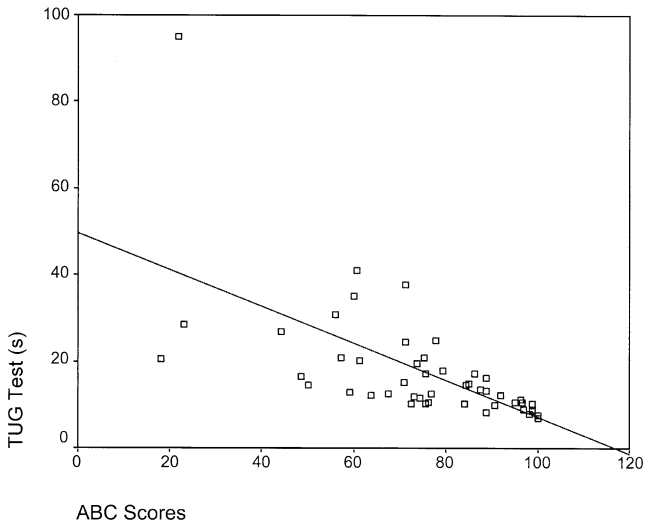

Fig 3. Scatterplot comparing the TUG test with ABC scores.

Table 4: ANOVA for Multigroup Comparison

Group	n	Mean ABC Score	95% CI	F Value
Wearing time (h/wk)				44.1
<84	96	45.8	40.3–51.0	
84.0–104.9	96	64.2	58.6–69.7	
≥105	137	77.6	73.7–81.5	
Stair climbing				190.08
Unable	78	31.7	27.2–36.3	
With help	76	56.4	51.5–61.3	
Independent	175	82.4	79.7–85.2	
Walking distance				97.3
<1 block	105	42.0	36.8–47.2	
1 block	89	62.3	57.5–67.2	
Unlimited	135	83.2	80.0–86.3	

NOTE. All between-groups findings statistically significant at $P<.005$.

lations. The internal consistency—and test-retest reliability—were similar to those seen in studies of older people. Our retest results are especially encouraging, because our retest period was over a 4-week period, whereas Powell and Myers[4] used a 2-week test-retest period. Review of the data from the Bland-Altman plots revealed large variation in the scores reported by 2 individuals, whose ABC score changed by more than 2 SDs at the retest. Measurement error may account for these findings. The follow-up questionnaire was sent to the home address, and so the time 2 ABC score may have been completed in more comfortable and familiar surroundings than the outpatient clinic. It is possible that the different environments may have influenced the perceived scores by a substantial margin in 2 individuals. Individuals may have tried out various activities before completing the second questionnaire. Experiential learning while performing specific activities is among the most powerful methods of influencing our perceptions of confidence.[20] Ideally, the repeatability of individual scores, as assessed by the difference between the scores of the same test taken at 2 different times when little or no change has occurred, should be zero. In reality, however, some variation is inevitable and must be expected. We found the mean difference in scores (.341) was slightly greater than zero, suggesting systematically higher scores on retesting and the possibility of bias. However, this is a single estimate from 1 study, and the CIs about this estimate include zero, which suggests that the bias was not statistically significant. Furthermore, all but 2 (<5%) of the data points on the Bland-Altman plot fit within 2 SDs. This finding suggests that a minimal bias exists between the 2 measurements.[18] The uneven distribution about and the cluster of data points around the right end (ABC score of 100) of the zero line in figure 1 suggests that repeatability is not even throughout the range of scores on the ABC Scale. It is better among those individuals who reported a high balance confidence score than among participants who scored in the middle of the scale. This difference suggests that a ceiling effect may exist.[23]

The SE of the measurement indicates the variability that can be attributed to measurement error or, put another way, it is the degree to which the score can be expected to vary with repeated measurement.[17] Our findings suggest that the true score for an individual's balance confidence will be within approximately ±6 points of their recorded score. Therefore, based on the data from our sample, repeated scores of more than 6 points would suggest that real change has occurred.[25] Additional studies to investigate the minimally important clinical difference of the ABC Scale are recommended.

We found good support for construct validity of the ABC Scale, especially when compared against measures that assess walking performance. The hypothesized correlations between the ABC Scale and the 2MWT and the TUG test were both significant and in the predicted direction. The strength of the relationships was considerable: as much as 50% of the variation in the 2MWT and the TUG was accounted for by the ABC score.

The ABC Scale also differentiated between clinical groups, although 1 of our 7 proposed null hypotheses for discriminant validity was not rejected. The ABC score for transtibial versus transfemoral amputation level did not differ statistically. The reason for this is unclear, although this finding was noted for tools developed to assess perceived prosthetic capability among amputees.[26,27] The relatively small difference in mean ABC scores between individuals with transtibial versus transfemoral amputation was surprising. It refutes our hypothesis that a difference would exist because of the absence of the knee joint. This absence would, in turn, lead to reduced proprioception, increased sway, and ultimately a lower perceived balance efficacy among individuals with a transfemoral amputation.

In the present study, we used a convenience sample of individuals to assess the reliability of the ABC Scale. It is possible that these subjects, who were sampled between May and September, may provide different results than a random sample from all qualified subjects. Moreover, 15 individuals either declined to participate or did not participate fully in this study; therefore, our estimate of the scale's reliability may be biased. The generalizability of the results is further limited to individuals who have a unilateral and not bilateral amputation. We did not consider individuals with bilateral amputation because these individuals are a small proportion of the active patients associated with the clinic. The present study also included a broad range of individuals, both young and old, and individuals whose amputation was for vascular versus other reasons. It is possible that our reliability coefficients may be inflated because of the heterogeneity of the sample.[23] Studies that compensate for these limitations might be worth consideration. However, the reliability sample we used closely resembles the entire outpatient clinic population, reflected by the validity sample used in the present study. Therefore, we are confident that the results presented here provide good estimates of the reliability of the ABC Scale for the amputee population. Studies examining the responsiveness and ongoing investigation of the validity of the ABC Scale are encouraged.

CONCLUSION

The results of the present study provide independent evidence that the ABC Scale is a psychometrically sound tool. We found it to be reliable and valid in our clinical sample of individuals with lower-extremity amputation, a group in whom balance confidence is a special concern. If research continues to bear favorable results, addressing balance confidence may provide an adjunct approach to the rehabilitation of this special clinical population. The ABC Scale provides a method of identifying individuals who have balance confidence issues.

References

1. Miller WC, Speechley M, Deathe B. The prevalence and risk factors of falling and fear of falling among lower extremity amputees. Arch Phys Med Rehabil 2001;82:1031-7.
2. Miller WC, Deathe B, Speechley M. The influence of falling, fear of falling, and balance confidence on prosthetic mobility and social activity among individuals with a lower extremity amputation. Arch Phys Med Rehabil 2001;82:1238-44.

3. Tinetti M, Mendes de Leon CF, Doucette JT, Baker KI. Fear of falling and fall-related efficacy in relationship to functioning among community-living elders. J Gerontol 1994;49:M140-7.
4. Powell L, Myers A. The Activities-specific Balance Confidence (ABC) scale. J Gerontol A Biol Sci Med Sci 1995;50:M28-34.
5. Myers AM, Fletcher PC, Myers AH, Sherk W. Discriminative and evaluative properties of the Activities-specific Balance Confidence (ABC) scale. J Gerontol A Biol Sci Med Sci 1998;53; M287-94.
6. Myers AM, Powell L, Maki BE, Holliday PJ, Brawley LR, Sherk W. Psychological indicators of balance confidence: relationship to actual and perceived abilities. J Gerontol A Biol Sci Med Sci 1996;51:M37-43.
7. Richardson JK, Sandman D, Vela S. A focused exercise regimen improves clinical measures of balance in patients with peripheral neuropathy. Arch Phys Med Rehabil 2001;82:205-9.
8. Medell JL, Alexander NB. A clinical measure of maximal and rapid stepping in older women J Gerontol A Biol Sci Med Sci 2000;55:M429-33.
9. Whitney SL, Hudak MT, Marchetti GE. The Activities-specific Balance Confidence Scale and the Dizziness Handicap Inventory: a comparison. J Vestib Res 1999;9:253-9.
10. Donner A, Eliasziw M. Sample size requirements for reliability studies. Stat Med 1987;6:441-8.
11. McGavin CR, Gupta SP, McHardy GJ. Twelve-minute walking test for assessing disability in chronic bronchitis. BMJ 1976; 1(6013):822-3.
12. Butland RJ, Pang J, Gross ER, Woodcock AA, Geddes DM. Two-, six-, and 12-minute walking test in respiratory disease. BMJ (Clin Res Ed) 1982;284:1607-8.
13. Podsiadlo E, Richardson S. The Timed "Up & Go": a test of basic functional mobility for frail elderly persons. J Am Geriatr Soc 1991;39:142-8.
14. Schoppen T, Boonstra A, Groothoff JW, de Vries J, Goeken LN, Eisma WH. The Timed "up & go" test: reliability and validity in persons with unilateral lower limb amputation. Arch Phys Med Rehabil 1999;80:825-8.
15. Gauthier-Gagnon C, Grisé MC. Prosthetic Profile of the Amputee Questionnaire: validity and reliability. Arch Phys Med Rehabil 1994;75:1309-14.
16. Shrout PE, Fleiss JL. Intraclass correlations: uses in assessing rater reliability. Psychol Bull 1979;19:3-11.
17. Domholdt E. Physical therapy research: principles and applications. 2nd ed. Philadelphia: WB Saunders; 2000.
18. Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. Lancet 1986; 1:307-10.
19. Rossier P, Wade D. Validity and reliability comparison of 4 mobility measures in patients presenting with neurologic impairment. Arch Phys Med Rehabil 2001;82:9-13.
20. Bandura A. Self-efficacy mechanism human agency. Am Psychol 1982;37:122-47.
21. World Health Organization. The international classification of impairments, disabilities, and handicaps. Geneva: WHO; 1980.
22. Andersen EM. Criteria for assessing the tools of disability outcomes research. Arch Phys Med Rehabil 2000;81 Suppl 2:S15-20.
23. Streiner DL, Norman GR. Health measurement scales: a practical guide to their development and use. 2nd ed. New York: Oxford Univ Pr; 1995.
24. Nunnally JC, Bernstein IH. Psychometric theory. 3rd ed. New York: McGraw-Hill; 1995.
25. Eliasziw M, Young SL, Woodbury MG, Fryday-Field K. Statistical methodology for the concurrent assessment of interrater and intrarater reliability: using goniometric measurements as an example. Phys Ther 1994:74;777-88.
26. Miller WC, Deathe AB, Speechley M. Lower extremity prosthetic mobility: a comparison of 3 self-report scales. Arch Phys Med Rehabil 2001;82:1432-40.
27. Legro MW, Reiber GD, Smith DG, del Aguila M, Larsen J, Boone D. Prosthesis Evaluation Questionnaire for persons with lower limb amputations: assessing prothesis-related quality of life. Arch Phys Med Rehabil 1998;79:931-8.

Supplier

a. SPSS Inc, 233 S Wacker Dr, 11th Fl, Chicago, IL 60606.