

## ACTIVITIES-SPECIFIC BALANCE CONFIDENCE (ABC) SCALE

### Type of test:

- **Time to administer:** 5-10 minutes to administer.
- **Clinical Comments:** This test, along with a functional balance test, such as the Berg, will tell the clinician if their client is over confident or under confident about falling.

**Purpose/population for which tool was developed:** The ABC is one of several tools designed to measure an individual's confidence in his/her ability to perform daily activities without falling. These tools were designed for use with older adults. The ABC was designed to include a wider continuum of activity difficulty and more detailed item descriptors than the Falls Efficacy Scale (FES) (see Appendix 2)<sup>1</sup> Fear of falling is important to assess because it is a likely confound in measuring postural performance. Deterioration in balance may result from activity restriction mediated by the fear of falling.<sup>1</sup>

**When appropriate to use:** Asking a yes/no question on fear of falling (e.g., "are you fearful of falling?") may indicate when the full scale should be used. This may work better for females than males.<sup>2</sup> The internal consistency does not decrease appreciably with the deletion of a few items; (12 of 16 are necessary). If fewer items are used, compute a total score by dividing by the number of items answered.

**Scaling:** Ordinal. Scale has 16 items (score 0-1600 possible). The score is recorded as a percentage (%), with 100% the highest level of confidence. Max score of 1600 divided by 16 items = 100%

### Equipment needed:

- Questionnaire (Appendix 1) and pencil

**Directions:** See appendix 1. The authors do not state what to do if the client says that it is an activity they never do. The questions are arranged in a hierarchical order yet this may not be true for all clients.

**Reliability:** The ABC demonstrates a high level of internal consistency.

Reference	N=	Sample Description	Reliability Statistic
<b>Internal Consistency: (how the items in the scale relate to each other and to the group of items as a whole). Reliability statistic= Chronbach's alpha (<math>\alpha</math>)</b>			
Powell, 1995 <sup>1</sup>	60	Seniors living at home over 65 years old.	$\alpha = .96$
Steffen, 2005 <sup>3</sup>	87	community-dwelling seniors	.93
Huang, 2009 <sup>4</sup>	168	Community dwelling, "less frail", >60 y.o. in Taiwan	Baseline: 0.96 8 weeks: 0.98
Talley, 2008 <sup>5</sup>	213	Older woman at risk of falling	0.95 at baseline and 12 weeks
Salbach, 2006 <sup>6</sup>	51	People with stroke ABC-French Canadian version	$\alpha = .94$ .93
Cattaneo, 2007 <sup>7</sup>	20	Multiple Sclerosis	0.92
Peretz, 2006 <sup>8</sup>	157	Parkinson's patients and patients with high level gait disorders (HLGD) with ABC scale and modified ABC-6 scale; HLGD N=70, controls N=68, PD N=19.	ABC-HLGD $\alpha = .90$ ABC-Control $\alpha = .83$ ABC-PD $\alpha = .91$ ABC 6-HLGD $\alpha = .81$ ABC 6-Control $\alpha = .86$ ABC 6-PD $\alpha = .90$

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**Test Retest Reliability:** Test retest reliability varied with the ABC from 0.70 to 0.92. The MDC was more divergent with the highest MDC = 38% change and the lowest was 13%.

<i>Reference</i>	<i>Population</i>	<i>N</i>	<i>X [SD] (time one)</i>	<i>Time Between Testing</i>	<i>Test/Retest Reliability</i>	<i>MDC<sub>95</sub></i>
Holbein-Jenny, 2005 <sup>9</sup>	Personal care home residents; Age Range 74-92	26	24.9	1-2 weeks	ICC (1,1) = 0.70	37.8
Miller, 2003 <sup>10</sup>	Patients from outpatient clinic	50	21.1	4 weeks	ICC (3,1) = 0.91	17.5
Parry, 2001 (UK ABC) <sup>11</sup>	Consecutive, ambulant, new, and return patients (n=119) and their friends and relatives (n=74)	39		1 week	ICC = 0.89	
Powell, 1995 <sup>1</sup>	Community dwelling older adults; Age: 65-95	21	27.7	2 weeks.	r = 0.92;	21.7
Steffen, 2008 <sup>12</sup>	Community dwelling adults with Parkinsonism	36	70(19)	1 week	ICC(2,1) = 0.94	13%
Cattaneo, 2007 <sup>7</sup>	Multiple Sclerosis	20	57(25)	3 days	ICC(2,1) = 0.92	20%

### **Validity:**

Although there often is no gold standard to measure the ABC against, the ABC is correlated with other self-administered tests and demonstrates Bandura's work on self-efficacy "that perceived capability rather than actual physical ability is more predictive of behavior in a given domain". Clinical application of this would include working on the patient's confidence in their balance as well as objective balance activities.

**Construct / Concurrent Validity:** It is difficult to always differentiate between these 2 types of validity. Evaluating this property requires a "gold standard" measure with which to compare the tests results. Such a "gold standard" is often not available.

<i>Population</i>	<i>N =</i>	<i>Support for Validity</i>
Young and older women	34 Young Unimpaired = 12 Older Unimpaired = 12 Older Impaired = 10	Correlations between ABC and maximal strength (.75), rapid step test (-.54). <sup>13</sup>
Seniors over 65	60	ABC is correlated with FES (-.84), Physical Self-Efficacy Scale Scores (.49), PANAS scale (.12) <sup>1</sup> , walking speed (.56) and FES (-.65). <sup>2</sup>
Pts with hip fx	56	There is <b>no</b> correlation between changes in FIM scores and change in ABC scores for 56 patients in a specialized rehabilitation program. <sup>14</sup> The Falls-Efficacy Scale (FES) and ABC were <b>not</b> correlated in this population.
Pts in a balance and vestibular clinic	71	Correlation between dizziness handicap inventory (DHI) and ABC (age 26-88) was -.64. <sup>15</sup>
Mild balance impairment	177  184	ABC correlated with tandem stance time, unipedal stance time, tandem walking, TUG, 6MWT, Tinetti's Performance Oriented Mobility Assessment (.52-.63). <sup>16</sup>  Patients with stooping, crouching, and kneeling (SCK) difficulties, characteristics associated with SCK included ABC Scale score. (OR=0.97; 95% CI, 0.95-0.99). <sup>17</sup>
Community dwelling elderly	50	ABC correlated with BBS (.75) and TUG (.70). <sup>18</sup> (Mean age = 82)

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Vestibular dysfunction	137	ABC with DGI = .58. This relationship increases for those with mild to moderate vestibular weakness and decreases for those with severe or total vestibular weakness. <sup>19</sup> (Mean age = 61)
	32	ABC not correlated with Four Square Step Test (FSST) <sup>20</sup>
4-month follow-up of hip fx pts.	73	ABC correlated with BBS (.77), FES (.68), Gait Speed (.65), Modified Barthel (.67). <sup>21</sup>
Community dwelling women 65-75 yrs of age	140	ABC with Simple & Complex walking while talking test (WWT) (-0.55 & -.54) <sup>22</sup>
Community dwelling >60 yr old seniors in Taiwan	168	ABC with FES baseline/8weeks (.88/.89) Geriatric Rear of falling (GFFM) (-0.57/-.61) <sup>4</sup>
Ambulatory adults with a wide range of balance function	first session n=12 second session n=11	ABC with BESTest (.685), Stability Limits/Verticality section (0.78) Anticipatory Postural Adjustments section( 0.41) <sup>23</sup>
Patients with Fibromyalgia	34	ABC with BESTest = 0.60, Fibromyalgia Impact Questionnaire (FIQ) severity -0.64, fatigue (-.60), stiffness(-.40), physical impairment(-.71), pain(-.56), anxiety (-.40) and depression (-.55) <sup>24</sup>
Older adults living in retirement villages	167	ABC with Tandem stance (0.39), one leg stance ( 0.41), TUG (-0.58) <sup>25</sup>
Older woman at risk of falling	213	ABC with survey of Activities and Fear of Falling in the Elderly (SAFE) (-0.65), age (-0.23), BBS (0.57), gait speed ( 0.51), TUG( -0.39), # Act. Restrictions (-0.43), geriatric depression scale ( -0.38), fall history (-0.20), # Medical Conditions (-0.32), Assistive device use( 0.51), 8 subscales of the SF-36 (.68-.24). No correlation with ABC and outdoor falls. <sup>5</sup>
Patients with stroke	25	ABC with DGI (0.68), BBS (.83) <sup>26</sup>
Community dwelling seniors	63	ABC with Reintegration to Normal Living (RNL) Index, (0.53) <sup>27</sup>
	91	ABC with Ambulatory Self-Confidence Questionnaire (ASCQ) (0.87) <sup>28</sup>
Subjects with Multiple Sclerosis (MS)	51	ABC with BBS(0.48), DGI (0.54), TUG (-0.38), DI(-0.45), and DHI (-0.70) <sup>29</sup>
The instrument went through three phases in its development. Therapists (15) and clients receiving therapy (12) gave input, then 60 seniors went through structured interviews, and finally 21 subjects were administered the ABC scale and balance testing. <sup>1</sup>		
Bandura's work on self-efficacy suggests "that perceived capability rather than actual physical ability is more predictive of behavior in a given domain" <sup>2,30</sup>		

**Predictive Validity: The cut off for high confidence is generally  $\geq 80\%$ , with a cutoff of  $< 67\%$  for a Fear of Falling.**

<i>Population</i>	<i>N</i>	<i>Results</i>
Senior Living Facility	287	Using regression and ABC scores as the dependent variable; depression, use of walking aid, slow gait speed and race were independent variables that were significant <sup>31</sup> . Individuals with ABC scores less than 50% were 2.6 times more likely to be depressed, were 3.8 times more likely to walk slower than .9m/s, were 4.4 times more likely to use a walking aid and were 5.4 times more likely to show impaired gait/balance than individuals with ABC scores greater than 50%. <sup>31</sup>
Seniors over 65	60	There was no significant difference on ABC scores for people who fell versus people who did not fall, with a cutoff score = 80. <sup>1</sup>
	278	ABC DGI.(0.49) <sup>32</sup> Scores were lower for women than men on total score and stair climbing item. <sup>32</sup>

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Community Dwelling Elderly	60 100	Using the median of the ABC scores of 80% (or 800 score) as a “cut-point” for differentiation of high-confidence (N=10) versus the rest of the subjects (N=11), the groups were statistically different with sway (M/L) and walking speed. <sup>2</sup> For subjects $\geq 75$ years, independently able to walk 10m for five trials and able to understand instructions, a score of <67% was considered to be classified as Fear of Falling (FoF). These individuals demonstrated a slower preferred gait velocity (higher stride-length and stride-time variability) than those without FoF, but no specific gait or balance parameters, or the ability to dual task while walking were found suggesting the FoF group uses a slower cadence as an adaptive mechanism. <sup>33</sup>
Homebound	11	Scores of < 50% correspond to homebound elderly or the person cannot leave their home without assist. <sup>34</sup>
Mild balance impaired Elderly	167 80	ABC Odds ratio for frequent falling (adjusted for age and sex) was .71 p = NS; <sup>16</sup> Average ABC for people who fall 48% and non-fallers 87.5% <sup>35</sup>
Community Seniors	60	Average ABC for people who fall 38% and non-fallers 81% <sup>1</sup>
Patients with PD, 40-85 yrs of age	120	Chinese version of ABC >80 (high) reduction of fall risk; Odds Ratio = 0.06 (95% CI:0.01, 0.65, p=0.020) 50-80 (moderate) reduction of fall risk: Odds Ratio = 0.10 (95% CI: 0.01, 1.29, p=NS) <sup>36</sup>
Clients with Lower Limb Amputations	415	For subjects with <80% (n=269), the mean QoL was 6.84 (2.17), $\geq 80$ -100% (n= 146), the mean QoL (0 worse to 10 best) was 8.42(1.47) demonstrating those with a higher balance confidence reported a higher quality of life. <sup>37</sup>
Clients with previous hip fracture	79	ABC Odds ratio (adjusted for age, gender, chronic conditions and medications) for falls was NS except for indoor falls 0.98(.96-1.00) <sup>38</sup>
Older women with low bone mass	98	The ABC score was the highest predictor (p<.001) of community balance and mobility scale scores (R <sup>2</sup> =.57) and normal-paced gait (R <sup>2</sup> =.34) in this population when using regression analysis. This supports Bandura’s Theory that perceived capability is more predictive of activity than actual physical ability. <sup>30</sup>
Post polio Syndrome (PPS)	172	ABC with Health Related Quality of Life (HRQOL), (0.4) <sup>39</sup>

**Sensitivity/specificity: The sensitivity and specificity of the ABC is varied among diagnosis/condition.**

<b>Population</b>	<b>N =</b>	<b>Cutoff Score and Description</b>
People with and without balance dysfunction	174	Using a cut off of 85, the ABC identifies balance dysfunction for all subjects (sensitivity = 83%, specificity = 90%). For people younger than 60 using a cut off of 96 (sensitivity = 96%, specificity = 81%). For people over 60 a cut off of 85 (Sensitivity = 85%, Specificity = 81%). <sup>40</sup>
Seniors from YMCA, nursing home and Senior residencies	125	Predicts falls using a cut off of 67 and above (sensitivity = 84%, specificity = 88%) The article combined the BBS and reaction time with the ABC to get a better predictive model. <sup>41</sup>
Clients with PD	49	With a cut off of 76%, the ABC predicts falls (Sensitivity = 84%, specificity = 63%. <sup>42</sup>
Clients with PD	124	With a cut off ABC score of 80%, ABC was assessed with subjects with PD and controls on the Push and Release test and the Pull test. Push and Release – 1 <sup>st</sup> Trial (Sensitivity =90 %, Specificity =38%) Push and Release – 3 <sup>rd</sup> Trial (Sensitivity =90%, Specificity =55%) Pull – 1 <sup>st</sup> Trial (Sensitivity = 85%, Specificity = 51%) Pull 3 <sup>rd</sup> Trial (Sensitivity = 65%, Specificity = 75%) <sup>43</sup>
Clients with PD and High Level gait disturbances	157	ABC-16 demonstrated ability to differentiate between PD and controls (Sensitivity =58%, Specificity = 96%) and HLGD and controls (Sensitivity = 96%, Specificity = 96%) <sup>8</sup>
Subject with Multiple sclerosis (MS)	51	With an ABC cutoff of 40%, ABC was able to predict fallers (previous mo) in subjects with MS (Sensitivity =65%, Specificity = 77%) <sup>29</sup>

NOTE: Clinicians need to choose a cut-off score based on the specific purpose for which the test is used.

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### Responsiveness / sensitivity to change:

Summary: Generally, the ABC demonstrated change with intervention. This is a measure of confidence of balance. Clinicians should address both the specific balance activity as well as the balance confidence.

<i>Population descriptor</i>	<i>N</i>	<i>Reference and intervention</i>	<i>Responsive: Yes / No</i>	<i>Data supporting responsiveness</i>
Clients with moderate to severe loss of vestibular function	12	<b>Brown, 2001</b> <sup>44</sup> Mean of 3.8 months, 4.6 visits of physical therapy. Mean age 65	Yes	Initial ABC score=35 d/c ABC score=44 Mean change 10%, p<.04
People with peripheral neuropathy	20	<b>Richardson, 2001</b> <sup>45</sup> 3 week intervention vs. control group	No	<i>Average change after intervention</i> ABC scale showed no change; both groups started at 80% <i>Group Differences Significant?</i> No
Clients with hip fx	56	<b>Petrella, 2000</b> <sup>14</sup> Rehabilitation Program The FES was better in measuring the significance of the change. Had the experiment been continued past d/c the change score may have been larger or had there been more concentration on behavioral determinants of well-being the responsiveness may have been higher.	Yes	<i>Average change after intervention</i> Before=30 (23)% After=39 (22) % (p = .01)  The power of the test was below .80
Pts with migraine-related vestibulopathy and vestibular dysfunction with hx of migraine	39	<b>Whitney, 2000</b> <sup>46</sup> Intervention: Physical Therapy, 4.9 visits for 4 months.	Yes	<i>Average change after intervention.</i> Change of 14 points on ABC scale (p<.01)
Pts with vestibular disorders with and without history of migraine headaches	62	<b>Wrisley, 2002</b> <sup>47</sup> Physical Therapy, mean of 4 visits over mean of 3 mo.	Yes	<i>Ave. change after intervention:</i> Yes Group with migraine: 35% improvement Control Group without migraine: 50% decline <i>Group differences significant:</i> Yes Group with migraine: Initial to d/c: 54-67% Δ 12, p<.01 Control Group without migraines: Initial to d/c: 52% -76% Δ 25, p<.001
Persons in Retirement homes	63	<b>Myers, 1998</b> <sup>34</sup> 26 week exercise intervention vs control (Average age = 60-94)	Yes	<i>Group differences significant?</i> Yes 35% improvement for exercise group
Community dwelling adults with chronic stroke	61	<b>Marigold, 2005</b> <sup>48</sup> Agility training (N=30) or Stretching/Weight shift (N=31) 3x/wk for 10 weeks and 1 mo follow-up.	No	Randomized; No difference btw groups Agility Training: 68(19) to 74(18) to 76(17); p<.001 Stretching/Weight shift: 58(21) to 68(19) to 65(20); p<.001
Subjects with Multiple sclerosis	44	<b>Cattaneo, Sept. 2007</b> <sup>56</sup> ( <i>Clinical Rehabilitation</i> ) Three groups: 1)Balance rehab with both motor and sensory strategies 2) Balance rehab with only sensory strategies 3)"Conventional therapy" – no specific balance strategies	No	Pre to Post difference in scores: 1) 2.32 2) 12.55 3) 0.9 No statistical difference for groups.

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<i>Population descriptor</i>	<i>N</i>	<i>Reference and intervention</i>	<i>Responsive: Yes / No</i>	<i>Data supporting responsiveness</i>
Hip or Knee replacement	27	<b>Myers, 1998</b> <sup>49</sup>	Yes	Baseline pre-surgery 72(17)% 6 weeks post-op 68(17)% 6 mos post-op 83(15)% Significant change across time. 59% improvement pre-op to 6 mos post-op.
Vestibular Disorders 20-40 and matched 60-80.	38	<b>Whitney, 2002</b> <sup>50</sup>	Yes	20-40 year old: 57(24) initial; 67(23) at discharge 60-80 year old: 68(25) initial; 80(20) at discharge A clinically significant change on ABC set at 10 or greater.
Central Vestibular dysfunction	45	<b>Brown, 2006</b> <sup>51</sup> Custom-designed PT program Mean = 5 visits, over 5 months	Yes	Pre to post change 13(23)%; p<.01 Mean d/c score: 55%
Chronic central and peripheral vestibular disorders	28	<b>Danilov, 2007</b> <sup>52</sup> Patients were treated with the BrainPort balance device; 1-1.5 hr, BID 3-4.5 days/week. Treatment included joint mobility exercises and balance training using the BrainPort balance device.	Yes	The average ABC score increased 38%. Pre-treatment 61.72(20) Post-treatment 78.0 (19) p<0.001
Community dwelling balance impaired	27  23	<b>Hess, 2005</b> <sup>53</sup> 10 wks; light intensity strength training program. Experimental (N=13) Control (N=14)  <b>Silsupadol, 2009</b> <sup>54</sup> 45 min, 3x/wk x 4wk a) Single task balance training n=8 b) Dual task balance training w/fixed priority instructions n= 8 c) Dual task balance training variable-priority instructions n= 7	Yes  Yes – only with single task training	Experimental: Pre-exercise 80(15); Post 88(10); p<.04 Control Group: Pre-exercise 81(12); Post 81(14);  a) Change =13.20 b) Change = 2.31 c) Change = 3.94 Difference between groups with single-task differs from dual-task p<.001
Older woman at risk of falling	213	<b>Talley, 2008</b> <sup>55</sup> Subjects were treated with a 12 week, randomized controlled trial of fall prevention.	No	ABC mean change in score = -1.1. Possible ceiling effect for less frail subjects.
Osteoporosis women	98	<b>Liu-Ambrose, 2004</b> <sup>57</sup> Randomized control; 13 weeks 1. Resistance (N=32) 2. Agility Training (N=34) 3. General strengthening (N=32) Improvement in group 1 and 2 = 6% small effect size (-.19)	Yes	1. 76(23) to 81(17)%; p<.03 2. 78(15) to 83(12)%; p<.03 3. 76(24) to 76(18)%; p = NS
Independent community dwelling older women with or at risk for osteoporosis	31	<b>Murphy, 2008</b> <sup>58</sup> 5 Form, Yang Style Tai Chi 2x/wk for 12 wks. Tested pre intervention, post intervention, 6 months post and 12 months post.	No	No significant change in the ABC Scale following 12 week training at any retest time increment.



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Community dwelling balance impaired	60	<i>Sze, 2008</i> <sup>55</sup> Hong Kong community dwellers with high risk of falls participated in Falls prevention clinic (12 sessions 1x/wk) followed by community step down program (falls prevention education, weekly ex class, and 2 home visits in following 9 mos).	Yes	Pre-program 109(30)** ; post-program 123(21)** $p = 0.001$  **seeking clarification of score totals from author
	184	<i>Hernandez, 2008</i> <sup>17</sup> Older adults with at least mild balance impairment grouped by ability to stoop, crouch, or kneel (SCK)	Yes	A) No SCK difficulty 83(14)% B) Low SCK difficulty 73(19)% C) Hi SCK difficulty 65(18)%
	157	<i>Peretz, 2006</i> <sup>8</sup> Subjects in three groups to study ABC -16 and ABC-6 with balance impaired and controls. A) High level gait disorders (HLGD) N=70 B) PD N=19 C) Controls N=68	Yes	A) HLGD 60(19)% B) PD 81(13)% C) Controls 96(2)%
Older adults living in retirement villages	167	<i>Cyarto, 2008</i> <sup>25</sup> Exercise twice weekly for 20 weeks, subjects clustered in three groups: 1) home based exercise program n=38 2) group based exercise program n=81 3) supervised walking program n=48	No	Change: 1) 6(3)% change significant $p < .05$ 32% of group increased ABC score at least 10% 2) -2(2)% NS 3) 16% of group increased ABC score at least 10% 4) -5(2)% NS 15% of group increased ABC score at least 10%  Discordance was noted between changes in ABC scores with improvement in balance ability, but little to no improvement in balance confidence as well as minimal change in balance ability and improvement in balance confidence.
House hold or community ambulators with stroke	24	<i>Yang, 2008</i> <sup>59</sup> RCT to research the effects of virtual reality-based training on community ambulation in subjects post stroke. Control group (n=9) received treadmill training, 20 min/session, 3x/wk x 3wk. Experimental group (n=11) received virtual reality based treadmill training, 20min/session, 3x/wk x 3 wk.	No	Significant changes in pre-training to post-training in the experimental group. Pre-training 79(12), post training 87(7), $p = 0.05$ , but this was not maintained at one month post training.
	30	<i>Lord, 2008</i> <sup>60</sup> Subjects with stroke were seen for treatment in a hospital based setting under the direction of a physical therapist (n=16) or in the community supervised by a physical therapist assistant.	No	There was a noted decrease in second testing indicating a possible over estimation in the initial study.(at 95%CI) a) post intervention decline was -0.6 (-14.8 to 13.5) $p = NS$ b) six month follow up change was -4.9 (-18.8 to 9.0) $p = NS$

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Patients with chronic dizziness, ages 34-82 yr.	32	<b>Badaracco, 2007</b> <sup>61</sup> Patients underwent vestibular rehabilitation daily x 2 hrs/day for 12 sessions.	Yes	ABC significant change was 10%; $p < 0.001$
Parkinson's Disease	19	<b>Lun, 2005</b> <sup>62</sup> In home and PT groups, PT 2x/week for 8 wks.	No	No significant change in home or PT group
Incomplete SCI (iSCI)	4	<b>Musselman, 2009</b> <sup>63</sup> Body weight supported treadmill training (BWSTT) and skill training for walking.	Yes-varied	Increase in balance confidence during skilled training (median = 11% of change). Reduction in scores with BWSTT (medium = -2% of change).
"Less Frail" Taiwanese community dwellers . 60 yr old	168	<b>Huang, 2009</b> <sup>4</sup> Pre and post Fear of Falling Intervention Program X 8 weeks 1) Standardized response 2) Grouped by mobility improvement 3) Grouped by mobility deterioration	No	1) 0.41 2) 7.93 3) 6.61
Non demented seniors at risk for falls	25	<b>McKinley, 2008</b> <sup>64</sup> 10 wk (40hr, 2hr, 2x/wk) pre, post and follow up testing 1) Tango class 2) walk group		Percent change from baseline to post treatment: 1) Tango class = 17% 2) Walk group = 2%
Healthy community dwelling seniors	36	<b>Westlake, 2007</b> <sup>65</sup> "FallProof Program" balance training (n=17) and falls prevention education (n=19). Balance training included 3x/wk x 8 wk.	No	No significant change in the balance training group. Scores significantly declined in the education group. Pre 87.5(10.711), post 79(24.2), $p = 0.047$
Patients with essential tremor (ET)	58	<b>Parisi, 2006</b> <sup>66</sup> Studied three groups: 1) Essential tremor without head tremor (N=14) 2) Essential tremor with head tremor (N=16) 3) Control Group (N=28)	Yes	Statistically significant differences in group mean scores (difference = 11%, 95% CI, 1.3-19.6) between control group and ET with head tremor.
Subjects on Antiepileptic Medications (AED)	30	<b>Fife, 2006</b> <sup>67</sup> Effects of three medications: A) Lamotrigine (N=10) B) Carbamazepine (N=10) C) Gabapentin (N=10)	No	No statistical difference in ABC scores A) 86% B) 82% C) 81%

### Reference data

	<i>Subjects</i>	<i>ABC Scale</i>
Myers, et al (1996) <sup>2</sup> did not find a statistical difference between genders. This may be due to the small sample size (N=21).	Females mean=58%	66%
	Males mean=66%	
	(N=43) Females	58%
	(N=26) Non-fearful	74%
	(N=16) Fearful but not avoiding	69%
	(N=18) Fearful and avoiding	31%



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<b>Medell, 2000</b> <sup>13</sup>	(N=12), mean age=21; young adults	97%
	(N=12) mean age=69; unimpaired older adults	95%
	(N=10) Older adults with balance impairments	69%
<b>Miller (2000)</b> found that age, gender, marital status, education, employment status, income, years since amputation, mobility device, walking ability, comorbidity, joint pain, fall injury, number of medications, alcohol intake, perceived health, ADL limitation, depression, adaptation to amputation and prosthesis demonstrated significant differences in subgroups on the ABC scale. Interestingly there were no differences in ABC scores for level of amputation or number of falls in the past year. <sup>68</sup>	(N=230) People with amputation due to vascular complications.	54%
	(N=205) People with amputations due to nonvascular reasons.	75%
<b>Steffen (2005)</b> The ABC scores comparing males and females are statistically different using a Mann-Whitney U analysis. As age increased the ABC scores decreased.	(N=32) Males, community-dwelling	89%
	(N=51) Females, community-dwelling	94%
<b>Hakim 2004</b> (N=94) seniors > 60 years old, <sup>69</sup>	(N=41) no exercise	66(26)%
	(N=29) exercise	84(18)%
	(N=29) Tai Chi	87(9)%
<b>Shumany Cook 2000</b> (N=18) <sup>70</sup>	Young controls	96(5)%
	Elderly non-faller	93(7)%
	Elderly fallers	53(17)%
<b>Holbein-Jenny (2005)</b> (N=26); residents of care homes <sup>9</sup>		54(25)%; CI = 44-64%
<b>Salbach, 2006</b> (N=89); people with stroke <sup>71</sup>	Ischemic stroke	59%
	Hemorrhage stroke	60%
	First stroke	59%
	Recurrent stroke	60%
	L hemiparesis	57%
	R hemiparesis	61%
	Walker	46(21)
	Cane	54(18)
	No assistive device	67(21)
Note: Other ABC scores by groups given in article showed age and gender differences (need reference)	(N=82) Mean age 59; no health problems	91%
	(N=25) Mean age 69; diabetes	70%
	(N=56) Mean age 72; heart problems	77%
	(N=93) Mean age 65; foot problems	79%
	(N=69) Mean age 64; vision problems	79%
	(N=20) Mean age 64; bladder problems	76%
	(N=170) Arthritis, Osteoporosis and COPD	Low 80's
	(N=225) Physically active	89%
	(N=17) Somewhat physically active	69%
	(N=42) Not at all active	74%
<b>Brauer, 2000</b> <sup>72</sup>	(N=65) Non-fallers; mean age = 72	87(1)%
	(N=35) Fallers; mean age = 74	87(2)%
	(N=16) Frequent fallers; mean age = 74	85(4)%
	(N=19) Recurrent fallers; mean age = 75	82(3)%

## ACTIVITIES-SPECIFIC BALANCE CONFIDENCE (ABC) SCALE

<b>Whitney, 2005</b> <sup>40</sup>	(N=32) Control under 60 y/o	98(4)%; 97-100
	(N=49) Control over 60 y/o	88(19)%; 79-95
	(N=47) Balance dysfunction under 60 y/o	65(22)%; 58-72
	(N=46) Balance dysfunction over 60 y/o	61(22)%; 54-68
<b>Liu-Ambrose, 2008</b> <sup>22</sup>	(N=140) Community dwelling women 65-75	88(13)%
<b>Herman, 2009</b> <sup>32</sup>	(N=166) Women <u>mean age=76</u>	90(11)%
	(N=112) Men, <u>mean age=77</u>	95(8)%
	(N=166) Women, <u>mean age=76</u> – only stair item	87(20)%
	(N=112) Men, <u>mean age=77</u> – only stair item	94(12)%
<b>Letgers, 2006</b> <sup>39</sup> Subjects with Post Polio Syndrome (PPS)	(N=9) Age 40-49	42(16-80)%
	(N=80) Age 50-59	43(2-95)%
	(N=54) Age 60-69	46(2-91)%
	(N=19) Age 70-79	30(8-70)%
	(N= 7) Age ≥ 80	39(1-51)%
	Overall median score	42(1-95)%
<b>Cattaneo, 2006</b> <sup>29</sup> Subjects with Multiple Sclerosis (MS)	Whole Group (N=51)	51(26)%
	Fallers (N=20)	37(19)%
	Non Fallers (N=31)	61(25)%
<b>Whitney, 2004</b> <sup>73</sup> DHI = Dizziness Handicapped Inventory. DHI groups listed are significantly different.	(N=23) Mild DHI (0-30)	74(14)%
	(N=44) Moderate DHI (31-60)	55(22)%
	(N=18) Severe DHI (61-100)	28(16)%
<b>Adken, 2003</b> <sup>74</sup>	(N=58) PD clients	69%
	(N=30) Control	93%
<b>Wolf, 2003</b> (N=286) Residents in congregate living facilities. <sup>75</sup>	(N=145) Tai Chi participants	53(19)%
	(N=141) Wellness participants	50(21)%
<b>Whitehead, 2003</b> <sup>21</sup>	(N=73) Hip fracture, 4 mo. follow-up	50(23)%

Table 1			Total ABC %		
Age (y)	Gender	N	Mean	Standard Deviation	Confidence Interval
50-59	Male	9	93	7	88-98
	Female	15	95	5	92-98
60-69	Male	9	96	6	92-100
	Female	10	93	5	89-96
70-79	Male	10	96	4	93-98
	Female	14	86	15	77-95
80+	Male	4	91	13	71-100
	Female	12	82	16	72-92
<b>TOTAL SAMPLE</b>		83	91	11	89-93

Steffen, TM, Mollinger, LA (2005). Age- and gender-related test performance in community-dwelling adults: multi-directional reach test, berg balance scale, sharpened Romberg tests, activities-specific balance confidence scale, and physical performance test. *Journal of Neurological Physical Therapy* 29(4): 181-188.

# ACTIVITIES-SPECIFIC BALANCE CONFIDENCE (ABC) SCALE

## **Ceiling and floor effect:**

Summary: There appears to be no ceiling effect in general with the ABC

In the ABC<sub>UK</sub> version 10% of subjects reached the ceiling (193 consecutive, new and return patients and their friends and relatives attending falls and syncope facility)<sup>11</sup>

Slabach (2006) reported no ceiling effect for patients within one year of stroke.<sup>8</sup>

Kressig (2001) reports no ceiling or floor effect in a study of 287 seniors living in senior living facilities<sup>31</sup>

Cattaneo (2006) reports no ceiling effect on ABC with subjects with multiple sclerosis<sup>29</sup>

**Interpreting results:** The ABC is situational-specific when assessing balance confidence in daily activities.<sup>1</sup> A review of the “Fear of Falling” concept can be found in *Physical Therapy*, 82 (3), 2002 article by K. Legters. In 67 people with PD the best predictors for total ABC score was gait measured by UPDRS item 29 and item 30 (pre-test) and one-legged stance test.<sup>76</sup>

## **Other:**

- The original authors suggest that therapists need to explore the reasons why people do not do certain activities.<sup>2</sup>
- There is a modified British version of the ABC. The version still has 16 items and is scaled 0-100%. Words have been changed to correspond to the culture, (N=189)  $\alpha=.98$ , test-retest reliability = .89.<sup>11</sup>
- There is a modified ABC for Canadian French speaking people (ABC-CF). Cultural language changes have been made. (n=35)  $\alpha = .93$ .<sup>6</sup>
- Whitney et al (2000) developed the following formula to allow for determination of clinically significant improvement [ABC score] + [100 – DHI<sup>1</sup> score] + [4 x DGI<sup>2</sup>] which give a maximum score of 296. Clinical experience showed >270 no impairment, 240-270 minimal impairment, 120-240 moderate impairment and below 120 severe impairment.<sup>46</sup>
- Blanchard et al (2007) have established a similar scale, the “Activities Specific Fall Caution” Scale (AFC) for residential living seniors for residential care specific content.<sup>77</sup>
- The ABC-S is a simplified version of the ABC; developed to have a more friendly use cue format and eliminates the question regarding walking on ice. The ABC-S has  $\alpha = 0.86$  demonstrating good internal consistency. (n=197).<sup>78</sup>
- Peretz et al (2006) developed a short version of the ABC (ABC-6). The ABC-6 included questions # 5, 6, 13, 14, 15, and 16 from the original ABC scale. ABC-6  $\alpha = .081-0.90$  in subjects with high level gait disorders (HLGD), PD, and controls. (N= 157).<sup>8</sup>

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### ADMINISTRATION

The ABC can be self-administered or administered via personal or telephone interview. Larger typeset should be used for self-administration, while an enlarged version of the rating scale on an index card will facilitate in-person interviews. Regardless of method of administration, each respondent should be queried concerning their understanding of instructions, and probed regarding difficulty answering specific items.

### INSTRUCTIONS TO PARTICIPANTS

For each of the following, please indicate your level of confidence in doing the activity without losing your balance or becoming unsteady by choosing one of the percentage points on the scale from 0% to 100%. If you do not currently do the activity in question, try and imagine how confident you would be if you had to do the activity. If you normally use a walking aid to do the activity or hold onto someone, rate your confidence as if you were using these supports. If you have any questions about answering any of these items, please ask the administrator.

### INSTRUCTIONS FOR SCORING

The ABC is an 16 point scale and ratings should consist of whole numbers (0 to 100) for each item. Total the ratings (possible range = 0 to 1600) and divide by 16 to get each subject's ABC score. If a subject qualifies his/her response to items #2, #9, #11, #14 or #15 (different ratings for "up" vs "down" or "onto" vs "off"), solicit separate ratings and use the lowest confidence of the two (as this will limit the entire activity, for instance likelihood of using the stairs).

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\*Powell LE & Myers AM. The Activities-specific Balance Confidence (ABC) Scale. *J Gerontol Med Sci* 1995; 50 (1):M28-34





# ACTIVITIES-SPECIFIC BALANCE CONFIDENCE (ABC) SCALE

## Appendix 2

### **Confidence in Mobility** (a.k.a. Falls Efficacy Scale –FES)

**Directions:** Ask subject or have him/her fill out this questionnaire:

“How confident are you that you can...[activity 1-10 below]...without falling?”

Ask the subject to rate his/her confidence on a scale of 1-10 (1=extreme confidence; 10=no confidence at all).

Name: \_\_\_\_\_ Date: \_\_\_\_\_

<p>“How confident are you that you can.....[    ]..... without falling?”</p> <p style="text-align: center;">             1      2      3      4      5      6      7      8      9      10  <b>extreme confidence</b> ←-----→ <b>no confidence at all</b> </p>
--

<i>Score</i>	<i>Activity</i>
	Take a bath or shower
	Reach into cabinets or closets
	Prepare meals not requiring carrying heavy or hot objects
	Walk around the house
	Get in and out of bed
	Answer the door or telephone
	Get in and out of a chair
	Get dressed and undressed
	Light housekeeping
	Simple shopping
	<b>TOTAL SCORE</b>

**Reliability: Internal consistency: = .90<sup>1</sup> Test-retest: (r=.71) in 18 cognitively intact seniors over 65.**