

Reliability of the Chinese Version of the Activities-specific Balance Confidence Scale

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Abstract

Purpose—To translate the Activities-specific Balance Confidence (ABC) Scale into a Chinese version and assess the reliability between Chinese versions and between Chinese and English versions of this outcome measure.

Method—Descriptive study using a 4-week test-retest design. Data were collected from a convenience sample of community living Chinese immigrants. Of the 79 participants, data from 71 subjects were included in the analysis. Two subsamples were formed to assess the reliability between Chinese versions (n=33) and between Chinese and English versions (n=38) of the scale.

Results—Internal consistency of the ABC was 0.98. Test-retest reliability was ICC=0.87 (95% CI, 0.76–0.93) for the Chinese versions and ICC = 0.88 (95% CI, 0.78–0.94) for Chinese and English versions. The total group ICC=.90 (95% CI, 0.84–0.94).

Conclusions—Balance confidence has been identified as an important area for clinical and research inquiry however collecting this information from Chinese speaking individuals has been limited by a lack of language specific measures. The Chinese version of the ABC has demonstrated acceptable measurement properties in this sample and should permit measurement of this unique construct in the Chinese population.

Introduction

In 1977, Bandura defined self-efficacy as people's beliefs about their abilities to perform certain activities, tasks and skills that influence other behaviours [1]. Thirteen years later, Tinetti conceptualized a specialized form of self-efficacy, calling it fall related self-efficacy or balance confidence [2]. In 1995, Powell and Myers expanded the concept of balance confidence and theorized that reduced confidence in one's ability to maintain balance while performing specific tasks may result in behaviour avoidance which could lead to a sedentary lifestyle ultimately leading to an increase risk of falling [3]. Falling persists as a major cause of injury, disability, and mortality in the elderly population, contributing to healthcare costs

that would otherwise be avoidable. This may be because many elderly individuals lead this kind of inactive lifestyle [4,5].

In a prospective longitudinal study of the elderly Chinese population (aged 65 years and over), Chu et al reported that 19.3% of individuals experienced a fall over a one-year period [6]. Ho et al, in their cross-sectional study of Chinese seniors, also reported similar findings of 18% of individuals experiencing one fall over a 12-month period [7]. The Chinese population, at 26%, is the largest visible minority in Canada [8]. This percentage is even higher in the province of British Columbia and metropolitan Vancouver, at 44% and 47% respectively [8,9]. In fact, individuals of Chinese descent make up 17% of the total population in Vancouver [9]. With such a large representation of Chinese individuals in Canadian society, we often exclude many Chinese-speaking subjects who would otherwise be eligible for participation in our research studies because of the lack of outcome measures in Chinese.

Currently, there are no measurements of balance confidence in Chinese. Although there are three measures of balance confidence in the English language (The Activities-specific Confidence (ABC) Scale [3], ABC-UK [10], and the Confidence in maintaining Balance Scale [11]), none of them have been translated into the Chinese language. The purpose of this study was to translate the Activities-specific Balance Confidence Scale into a Chinese version and assess the reliability between Chinese versions and between Chinese and English versions of this outcome measure.

Methods

Sample

The study sample was drawn from the Chinese immigrant population in Vancouver, BC, Canada. It was obligatory that participants were at least 50 years of age and to have resided in Canada for over 5 years. Only immigrants were included in this study because of their fluency in Chinese, which would allow them to answer the questionnaire with ease. In contrast, most second-generation Chinese people may have difficulty reading and writing in the Chinese language. Participants were excluded if they had a medical history of stroke, Parkinson's disease, other neurological conditions that may have influenced their balance, or if their data was incomplete. A convenience sample was assembled using advertisements that were posted in public areas frequented by the Chinese community (i.e. Chinatown, churches, community centres) and by targeting individuals known to the investigators. Two subsamples were targeted from the people who responded. Solely Chinese speaking individuals were assigned to a Chinese subsample (n=33) to assess the reliability of the Chinese version of the ABC Scale and participants capable of speaking both English and Chinese were assigned to a bilingual subsample (n=38) to assess the reliability between the English and Chinese versions of the ABC Scale.

Procedure

Data were prospectively collected at two time points approximately 4 weeks apart. Information regarding medications, assistive devices, and fall history was also collected.

Demographic data included date of birth, sex, marital status, date of immigration to Canada, exposure to English prior to immigration (i.e. English as a Second Language classes), employment status, and education level. Following the interviews, participants independently completed the Activity-specific Balance Confidence (ABC) Scale. Participants from the Chinese subsample completed the Chinese version of the ABC Scale at both test and retest intervals, while subjects from the bilingual subsample were randomly assigned either the English or Chinese version at the testing interval and then completed the 'other' version four weeks later at the retest interval. Alternating the Chinese and English versions for the bilingual subgroup eliminated any order effect.

Time 2 data were collected by having the subjects complete their assigned version of the ABC scale as well as answer several questions about any changes in health status over the retest interval. This information was mailed back to the study coordinator using a self-addressed, pre-stamped return envelope. Subjects received up to 2 reminder letters at 2-week intervals if they failed to return the information on time. A second questionnaire was sent out with the second reminder letter. The study was approved by the Behavioural Research Ethics Board at the local University.

Measurement

The ABC Scale measures an individual's perception of balance confidence for a number of ambulatory activities that occur in daily life [3]. This 16-item questionnaire asks individuals to estimate, on a scale of 0 'not confident' to 100% 'completely confident', their confidence in maintaining balance while performing activities such as walking around the house or walking on an icy sidewalk. An overall mean balance confidence score is obtained by summing the percentages of the items and dividing by 16. The English version of the ABC Scale was found to have good test-retest reliability (ICC=0.92) and internal consistency ($\alpha=0.96$) in a sample of 60 community seniors (aged 65–95) [3]. The reliability and validity of the ABC Scale has also been evaluated in various populations such as the elderly [3,12], people with lower limb amputations [13], and individuals with stroke [14].

The Chinese version of the questionnaire used in the study was translated into Chinese and then back-translated into English by two independent bilingual translators. Backward translation is commonly used to verify that translation was properly conducted. The forward-translator was a Master's student at the University of British Columbia who had previously completed an undergraduate degree in physical therapy from the Kaohsiung Medical University in Taiwan and the back-translator was an undergraduate science student who was bilingual in Chinese and English. Discrepancies in the different versions were resolved through discussion between the translators and a mediator, a post-doctorate fellow at the University of British Columbia who was born and raised in Hong Kong. The post-doctorate fellow also independently back-translated the ABC Scale a second time. Although the forward and back translators were from different countries, the written language of Chinese is universal in both Taiwan and Hong Kong.

Analyses

Using Donner and Eliasziw tables to indicate sample size for determining reliability using intraclass correlation coefficient (ICC) we determined a maximum of approximately 40 subjects would be necessary [15]. The sample size was derived based on testing the hypothesis of detecting a significant difference between a minimal standard and expected ICC at a pre-selected alpha level (0.05) and beta (0.20). Previous studies indicate the reliability of the ABC to be greater than or equal to ICC=0.85. The minimum acceptable ICC for the proposed study was set at 0.70 and expected at 0.90. We oversampled to compensate for non-response.

After data collection was complete, we analysed the data in the following three groups: 1) all individuals in the sample, 2) subsample of individuals who completed only Chinese versions of the ABC Scale, and 3) subsample of individuals who completed both Chinese and English versions of the ABC Scale. Means and proportions were calculated for the demographic data for all three groups. Differences in age and education level between the subsamples were tested using independent *t*-test and chi-square test respectively. Total mean ABC scores, standard deviations, and individual item mean scores were calculated for the subsamples. Differences in total mean ABC scores and individual item mean scores were tested using independent *t*-tests. Internal consistency of the ABC Scale was ascertained by calculating Cronbach's α for the baseline ABC scores for all three groups. As outlined in Shrout and Fleiss [16], test-retest reliability for summary scores and individual items was determined using one-way ANOVAs to calculate ICC (1,1) and 95% confidence intervals for the subsamples. Standard errors of measurement were calculated for the subsamples by multiplying the standard deviation of baseline ABC score with the square root of one minus the ICC. All data entry and analyses were performed by using SPSS, version 11.5, for Windows.

Results

Seventy-nine individuals were recruited and provided baseline data. During the follow-up period, two subjects passed away, 1 moved back to Asia, and 4 did not return the follow-up questionnaire (all from the Chinese subsample), leaving 72 (91%) subjects who completed the follow-up questionnaire. One subject's information in the bilingual subsample was excluded from the analysis because his baseline and follow-up questionnaires contained incomplete data.

Table 1 presents the demographics for the 71 subjects included in the analysis. The mean age of the primarily female (58%) sample was 65.9 ± 12.0 years. Subjects in the Chinese subsample were significantly ($p < 0.05$) older and less educated than the subjects in the bilingual subsample.

Table 2 shows the total ABC mean scores and individual item mean scores for both subsamples. Participants in the Chinese subsample had a significantly ($p < 0.05$) lower total ABC mean scores at time one (72.9 ± 23.9) than subjects in the bilingual subsample (82.8 ± 16.5). The items that participants in both subsamples were most confident and least confident to perform without losing their balance included walking around the house and

walking on icy sidewalks respectively. Items that showed significant difference ($p < 0.05$) between the two subsamples included reaching at eye level, walking outside to nearby car, getting in and out of a car, and riding an escalator holding the rail.

The internal consistency of the ABC Scale was determined using data from the Chinese subsample at time 1 and the Chinese versions of the ABC Scale for the bilingual subsample. This analysis yielded a high Cronbach α of 0.98. No change in the alpha was observed with item-by-item deletion.

The total score ICC for the Chinese subsample was $ICC = 0.87$ (95% CI, 0.76–0.93) and $ICC = 0.88$ (95% CI, 0.78–0.94) for the bilingual subsample (table 3). Individual item test-retest reliability for the Chinese subsample ranged from 0.45 (95% CI, 0.14–0.68) for confidence walking around the house to 0.89 (95% CI, 0.78–0.94) for riding an escalator without holding the rail. Individual item test-retest reliability for the bilingual subsample ranged from 0.45 (95% CI, 0.36–0.77) for standing on a chair to reach to 0.94 (95% CI, 0.89–0.97) for walking across a parking lot.

Discussion

Providing health care transcends language. With the increasing flow of people between different countries, it is critical for clinicians to overcome language barriers and provide the best care to all patients. In the area of balance confidence, many studies have shown that Caucasian people have problems with their balance confidence [17–24], but we have been unable to obtain valid information from the Chinese population in this area because of a lack of reliable translated tools. Thus, there is need for balance confidence tools to be translated into the Chinese language. To our knowledge this is the first published study to assess the reliability of the ABC Scale translated into the Chinese language.

We found the internal consistency to be $\alpha = 0.98$ and according to Andresen's criteria for assessing the tools of disability outcomes, $\alpha > 0.80$ means excellent reliability [25]. Our high Cronbach α indicated that the items of the ABC scale measured a single unidimensional construct. In comparison to other studies, our Cronbach α was similar those determined by Miller et al ($\alpha = 0.93$) [13] and Powel et al ($\alpha = 0.96$) [3].

Our ICCs for each subsample and the total group summary scores are comparable to coefficients obtained by Powell et al ($ICC = 0.92$), Miller et al ($ICC = 0.91$), and Botner et al ($ICC = 0.85$) for the English speaking, North American, older adult, amputee and stroke population respectively [3,13,14]. The only other known translation of the ABC Scale is a Swedish version with a reported reliability of $k = 0.80$ [26]. According to Andresen's criteria for assessing the tools of disability outcomes, an $ICC > 0.75$ and $k > 0.75$ mean excellent reliability. [25]. While the total score ICCs across all of the samples in our study exceed the standard some of the individual item coefficients do not. Of particular interest is the "walk around the house" item which had an $ICC = 0.54$ for the total group. Coefficients of similar magnitudes have been reported for this item [13, 14]. Based on our analysis (data not shown) this item could be dropped if scale development relied only on statistical methods as the reliability was not substantially different if it was eliminated. However from a clinical

perspective this item anchors the easier range of factors and provides information regarding a very basic activity that may challenge balance confidence and therefore may require clinical attention.

The mean score of participants in the Chinese subsample was similar to the mean ABC score of non-fearful community-dwelling elderly in a study examining balance confidence by Myers et al [24] who studied older Canadians. The mean score of subjects in the bilingual subsample was comparable to the mean ABC score of elderly individuals with high mobility in another study by Myers et al [12]. Meyers et al proposed that individuals with an ABC score of less than 80 would greatly benefit from treatment to improve their balance confidence [12]. Although this was not the primary purpose of this study, it was interesting to note that the participants in this study had problems with their balance confidence and this suggests that balance confidence may be an issue within the elderly Chinese population. Assessing balance confidence is important but even more encouraging is the fact that there are treatments available that can increase balance confidence [27,28]. Our results suggest that there is room for improvement in the elderly Chinese population and thus they could benefit from treatment to improve their confidence. Our translated tool will increase the likelihood that the level of balance confidence among individuals who speak Chinese can be identified.

There were two limitations to our study. First, the reliability of the ABC Scale was determined using a convenience sample of individuals drawn from the Chinese immigrant population in Vancouver, BC, Canada. It is possible that the results derived from this sample might be different than if they had been taken from a random selection of all eligible participants in the Chinese population. A second limitation was that our sample might not reflect the Chinese immigrant population in British Columbia because participants in the bilingual subsample were significantly younger and more educated than subjects in the Chinese subsample. However, BC Statistics show that Chinese immigrants of younger age cohorts tend to have a higher level of education than older cohorts [29-31]. Thus, our sample characteristics are comparable to the demographics of the Chinese immigrant population in British Columbia.

Although there was a significant difference in the age and education level between subjects in the Chinese subsample and participants in the bilingual subsample, the internal consistency and test-retest reliability of the outcome measure remained constant between the two groups. It is possible that the bilingual subsample had higher mean ABC scores because they were younger in age. It is also possible that our results could have been different if the two groups had been comparable in age and education level. However, both subsamples had similar ICCs and this gives us confidence to clinically use the tool. Furthermore, the confidence intervals were relatively tight which gives us a relative certainty that the true values fall in a good range. Further studies examining the reliability, validity and responsiveness of the ABC Scale using a larger randomly selected sample from the Chinese population would tighten confidence intervals and increase the confidence in the intraclass correlation coefficient.

Conclusion

This study provides evidence that the Chinese-translated ABC Scale is a reliable tool. Moreover, little difference in ABC Scale scores was observed for those individuals who completed a Chinese and English version of the test. This translated tool will open doors to clinicians and researchers who may be interested in examining the balance confidence of individuals in the Chinese population.

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Table 1Demographic characteristics of the sample[†]

Parameter	Total, N=71	Chinese, N=33	Bilingual, N=38
	No. of Cases (%)	No. of Cases (%)	No. of Cases (%)
Female	41 (57.7)	22 (66.7)	19 (50.0)
Married	65 (91.5)	31 (93.9)	34 (89.5)
Not working	44 (62.0)	24 (72.7)	20 (52.6)
Attended college	40 (56.3)	12 (36.4)	28 (73.7) [‡]
No exposure to English	42 (59.2)	25 (75.8)	17 (44.7)
Mean age (SD)	65.9 (12.0)	70.1 (10.8)	62.2 (11.9) [‡]
Mean years of immigration (SD)	18.0 (9.4)	16.0 (8.1)	19.7 (10.2)

[†]Parameters presented as binary; thus only one of the factors is shown (e.g. male data not presented)

[‡]Group differences $p < 0.05$

Table 2

Mean ABC scores and individual item mean ABC Scores for the Chinese and bilingual subsamples at baseline

ABC Individual Items	Chinese (N=33)	Bilingual (N=38)
Total ABC Score	72.9	82.8 [†]
ABC Individual Items		
Walk around the house	91.4	93.7
Pick up a slipper from the floor	83.5	88.6
Reach at eye level	82.1	93.3 [†]
Ride an escalator holding the rail	80.5	90.4 [†]
Walk outside to nearby car	80.2	92.4 [†]
Walk across a parking lot	78.5	88.5
Get in and out of a car	77.6	90.8 [†]
Walk up and down stairs	76.0	84.0
Walk in a crowded mall	75.4	85.9
Sweep the floor	74.9	86.6
Reach while standing on your tiptoes	71.2	82.5
Walk up and down a ramp	69.7	80.1
Walk in a crowd or get bumped	67.9	75.8
Stand on a chair to reach	58.8	73.2
Ride an escalator without holding the rail	57.3	72.1
Walk on icy sidewalks	41.8	48.2

[†] Group differences $p < 0.05$

Table 3

Total and item by item ICC and 95% CI of the Chinese version of the ABC Scale for the sample.

Parameter	Total (N=71)		Chinese (N=33)		Bilingual (N=38)	
	ICC	95% CI	ICC	95% CI	ICC	95% CI
Total ABC Score	0.88	0.82–0.92	0.87	0.76–0.93	0.88	0.78–0.94
ABC Individual Items						
Walk around the house	0.54	0.35–0.68	0.45	0.14–0.68	0.76	0.59–0.87
Walk up and down stairs	0.72	0.58–0.81	0.74	0.53–0.86	0.66	0.44–0.81
Pick up a slipper from the floor	0.74	0.61–0.83	0.66	0.42–0.82	0.82	0.68–0.90
Reach at eye level	0.60	0.43–0.73	0.53	0.24–0.74	0.62	0.39–0.78
Reach while standing on your tiptoes	0.79	0.68–0.86	0.80	0.63–0.89	0.75	0.57–0.86
Stand on a chair to reach	0.76	0.64–0.84	0.83	0.68–0.91	0.61	0.36–0.77
Sweep the floor	0.81	0.71–0.88	0.79	0.61–0.89	0.82	0.68–0.90
Walk outside to nearby car	0.72	0.59–0.82	0.68	0.44–0.83	0.76	0.59–0.87
Get in and out of a car	0.73	0.60–0.82	0.67	0.43–0.82	0.83	0.70–0.91
Walk across a parking lot	0.78	0.67–0.86	0.67	0.42–0.82	0.94	0.89–0.97
Walk up and down a ramp	0.76	0.65–0.85	0.69	0.47–0.84	0.84	0.72–0.91
Walk in a crowded mall	0.85	0.76–0.90	0.80	0.63–0.89	0.89	0.80–0.94
Walk in a crowd or get bumped	0.79	0.69–0.87	0.76	0.57–0.87	0.82	0.68–0.90
Ride an escalator holding the rail	0.81	0.71–0.88	0.78	0.61–0.89	0.84	0.71–0.91
Ride an escalator without holding the rail	0.88	0.82–0.93	0.89	0.78–0.94	0.87	0.76–0.93
Walk on icy sidewalks	0.75	0.62–0.83	0.73	0.53–0.86	0.75	0.57–0.86