HSOA Journal of Physical Medicine, Rehabilitation & Disabilities

Research Article

Cross Cultural Adaptation of Berg Balance Scale in Greek for Various Balance Impairments

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Abstract

Rationale, Aim & Objectives

The Berg Balance Scale (BBS) although widely used for assessing balance, it has not been officially adapted into Greek. The aim therefore, of this research is to translate and validate the cross cultural adaptation of the Greek BBS (BBS-GR).

Method

The BBS was adapted according to international guidelines, (forward & backward translation, by four bilingual independent translators). The pre-final BBS-GR was piloted by 6 physiotherapists (1-5 years of experience) and 12 patients (5 men & 7 women, age 76±7 years) in the 1st pilot study and by 10 patients (7 men & 3 women, age 57±20 years) during the 2nd pilot study with balance impairments. After modifications, the final BBS-GR was undertaken to 112 patients (43 men, 69 women, age 67±19 years) for its psychometric testing. It was administered by two raters, twice over a 10 day period, to assess both inter- and test-retest reliability correspondingly. Bland-Altman analysis presented the levels of agreement between measurements. Validity was assessed by correlation of the BBS-GR with the mini-Balance Evaluation Systems Test (mini-BESTest-GR), the Functional Reach Test (FRT), the Timed Up and Go test (TUG) and the questionnaire of Falls Efficacy Scale-International (FES-I).

Results

Minor modifications to one item were required for the final BBS-GR version, and showed: excellent inter-rater reliability (ICC=0.998), test-retest (ICC=0.976) reliability and internal consistency (Cronbach's alpha=0.830). Measurements showed a good level of agreement ($mean_{dif}$=0.126±0.7, p>0.05). Spearman's correlations coefficient (r_s) were strong between the BBS-GR and the mini-BESTest (r_s=0.844, p<0.001), the TUG (r_s=-0.781, p<0.001), the FRT (r_s=0.650, p<0.001) and FES-I (r_s=-0.501, p<0.001), indicating good validity properties. Responsiveness across fallers and non fallers showed a moderate effect size (0.54).

Conclusion

The excellent psychometric characteristics of the Greek BBS highly recommend its utility to the Greek clinical setting. Further research should be undertaken to evaluate responsiveness over treatment conditions.

Keywords: BBS; Balance; Cross-cultural adaptation; Greek; Reliability; Validity

Introduction

The Berg Balance Scale (BBS) [1] constitutes a popular and well established clinical tool for the assessment of balance [2]. It is mainly known as a tool for measuring balance in the elderly [1,3,4] but it has also been tested for its reliability and validity in assessing balance in patients with various neurological diseases, such as stroke [5-7], multiple sclerosis [8], traumatic brain injury [9] and Parkinson's disease [10] with very good results. The BBS also predicts prospective falls in the elderly although it is highly recommended that it also be administered with other outcome measures [11,12].

In relation to other scales of assessing static and dynamic balance, such as the Performance Oriented Mobility Assessment (POMA) or the Balance Evaluation Systems Test (BESTest), the BBS has the advantage of being an easy and quickly administered physical performance test that does need no training or special equipment [13]. The BBS consists of 14 balance tasks such as sitting-to-standing, standing-to sitting, transferring from bed to chair, sitting and standing unsupported, standing with eyes closed, standing with feet together, tandem standing, single limb standing, reaching forward, picking up an object from the floor, alternating foot on stool, looking over the shoulders, and turning 360° [1]. Every task is scored in a 5-point ordinal scale (0-4) and total score ranges from 0 to 56 with higher scores indicating better performance and greater independence [13]. A cut off point of 45/56 has been suggested for independent and safe ambulation [3]. All tasks take no more than 15 minutes to be delivered whereas the BESTest usually takes more than 40 minutes to administer [14]. In addition, compared to single balance tests such as the Romberg's Test, the Functional Reach Test (FRT) or the Timed Up and Go test (TUG), BBS, with the 14 aforementioned functional tasks that it includes, offers a thorough assessment of balance [15,16]. Finally, it is freely available and inexpensive. Thus, the BBS offers several advantages for international adoption for balance assessment [13].

BBS has been adapted into several languages, including Italian [17], Brazilian-Portuguese [18], German [19], Korean [20], Swedish [4], Norwegian [21], Turkish [22], French [23], and Persian [24,25].

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Citation: Lampropoulou S, Gizeli A, Kalivioti C, Billis E, Gedikogloy IA, et al. (2016) Cross Cultural Adaptation of Berg Balance Scale in Greek for Various Balance Impairments. J Phys Med Rehabil Disabil 2: 011.

Received: May 13, 2016; **Accepted:** June 23, 2016; **Published:** July 07, 2016

Adapted version	Study	Sample	Reliability	Validity (correlation with BBS)
Italian	Ottonello et al. [17]	N=85 Neuro/msk	Inter-rater (ICCC=0.99) Cronbach' α=0.95	TBS (r=0.96*) FIM_{total} (r=0.64*) FIM_{motal} (r=0.68*)
Brazilian/portuguese	Miyamoto et al. [18]	N=36 Elderly	Inter-rater (ICCC=0.99) Inter-rater (ICCC=0.98)	- UPDRS II (r=-0.467*) UPDRS II (r=-0.374*)
	Scalzo et al. [26]	N=53 PD	-	HY (r=-0.051*) S & E (r=0.492*)
Korean	Jung et al. [20]	N=18 Stroke	Inter-rater (ICCC=0.97) Inter-rater (ICCC=0.97 physio) (ICCC=0.95 physiatrists)	-
Norwegian	Halsaa et al. [21]	N=83 Elderly	Inter-rater (ICCC=0.988) Cronbach' α=0.87	-
Swedish	Conradsson et al. [4]	N=45 Elderly	Inter-rater (ICCC=0.97)	-
Turkish	Sahin et al. [22]	N=60 Elderly	Inter-rater (ICCC=0.98) Inter-rater (ICCC=0.97)	MBI (r=0.67*) TUG (r=-0.75*)
French	Lemay & Nadeau [23]	N=32 SCI	-	WISCI II (r=0.816*) $SCI\text{-}FAI_{mobility}$ (0.740*) $SCI\text{-}FAI_{parameter}$ (0.747*) $SCI\text{-}FAI_{assistive\ devices}$ (0.714*) 2MWT (r=0.781*) 10MWT (r=0.792*) TUG (r=-0.815*)
Persian	Azad et al. [24]	50 MS	Inter-rater (ICCC=0.99) Cronbach' α=0.9	-
	Salavati et al. [25]	106 Elderly	Intra-rater (ICC=0.95) Inter-rater (ICCC=0.93) Cronbach' α=0.62	TUG (r=-0.74*)

Table 1: Psychometric characteristics of adapted versions of Berg Balance Scale (BBS).

Abbreviations

BBS: Berg Balance Scale
HY: Hoehn & Yahr Staging Scale
FIM: Functional Independence Measure
MBI: Modified Barthel Index
MS: Multiple Sclerosis
2MWT: 2-min walk test
10MWT: 10-min walk test
PD: Parkinson Disease
S & E: Schwab and England Scale
SCI-FAI: Spinal Cord Injury Functional Ambulation Inventory
TBS: Tinetti Balance Scale
TUG: Timed Up and Go
UPDRS II & III: Unified Parkinson's Disease Rating Scale (Subscales II & III)
WISCI II: Walking Index for Spinal Cord Injury (Version II)
*p<0.05

Most translations to the target language have been undertaken according recommendations of using double directed (forward and backward) translation process [17-21]. Psychometric characteristics of reliability and validity of the adapted versions are shown in table 1. Almost all adapted versions showed high intra- and inter-rater reliability and internal consistency [4,18,20,22,24,25]. The Italian [17], Turkish [22], Brazilian-Portuguese [26] and French [23] versions presented good construct and criterion validity in correlation with other balance measurements.

Despite its popularity, BBS has not been cross culturally adapted into the Greek language and setting. A Greek study of Chatzitheodorou et al., [27] tested its reliability regarding gender and the falls' history in 60 elderly with very good results, but this study did not refer to any kind of official translation of the scale with consideration of cross cultural adaptation guidelines and no evaluation of cross cultural validation in Greek has been undertaken. Therefore, the aim of this study is to cross culturally adapt and validate the BBS in Greek adults with balance impairments. An officially translated and scientifically adapted tool would be of great value for a valid balance assessment in Greek patients.

Material and Methods

This study followed three phases. Firstly, a translation of the BBS into Greek was conducted after receiving permission of the original instrument's developer, Dr. Berg. Secondly, a piloting testing of the pre-final version (derived in the initial phase) of the Greek BBS (BBS-GR) followed. Finally, full psychometric evaluation of the final BBS-GR was undertaken including reliability, validity and responsiveness of the measurement tool. The study was approved by ethics review board of the Scientific Committee of the Technological Educational Institute (TEI) of Western Greece.

Translation of the scale

The BBS was translated according to international guidelines as indicated for previous translations of self-reported health

questionnaires [28]. Despite BBS being an observational and not a self-reported scale, translation procedures of such tools usually follow the same guidelines [18,29]. Translation process included five stages: forward translation by two translators (English to Greek) (stage I), a synthesis of the two forward translations, which resulted to the first Greek version of the BBS (stage II). This synthesis version was then translated back in English (Greek-English) by two other translators (stage III) and then a second synthesis of the backward translations was undertaken to produce the *pre-final Greek version* of the BBS (stage IV). This *pre-final version* was piloted among Greek patients and physiotherapists to evaluate the clarity of the translation (stage V) (see "Pilot Study"). The two translators, participating at stage I, were native speakers of Greek language but also with proficient knowledge of English language. The back translators (Stage III) were native speakers of English language and fluent speakers of Greek language. At every stage of translation (forward or backward) one of the translators was a health professional knowing the balance concept and the other was a professional translator with a deep knowledge of the cultural and linguistic nuances of the target language but unaware of the content of the BBS. All translators were instructed to perform a conceptual rather than a literal translation while they kept notes and comments about the translation process. During the back translation (Greek to English) both translators were blinded to the original English instrument. A committee consisted of the translators of the previous stage, a third independent translator and with the guidance of the instructors of the original instrument, whenever it was needed, helped to develop Synthesis I and II and resolve discrepancies or ambiguities in final BBS-GR.

Pilot study

The *pre-final Greek BBS* was piloted in a convenience sample of 12 Greek ambulant patients (5 men & 7 women, age 76±7 years) with balance impairments due to neurological conditions such as chronic stroke, vestibular disorders, cerebellar dysfunctions. They had not any cognitive impairments in order to understand the semantic content of the scale. They were residents of the local area and had been invited to participate in a balance assessment for the purpose of the research project. The scale was also given to 6 qualified physiotherapists (1-5 years of experience) to test the comprehensibleness of the commands and the clarity of the instructions. Newly qualified physiotherapists were on purpose selected to avoid implications to the habitual administration of the scale due to experience. The commands were announced exactly as they were written, to ensure testing clarity of every single phrase. Patients and/or physiotherapists were asked to state as "unclear" any command or instruction that was confusing or non-comprehensible. Instructions and/or items of the instrument that were characterized as "unclear" by at least 20% of the sample were rephrased [18,28]. After modifications a *second pre-final Greek version* was given to another group of 10 Greek ambulant neurological patients (7 men & 3 women, age 57±20 years) with balance impairments for further testing of the measure's clarity. At this stage all commands and instructions were considered understandable and appropriate by the patients so this version was considered the *final Greek version of BBS (BBS-GR)* and was used for subsequent full psychometric testing.

Psychometric testing of the final Greek version of BBS

Sample: Greek ambulant patients with neurological diseases from four main cities of mainland of Greece (Athens, Patras, Aigio, Korinthos) were invited to participate in the study by signing an informed consent form. Participants were recruited during the period June 2013 to November 2014. Inclusion criteria consisted of i) balance impairments (due to chronic neurological diseases or other conditions such as age related or musculoskeletal imbalance), ii) ability to walk (all patients had to be ambulant for testing all items of the scale), iii) Greek as a mother language iv) absence of cognitive impairments (for being able to understand the commands and instructions). Exclusion criteria consisted of i) the presence of any cognitive impairment that would restrict the apprehension of the scale commands ii) non ambulant participants who would not be able to undertake most of the tasks of the scale iii) acute stage of any disease (i.e., acute stroke) that would affect the stability of the patient's condition between repeated measures for reliability assessment iv) children and pregnant women. The sample size was decided according to previous similar research, and it was considered to be sufficient enough for a scale's psychometric assessment [30-32].

Outcome measures: Balance assessment tools were selected for comparison with the BBS to test its validity**.** The mini-Balance Evaluation Systems Test (mini-BESTest) is a recently developed balance tool, and it is the short version of the original BESTest [33]. It was chosen because, similarly to BBS, it consists of 14 functional balance tasks of static and dynamic balance, and it takes 15 minutes to be delivered. Its advantage to other functional balance scales is that its tasks are divided into five balance testing systems (anticipatory adjustments, reactive control, compensatory stepping corrections, sensory orientation and dynamic balance during gait) offering the benefit of identification of the system responsible for the balance deficit [33,34]. Its excellent reliability, its strong correlation with the BBS and other balance measures [30,31,34,35] and its availability to Greek language (www.bestest.us) makes it one of the best choices for comparison with the Greek version of the BBS. The Timed Up and Go Test (TUG) [13,36] and the Functional Reach Test (FRT) [37] are simple balance tests which were chosen due to their high correlation with the BBS, their reliability, their ability to predict falls and because these are of the most frequently simple tests used in clinical and similar research settings [15,38,39]. Additionally to observational assessment tools, balance was self-reported by the participants through the Falls Efficacy Scale-International (FES-I) questionnaire [40]. Its excellent psychometric characteristics in exploring the chance of fall in everyday living activities as well as its availability in the Greek language [32] made its selection the best choice for the validity assessment of the Greek version of the BBS.

Procedure: All measurements administered in outpatients settings, including patient's homes, quiet environment to avoid attention disturbance, and at a convenient time for them, but not close to meals or close to medication times. Patients had been advised in advance to wear comfortable clothes and flat shoes. Apart from the demographic characteristics, patients were asked about how often they had fallen during the last year with answer choices of "never", "once", "twice", "more than two times". At the same time, the FES-I was also completed by the patient. The functional balance tests (BBS, mini-BESTest, TUG, FRT) were then undertaken. After completion of the BBS a 10 minutes break was taken before the administration of the mini-BESTest to eliminate fatigue from the tasks.

Reliability: Reliability concerns the degree of similarity/stability in answers taken in repeated measures (41). To evaluate the test-retest reliability, measurements were repeated 7-10 days after the first testing. During the first session two observers scored the patient performance independently, to examine the inter-rater reliability.

Raters for psychometric testing of the BBS-GR were two physiotherapists of those participating to the 1st pilot study. These procedures (7-10 days between tests time-interval and at least two raters) for reliability assessment were followed by other BBS cross cultural adaptation studies [18]. The internal consistency reliability, which measures the degree that the items of the scale are correlated and thus measuring the same concept was also evaluated [41].

Validity: Validity is referred to the degree to which an instrument measures what it is intended to measure [42]. Criterion validity is used to demonstrate the instrumental validity by comparing the scale being tested with a criterion measure of a same construct that has been established as valid [43]. For the criterion validity, the BBS-GR was correlated with the Greek version of mini-BESTest, previously assessed as having very good (construct) validity with Greek patients with balance disorders [44]. The BBS-GR was also tested for its construct validity (specifically the convergent validity) through the agreement among ratings that have been selected independently by other measurement scales that theoretically should be related [43]. For the convergent validity the final Greek version of BBS was correlated with the TUG, the FRT, and the Greek FES-I.

Responsiveness: BBS-GR was also assessed for its responsiveness, meaning its ability to detect a clinically significant change [45]. However, in the absence of intervention, responsiveness could be used to assess the ability of a measurement tool to reflect change according to an external standard (i.e., to classify patients in two categories) [46]. Responsiveness was assessed through the differences between the two big categories, of "fallers" and "non fallers", where as "fallers" are characterized those who experienced at least one unexplained fall during the last year and "non fallers" those who had not one fall [32].

Ceiling & floor effects: Ceiling and floor effects of the BBS-GR were examined to assure that no great proportion of the testing sample have scores at the bottom (floor) or top (ceiling) of the scale and thus the measurement outcome is able to detect change in performance and does not limit sensitivity [47].

Data Analysis

Tests of all data for normality by use of Kolmogorov-Smirnov test were significant so nonparametric tests were used. Criterion and construct validity were investigated by using Spearman's correlation coefficient (r_s). Correlation between 0.0-0.25 indicates little if any association, 0.26-0.49 low association, 0.50-0.69 moderate association, 0.70-0.89 high association and 0.90-1.00 very high association [48]. Relative reliability was assessed by computing the consistency of the two measurements using Intraclass Correlation Coefficient ($ICC_{2,2}$) where values <0.5 indicate poor reliability, 0.51-0.75 moderate to good reliability and >0.75 excellent reliability [8,45]. The Bland Altman Analysis for absolute reliability was also used to plot the differences between the two measurements against the means for each subject and to show the 'bias' (mean difference) of the measurements and the 95% Limits of Agreement (LoA) [49,50]. One Sample *t*-test for the differences was used to find whether these measurements significantly differed from 0. The internal consistency reliability was measured with the Cronbach's alpha coefficient with accepted value of 0.70 (or 70%), values between 0.70 and 0.80 to demonstrate good internal consistency and values above 0.80 to indicate very good internal consistency [32,48]. Responsiveness of the BBS-GR was calculated as the ratio between the mean difference of the scores between "fallers" and "non fallers" divided by the standard deviation of the baseline score (total score of "fallers" and "non fallers" together) [32,46]. That ratio was considered as the effect size with the value of 0.2 to 0.5 to indicate a small effect, value from 0.5 to 0.8 a moderate and above 0.8 a large effect [51]. Percentage more than 20% of the participants at the highest and lowest score was considered as ceiling and floor effects, accordingly. Skewness of scores distribution, as further estimator of ceiling & floor effect, was presented at total scores [35]. All data were presented as mean ± standard deviation (mean±SD), and statistical significance was set at $p \leq 0.05$. Statistical analysis was performed with SPSS (version 17.0, SPSS for Windows, Chicago, SPSS Inc).

Results

Translation and adaptation of the scale

No significant difficulties were encountered with wording during the forward-backward translation process. A few words that needed some attention especially at the Synthesis and for production of the *1st pre-final Greek version* are presented in table 2. During piloting the *1st pre-final Greek BBS* to patients, items 10 and 11 were characterized as "unclear" by 80% (8 out of 10) of patients as to whether to move their feet and make steps or not. Thus, instructions in item 10 were modified as "turn to look directly behind over your left/right shoulder, without moving your feet from the floor" and instructions for item 11 were modified to "turn completely around in a full circle with small steps". Underlined phrases were added (Table 2). Modifications were made after permission was obtained from Dr. Berg. The *2nd pre-final version* was piloted again. It was characterized as clear and comprehensible by all patients and therefore this was considered as *the final BBS-GR version* (Appendix I) was used for further psychometric testing. Physiotherapists did not have any difficulty in understanding the content of the translated version apart from 1 physiotherapist who found the wording of the instructions in item 13 and for scoring the 3 points statement "a little wordy". However, because the meaning was comprehensible, no action was taken to simplify this item.

Psychometric testing of the final Greek version of BBS

One hundred and twelve patients (43 men, 69 women, age 67±19 years) participated in the study. All of them suffered from balance problems due to neurological and other conditions (musculoskeletal, age related, blindness) for more than two years. Demographic data of the sample as well as the mean score of the BBS-GR according to sex, condition and number of falls are presented in table 3.

Reliability

Inter-rater reliability was excellent for total score (ICC=0.998, 95% Confidence Interval (CI) 0.998-0.999). Test-retest reliability by relating the two repeated measurements was also excellent for total score (ICC=0.976, 95% CI 0.965-0.984). Bland Altman analysis showed that most of the cases were lying between 95% Limits of Agreement (LoA) (-1.224 and 1.476) and the measurements did not differ significantly from 0 (mean difference of the group total BBS score between the two raters was 0.126±0.689, $p>0.05$) (Figure 1). Results about test-retest and inter-rater reliability for each item of the scale are presented in table 4. Internal consistency of the 14 items of the scale was high (Cronbach's a=0.830).

Stages	Translation Procedure	Words/Phrases that needed attention/modification	Final Wording (Meaning in English)
1°	Forward Translation (English-Greek)	Without Difficulties	
2°	Synthesis I	Item Subject Reaching forward	Λειτουργική Δραστηριότητα (Functional task) Εξεταζόμενος (Examinee) Τέντωμα προς τα εμπρός (Stretching forward) First Greek BBS
3°	Backward Translation Greek- English	Τεντωθειτε μπροστα (Stretch forward) Γυριστε να κοιτάξτε κατευθείαν πίσω (Turn to look directly behind) Κάντε μια πλήρη περιστροφή (Doafullturn)	Lean forward Turn around to look straight behind Perform a full rotation
4°	Synthesis II	Turn back Rotate Steps	Γυρίστε προς τα πίσω (Turnback) Στρίψτε (Rotate) Πατήματα (Touch) 1st Pre-final Greek BBS
5°	1st Pilot Testing 2nd Pilot Testing	Difficulty in understanding "turn back" & "rotate 360°" (from patients) All clear and comprehensive	Item 10 Instructions: Turn to look directly behind over your left shoulder, without moving your feet from floor (Underlined phrase added in Greek version after permission) Item 11 Instructions:Turn completely around in a full circle, with small steps (Underlined phrase added in Greek version after permission) 2nd Pre-final Greek BBS No more modifications needed Final Greek BBS (BBS-GR)

Table 2: Modifications during BBS adaptation into Greek. Terms in parenthesis render in English the meaning of the Greek words. At 5th stage, the final wording is in Greek but it added here in English for comprehension.

Characteristics	Percentage (Number)	Mean Score ± SD (Range)
Sex		
Male	38% (43)	48±9 (23-56)
Female	62% (69)	47±9 (6-56)
Condition causing Balance Impairment		
Imbalance (Age related)	37% (42)	50±5 (37-56)
Musculoskeletal	19% (21)	46±8 (23-56)
Stroke	15% (18)	44±14 (6-56)
Multiple Sclerosis	8% (9)	49±5 (41-56)
Parkinson	8% (9)	47±5 (39-53)
Traumatic Brain Injury	4% (4)	55±3 (50-56)
Cerebellum Inflammation	3% (3)	33±18 (20-53)
Blindness	2% (2)	51±0 (51-51)
Cerebrum Inflammation	2% (2)	54±3 (52-56)
Hydrocephalus	1% (1)	49±0 (49-49)
Drop Foot	1% (1)	56±0 (56-56)
Falls over last year		
0	61% (69)	50±6 (6-56)
1	37% (41)	45±9 (20-56)
≥2	2% (2)	46±3 (44-48)

Table 3: Demographic characteristics of the Greek sample (n=112).

Intraclass Correlation Coefficient		
Item	Inter-rater	Test-retest
1	0.972*	0.990*
2	1.000*	0.913*
3	0.983*	0.967*
4	0.902*	0.955*
5	0.995*	0.931*
6	0.984*	0.786*
7	0.975*	0.837*
8	0.982*	0.871*
9	0.995*	0.893*
10	0.976*	0.888*
11	0.995*	0.830*
12	0.999*	0.961*
13	1.000*	0.894*
14	0.999*	0.856*

Table 4: Intra- and inter-rater reliability for every item of the Berg Balance Scale (BBS) as it was measured by Intraclass Correlation Coefficient at 95% confidence interval (ICC) (n=112).

*p<0.001

Validity

The Greek version of BBS was significantly and positively correlated with the Greek mini-BESTest (Figure 2) and with the FRT, whereas negative correlations were yielded with the TUG test and the FES-I questionnaire. Table 5 presents all the correlations revealed.

Responsiveness

The effect size based on fallers and non fallers was moderate, (ES=0.54).

Ceiling & floor effects

Nine percent of the participants (10/112) scored the best score (56/56) on BBS-GR, while 0% (0/112) showed the lowest possible score (0/56) on BBS-GR. The distribution of the scores had a negative skewness (-2.072) (Table 6).

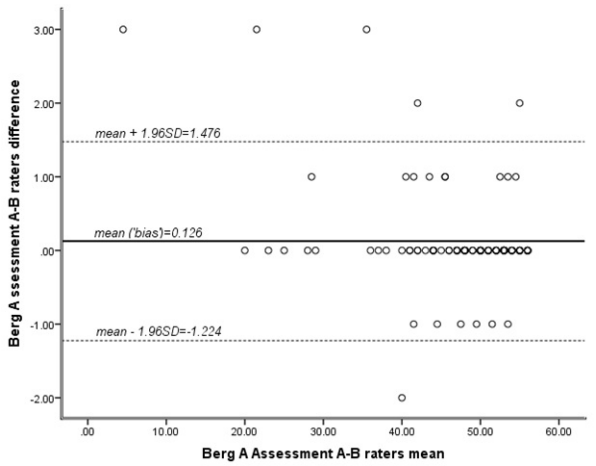

Figure 1: Bland Altman Plot of the difference scores of the two raters measurements in total BBS scores of the sample (n=112) during the first assessment. LoA as the mean difference±1.96SD are presented.

Measurement Outcome	Spearman's rho (r)
Mini-BESTest	0.844*
TUG	-0.781*
FRT	0.650*
FES	-0.501*

Table 5: Correlations of BBS-GR with the other measurement outcomes of the study (n=112).

*Statistically Significant Correlation at p<0.001

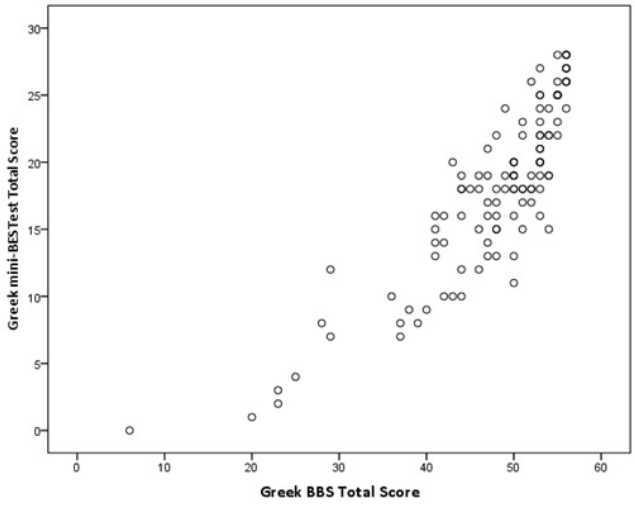

Figure 2: Scatter Plot of total scores of the sample (n=112) showing the relation between Greek BBS and Greek mini-BESTest.

Discussion

This study aimed to cross culturally adapt and validate the BBS into Greek for patients with balance impairments. The main findings in regards the translation and the validation process are discussed and interpreted below.

Translation

Translation procedures were completed without any great difficulties. A few words needed some attention mainly because they had to yield the closest meaning to Greek culture. "Turn" and "rotate" were two words that were used interchangeably between items 10 and 11 by translators and also confused the patients, mainly because these two words have the same meaning in Greek. Difficulties in items 10 and 11 were reported in the Brazilian study [18], because these two words have similar meaning in Brazilian language as well. During piloting the *1st pre-final BBS-GR* to patients, items 10 and 11 were characterized as "unclear". The difficulty that patients found was to understand when they have to use steps to make a turn and when they turn without moving their feet from floor. To help comprehension, the instructions for both items were modified with clear command to make steps or not. The *2nd pre-final version* was piloted again and it was characterized as clear and comprehensible by all patients and therefore it became *the final version of BBS-GR* which is now available in appendix I and further tested for its psychometric characteristics. In the study of Miyamoto et al., [18] Brazilian version items 10 and 11 had been modified in the same way as patients had the same difficulty. In addition, the Turkish translation faced similar difficulty as it was confusing whether patients had to turn head or/and trunk [22]. Physiotherapists in our study did not have any difficulty in understanding the content of the translated version during the 1st pilot. The only item that was characterized as too wordy was item 13 especially for the instructions about the way patients had to place their feet for tandem balance and scoring. However, it was decided by the translation committee not to modify this item mainly because the meaning was clear, in contrary to Brazilian study that simplified the instructions of the referred item [18]. All other items and instructions were considered as clear and comprehensible so the scale had not been given to physiotherapists for 2nd pilot testing. Two of them participated to the psychometric testing of the scale.

Psychometric Testing of the Greek version of BBS

In this part of the study the psychometric properties of the BBS-GR for people with various balance deficits were examined. The first results showed that the BBS-GR has high criterion validity and moderate to high convergence validity. Its ability in giving stable results over time and between raters was proved by the excellent test-retest and inter-rater reliability. No ceiling or floor effects were revealed thus arguing towards the ability of the scale to detect changes in performance. The negative skewness in the distribution of the scores in combination with the moderate responsiveness of the scale may be explained by the sample used in the present study, which consisted of ambulatory patients.

The BBS-GR showed high criterion validity with the Greek mini-BESTest. Other language translations of the BBS have not been correlated with the mini-BESTest probably because this scale has only recently been developed [33]. However, similar results of high correlation between the two scales have been recorded in other validity studies for the mini-BESTest. Specifically, in the studies of Bergstorm et al., [29], Godi et al., [30], Tsang et al., [35] correlations of 0.86, 0.85 and 0.83 respectively, were reported when the scales have been administered to patients with stroke and balance impairments. Our lower correlation of the BBS-GR with the TUG is similar to correlations for the Persian [25] and Turkish study [22], which reported a correlation value of 0.74 and 0.75 respectively. The moderate correlation of the BBS-GR with the FRT that yielded in our study, is not in agreement with the study of Smith et al., [52], which was conducted in 75 patients with stroke (r=0.78). The results may be explained by the differences between our study which included participants with varied neurological conditions, and the Smith et al.,

Measurement Outcome	Mean Score±SD	Skewness	Floor Effect (% of participants with lowest score) (N of patients)	Ceiling Effect (% of participants with highest score) (N of patients)
BBS	48±8	-2.072	0% (0)	9% (10)
Mini-BESTest	18±6	-0.594	0.9% (1)	2.7% (3)
TUG	16±9	2.901	-*	-*
FRT	19±6	0.344	0% (0)	-*
FES	33±12	0.793	1.8% (2)	3.6% (4)

Table 6: Comparison of Greek BBS with Greek mini-Balance Evaluation Systems Test (mini-BESTest), Timed Up & Go (TUG), Functional Reach Test (FRT) and Falls Efficacy Scale International (FES-I) balance measures: Floor and Ceiling Effects (n=112).

*Not applicable

study [52] which used a more homogeneous sample consisting of stroke patients. Our results were more similar to that of Kuruka et al., [53] who showed a more moderate correlation (r=0.48) based on a sample of 30 healthy elderly woman. A moderate correlation of BBS-GR with the FES-I questionnaire, which was revealed in the present study, may be expected due to the indirect way that the FES-I assesses balance, which in contrary to the BBS that assesses it via tasks performance, FES-I is based on subjective reports from the patient. Moderate correlations between BBS and other scales, such as the Modified Barthel Index [22], the Modified Hoehn and Yahr Staging Scale [10] or the Schwab & England Activities of Daily Living (ADL) Scale [26], have been attributed to less closely relation of these scales with balance performance. The high correlation between BBS and FES-I scales in the study of Wirz et al., [54] may be attributed to homogeneity of their sample which consisted of spinal cord injured patients only. The moderate and high correlations of the BBS-GR with the TUG, FRT and FES-I balance tools that have been revealed in the present study indicate a moderate to high convergence validity of the BBS-GR.

The BBS-GR showed both excellent test-retest and inter-rater reliability as it was assessed by the ICC of the scores between repeated measurements and scores between observers. In addition to excellent relative reliability, BBS-GR showed absolute reliability as this was proved by the Bland Altman Analysis. The mean difference between the measurements of the two raters were close to 0 and 95% of the cases were lying between the limits of agreement proving the absence of proportional bias in the measurements [48]. The high correlation and the agreement between the measurements indicate that the scale is reliable in presenting stable repeated results. These excellent results are in agreement with many of the other language versions of the BBS [18,20,22,25]. In addition, a systematic review of 11 studies that assessed intra- and inter-rater reliability of the English BBS in a variety of clinical populations revealed a value of 0.98 for the intra-rater reliability and 0.97 for inter-rater reliability [55]. Our findings with the BBS-GR also have very similar correlations. An excellent correlation was presented not only in the total score of the scale but also in the score of every item. The inter-rater reliability for each item ranged from 0.972 to 1.00 and the test-retest reliability ranged from 0.786 to 0.99, values that are close enough to those reported in the Brazilian BBS [18], the Iranian BBS [24], the Norwegian BBS [21] and in the original BBS [1,5]. The high internal consistency of the BBS-GR (0.83) indicates the homogeneity of the scale and is in line with the Norwegian (0.87) [21], the Italian (0.95) [17], and the Turkish versions (0.98 at total score) [22]. The Iranian scale has presented lower internal consistency (0.62) [25].

The Greek BBS-GR did not present any ceiling or floor effects, but compared to other scales it showed the biggest percentage in people at highest score. In a systematic review of 21 studies in people with stroke three studies reported a ceiling or/and floor effect of the BBS [2]. In addition, the study of Tsang et al., [35] did also report a larger ceiling effect of 32% for BBS. The negative skew, reported to our study, with more scores gathered to the higher levels, agree with the studies of Sahin et al., [22] and Tsang et al., (35). These results may be explained by the characteristics of the sample in which all patients were ambulant, as the inclusion criteria required, which however may skew the scores towards higher levels. The same characteristics may also explain the moderate responsiveness also presented here. Nevertheless, the mean total BBS-GR score in the group of "fallers" did not differ too much from the "non fallers" BBS-GR score (Table 3), thus leading to moderate effect size. Additionally, the variability in the sample characteristics may have masked the responsiveness results. This finding implies that the BBS-GR of scores equal or above 20/56 in various balance impairments cannot actually distinguish "fallers" from "non-fallers". Further application of the BBS-GR to a less varied sample according to neurological conditions, and including non-ambulant patients as well, may give more concluding results regarding the skewness and the responsiveness of the scale.

Study Limitations

Sample recruitment from three of the biggest cities of Greek mainland gave a good sample to assess the psychometric characteristics of the BBS-GR. Nevertheless, randomized criteria for sampling would have given more generalized results. Additionally, despite the fact that the sample of that research on purpose consisted mainly of ambulant participants, this could be a study limitation because the possibility that the BBS-GR is less reliable for people with very poor balance could not be ruled out. The variety of the conditions included in the present study could be also considered as a limitation suggesting more homogeneous sample conditions. However, normative scores on the BBS after the age of 70 tend to be similar around the world, and close enough to our scores [56]. This implies that the BBS-GR at scores equal to or above of 20/56 is similar to the original English BBS and to other language BBS tools and that the variability of the conditions did not affect the reliability or the validity of the scale. However, this variability may have affected the responsiveness results and could be thought as an invalid way of making comparisons between "fallers" and "non fallers" because these have different characteristics.

Implications for further research

This is the first study to perform a complete official cross cultural adaptation of the BBS into Greek, and an extensive validation of the Greek version, and therefore this is of great value for the Greek clinical environment. Further research on assessing responsiveness in means of detectable changes following treatment or in a more homogenous

sample could allow for more valid within subjects comparisons. Furthermore, it would give more informative results in regards BBS-GR clinical and research utility as a measurement outcome for neurological assessment and rehabilitation programs.

Conclusion

In conclusion, the translation process led to a final Greek version of the BBS that was characterized by patients and raters as clear, easy to use and comprehensible. The Greek version of the BBS is now available for use through this article (Appendix I). In addition, the psychometric testing revealed a tool with high criterion and convergent validity and excellent test-retest and intra-rater reliability, which can now be applied to Greek clinical settings. The ambulatory patients included in the study to ensure that all tasks would be performed and tested may have skewed the BBS-GR results to higher scores and masked the responsiveness of the scale. The use of BBS-GR in conjunction with a rehabilitation program, to non-ambulant patients as well as its clinical importance in balance assessment of neurological patients merit further research.

Acknowledgment

Initially, we would like to thank Dr. Berg for giving us the permission to adapt the BBS into Greek and for her valuable advices in the adaptation process. We also thank all translators for their time and their help in translation of this scale and the physiotherapists who administered the scale. Last but not least, we want to thank all patients for their kind willingness to voluntary participate in the balance assessment for the validation process of the BBS; without them this research would not be completed.

Statement

Part of the results have been orally presented to 24o Panhellenic Scientific Conference of Physiotherapy, PSF, Athens, Greece (5-7 Dec. 2014).

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Appendix I: Berg Balance Scale translated into Greek.

[1]

Κλίμακα Ισορροπίας Berg (Balance Berg Scale)

Ονοματεπώνυμο: _____ **Ημερομηνία:** _____
Τόπος: _____ **Βαθμολογητής:** _____

ΠΕΡΙΓΡΑΦΗ ΔΡΑΣΤΗΡΙΟΤΗΤΑΣ	**ΒΑΘΜΟΛΟΓΙΑ (0-4)**
Από καθιστή προς την όρθια θέση	_____
Ορθοστάτηση χωρίς υποστήριξη	_____
Καθιστή θέση χωρίς υποστήριξη	_____
Από όρθια θέση προς την καθιστή θέση	_____
Μεταφορές	_____
Ορθοστάτηση με μάτια κλειστά	_____
Ορθοστάτηση με πόδια ενωμένα	_____
Τέντωμα προς τα εμπρός με απλωμένο βραχίονα	_____
Ανάκτηση αντικειμένου από το πάτωμα	_____
Γύρισμα να κοιτάξει πίσω	_____
Στροφή 360 μοίρες	_____
Τοποθέτηση ποδιών εναλλάξ σε υποπόδιο	_____
Ορθοστάτηση με ένα πόδι εμπρός	_____
Ορθοστάτηση στο ένα πόδι	_____
ΣΥΝΟΛΙΚΗ ΒΑΘΜΟΛΟΓΙΑ (μέγιστη 56):	_____

0–20, καθήλωση σε αναπηρικό αμαξίδιο
21–40, βάδιση με υποστήριξη
41–56, ανεξάρτητος

ΓΕΝΙΚΕΣ ΟΔΗΓΙΕΣ

Παρακαλώ καταγράψτε κάθε μία δραστηριότητα και/ή δώστε οδηγίες όπως αυτές είναι γραμμένες. Όταν βαθμολογείτε, παρακαλώ καταγράψτε την κατηγορία της χαμηλότερης απάντησης που αντιστοιχεί σε κάθε λειτουργική δραστηριότητα.

Στις περισσότερες λειτουργικές δραστηριότητες, ο εξεταζόμενος ζητείται να διατηρήσει μια δεδομένη θέση για ένα συγκεκριμένο χρονικό διάστημα. Βαθμιαία περισσότεροι βαθμοί αφαιρούνται αν:
* ο χρόνος ή η απόσταση δεν εκπληρώνονται
* η απόδοση του εξεταζόμενου υποδηλώνει ότι θέλει επίβλεψη
* ο εξεταζόμενος ακουμπά κάποιο αντικείμενο για εξωτερική υποστήριξη ή δέχεται βοήθεια από τον εξεταστή.

Οι εξεταζόμενοι θα πρέπει να καταλάβουν ότι πρέπει να διατηρούν την ισορροπία τους όσο επιχειρούν να εκτελέσουν τις δραστηριότητες. Η επιλογή όσον αφορά σε ποιό πόδι να σταθούν ή πόσο μακριά να φτάσουν έγκειται στον κάθε εξεταζόμενο. Φτωχή κρίση θα επηρεάσει αρνητικά την επίδοση και τη βαθμολογία.

Εξοπλισμός που απαιτείται για την αξιολόγηση είναι ένα χρονόμετρο ή ρολόι χεριού με δείκτη δευτερολέπτων, ένας χάρακας ή άλλος δείκτης 5, 12 και 25 εκατοστών. Οι καρέκλες που θα χρησιμοποιηθούν κατά τις δοκιμασίες πρέπει να είναι λογικού ύψους. Για τη λειτουργική δραστηριότητα #12 μπορεί να χρησιμοποιηθεί είτε σκαλοπάτι είτε σκαμνάκι μέσου ύψους.

Λαμπροπούλου και συν., 2015, Ελληνική Έκδοση Κλίμακας Ισορροπίας Berg (BBS-GR)

[2]

Κλίμακα Ισορροπίας Berg

1. ΑΠΟ ΤΗΝ ΚΑΘΙΣΤΗ ΠΡΟΣ ΤΗΝ ΟΡΘΙΑ ΘΕΣΗ

ΟΔΗΓΙΕΣ: Παρακαλώ σηκωθείτε όρθιος. Προσπαθήστε να μην χρησιμοποιήσετε τα χέρια σας για υποστήριξη.

( ) 4 ικανός να σταθεί χωρίς να χρησιμοποιήσει τα χέρια του και να σταθεροποιηθεί μόνος του.
( ) 3 ικανός να σηκωθεί μόνος του χρησιμοποιώντας τα χέρια του.
( ) 2 ικανός να σηκωθεί χρησιμοποιώντας τα χέρια του μετά από αρκετές προσπάθειες.
( ) 1 χρειάζεται ελάχιστη βοήθεια για να σηκωθεί ή να σταθεροποιηθεί.
( ) 0 χρειάζεται μέτρια ή μέγιστη βοήθεια για να σηκωθεί.

2. ΟΡΘΟΣΤΑΤΗΣΗ ΧΩΡΙΣ ΥΠΟΣΤΗΡΙΞΗ

ΟΔΗΓΙΕΣ: Παρακαλώ σταθείτε όρθιος για δυο λεπτά χωρίς να κρατιέστε.

( ) 4 ικανός να σταθεί με ασφάλεια για 2 λεπτά.
( ) 3 ικανός να σταθεί 2 λεπτά με επιτήρηση.
( ) 2 ικανός να σταθεί 30 δευτερόλεπτα χωρίς υποστήριξη.
( ) 1 χρειάζεται αρκετές προσπάθειες για να σταθεί 30 δευτερόλεπτα χωρίς υποστήριξη.
( ) 0 ανίκανος να σταθεί 30 δευτερόλεπτα χωρίς υποστήριξη.

Αν ο εξεταζόμενος είναι ικανός να σταθεί 2 λεπτά χωρίς υποστήριξη, βαθμολογείστε με τη μέγιστη βαθμολογία για το κάθισμα χωρίς υποστήριξη. Προχωρήστε στη λειτουργική δραστηριότητα #4.

3. ΚΑΘΙΣΤΗ ΘΕΣΗ ΜΕ ΤΗΝ ΠΛΑΤΗ ΧΩΡΙΣ ΥΠΟΣΤΗΡΙΞΗ ΑΛΛΑ ΤΑ ΠΟΔΙΑ ΣΤΗΡΙΓΜΕΝΑ ΣΤΟ ΠΑΤΩΜΑ Ή ΠΑΝΩ ΣΕ ΣΚΑΜΝΑΚΙ

ΟΔΗΓΙΕΣ: Παρακαλώ καθίστε με τα μπράτσα σας σταυρωμένα για 2 λεπτά.

( ) 4 ικανός να καθίσει με ασφάλεια και σιγουριά για 2 λεπτά.
( ) 3 ικανός να καθίσει 2 λεπτά με επιτήρηση.
( ) 2 ικανός να καθίσει 30 δευτερόλεπτα.
( ) 1 ικανός να καθίσει 10 δευτερόλεπτα.
( ) 0 ανίκανος να καθίσει χωρίς υποστήριξη 10 δευτερόλεπτα.

4. ΑΠΟ ΟΡΘΙΑ ΘΕΣΗ ΠΡΟΣ ΤΗΝ ΚΑΘΙΣΤΗ ΘΕΣΗ

ΟΔΗΓΙΕΣ: Παρακαλώ καθίστε.

( ) 4 κάθεται με ασφάλεια χρησιμοποιώντας ελάχιστα τα χέρια του.
( ) 3 ελέγχει το κατέβασμα με τη χρήση των χεριών του.
( ) 2 χρησιμοποιεί το πίσω μέρος των ποδιών του ενάντια στην καρέκλα για να ελέγξει το κατέβασμα.
( ) 1 κάθεται μόνος του αλλά έχει ανεξέλεγκτο το κατέβασμα.
( ) 0 χρειάζεται βοήθεια για να καθίσει.

5. ΜΕΤΑΦΟΡΕΣ

ΟΔΗΓΙΕΣ: Διατάξτε τις καρέκλες για περιστροφική μετακίνηση. Ζητήστε από τον εξεταζόμενο να μεταφερθεί προς μία καρέκλα με μπράτσα και προς μία καρέκλα χωρίς μπράτσα. Μπορείτε να χρησιμοποιήσετε δυο καρέκλες (μια με μπράτσα και μία χωρίς μπράτσα) ή ένα κρεβάτι και μία καρέκλα.

( ) 4 ικανός να μεταφερθεί με ασφάλεια χρησιμοποιώντας ελάχιστα τα χέρια του.
( ) 3 ικανός να μεταφερθεί με ασφάλεια, σαφή ανάγκη για χέρια.
( ) 2 ικανός να μεταφερθεί με λεκτικά παραγγέλματα ή/και επίβλεψη.
( ) 1 χρειάζεται ένα άτομο να βοηθήσει.
( ) 0 χρειάζεται δυο άτομα να βοηθήσουν ή να επιβλέψουν για να είναι ασφαλής.

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6. ΟΡΘΟΣΤΑΤΗΣΗ ΧΩΡΙΣ ΥΠΟΣΤΗΡΙΞΗ ΜΕ ΤΑ ΜΑΤΙΑ ΚΛΕΙΣΤΑ

ΟΔΗΓΙΕΣ: Παρακαλώ κλείστε τα μάτια σας και σταθείτε ακίνητος για 10 δευτερόλεπτα.

( ) 4 ικανός να σταθεί 10 δευτερόλεπτα με ασφάλεια.
( ) 3 ικανός να σταθεί 10 δευτερόλεπτα με επίβλεψη.
( ) 2 ικανός να σταθεί 3 δευτερόλεπτα.
( ) 1 ανίκανος να κρατήσει τα μάτια κλειστά 3 δευτερόλεπτα αλλά στέκεται με ασφάλεια.
( ) 0 χρειάζεται βοήθεια για να μην πέσει.

7. ΟΡΘΟΣΤΑΤΗΣΗ ΧΩΡΙΣ ΥΠΟΣΤΗΡΙΞΗ ΜΕ ΠΟΔΙΑ ΕΝΩΜΕΝΑ

ΟΔΗΓΙΕΣ: Κλείστε τα πόδια σας και σταθείτε όρθιος χωρίς να κρατιέστε.

( ) 4 ικανός να κλείσει τα πόδια του μόνος του και να σταθεί 1 λεπτό με ασφάλεια.
( ) 3 ικανός να κλείσει τα πόδια του μόνος του και να σταθεί 1 λεπτό με επιτήρηση.
( ) 2 ικανός να ενώσει τα πόδια του μόνος του αλλά ανίκανος να κρατηθεί για 30 δευτερόλεπτα.
( ) 1 χρειάζεται βοήθεια για επίτευξη της θέσης αλλά ικανός να σταθεί για 15 δευτερόλεπτα με τα πόδια ενωμένα.
( ) 0 χρειάζεται βοήθεια για επίτευξη της θέσης και ανίκανος να κρατηθεί για 15 δευτερόλεπτα.

8. ΤΕΝΤΩΜΑ ΠΡΟΣ ΤΑ ΕΜΠΡΟΣ ΜΕ ΑΠΛΩΜΕΝΟ ΒΡΑΧΙΟΝΑ ΚΑΤΑ ΤΗΝ ΟΡΘΙΑ ΣΤΑΣΗ

ΟΔΗΓΙΕΣ: Σηκώστε το χέρι σας στις 90 μοίρες. Τεντώστε τα δάκτυλα σας και τεντωθείτε μπροστά όσο πιο μακριά μπορείτε. (Ο εξεταστής τοποθετεί έναν χάρακα στο τέλος των ακροδακτύλων όταν ο βραχίονας είναι ανυψωμένος στις 90 μοίρες. Τα δάκτυλα δεν πρέπει να ακουμπήσουν τον χάρακα κατά το τέντωμα προς τα εμπρός. Η μέτρηση που καταγράφεται είναι η πρόσθια απόσταση που τα δάκτυλα διανύουν όταν ο εξεταζόμενος είναι στην μέγιστη πρόσθια κλίση του. Όταν είναι δυνατό, ζητείστε από τον εξεταζόμενο να χρησιμοποιήσει και τα δύο χέρια του για να τεντωθεί μπροστά για να αποφθεχθεί στροφή του κορμού)

( ) 4 μπορεί να φτάσει μπροστά με σιγουριά 25 εκ (10 ίντσες).
( ) 3 μπορεί να φτάσει μπροστά 12 εκ (5 ίντσες).
( ) 2 μπορεί να φτάσει μπροστά 5 εκ (2 ίντσες).
( ) 1 φτάνει μπροστά αλλά χρειάζεται επιτήρηση.
( ) 0 χάνει την ισορροπία του κατά την προσπάθεια/χρειάζεται εξωτερική υποστήριξη.

9. ΣΗΚΩΜΑ ΑΝΤΙΚΕΙΜΕΝΟΥ ΑΠΟ ΤΟ ΠΑΤΩΜΑ ΑΠΟ ΟΡΘΙΑ ΘΕΣΗ

ΟΔΗΓΙΕΣ: Σηκώστε το παπούτσι/παντόφλα, που βρίσκεται μπροστά στα πόδια σας.

( ) 4 ικανός να σηκώσει την παντόφλα με ασφάλεια και ευκολία.
( ) 3 ικανός να σηκώσει την παντόφλα αλλά χρειάζεται επιτήρηση.
( ) 2 ανίκανος να την σηκώσει αλλά φτάνει 2-5 εκ (1-2 ίντσες) από την παντόφλα και διατηρεί την ισορροπία μόνος του.
( ) 1 ανίκανος να την σηκώσει και χρειάζεται επίβλεψη καθώς προσπαθεί.
( ) 0 ανίκανος να προσπαθήσει/χρειάζεται βοήθεια για να μη χάσει την ισορροπία του ή πέσει.

10. ΓΥΡΙΣΜΑ ΓΙΑ ΚΟΙΤΑΓΜΑ ΠΙΣΩ ΑΠΟ ΔΕΞΙ ΚΑΙ ΑΡΙΣΤΕΡΟ ΩΜΟ ΑΠΟ ΟΡΘΙΑ ΘΕΣΗ

ΟΔΗΓΙΕΣ: Γυρίστε να κοιτάξετε κατευθείαν πίσω από τον αριστερό σας ώμο, χωρίς να μετακινήσετε τα πόδια σας από το πάτωμα. Επαναλάβατε προς τα δεξιά. Ο εξεταστής μπορεί να διαλέξει ένα αντικείμενο για κοίταγμα που να βρίσκεται ακριβώς πίσω από τον εξεταζόμενο για να ενθαρρύνει μια καλύτερη περιστροφή .

( ) 4 κοιτάει πίσω και από τις δύο πλευρές και μετατοπίζει το βάρος καλά.
( ) 3 κοιτάει πίσω μόνο από τη μία πλευρά, η άλλη πλευρά παρουσιάζει λιγότερη μετατόπιση βάρους.
( ) 2 γυρνάει στα πλάγια μόνο αλλά διατηρεί την ισορροπία του.
( ) 1 χρειάζεται επίβλεψη καθώς γυρνάει.
( ) 0 χρειάζεται βοήθεια για να μην χάσει την ισορροπία του ή πέσει.

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11. ΣΤΡΟΦΗ 360 ΜΟΙΡΩΝ

ΟΔΗΓΙΕΣ: Κάντε μια πλήρη περιστροφή με μικρά βήματα. Κάντε μία παύση. Στη συνέχεια κάντε μια πλήρη περιστροφή από την άλλη πλευρά.

( ) 4 ικανός να περιστραφεί 360 μοίρες με ασφάλεια μέσα σε 4 δευτερόλεπτα ή λιγότερο.
( ) 3 ικανός να περιστραφεί 360 μοίρες με ασφάλεια από την μία πλευρά μόνο σε 4 δευτερόλεπτα ή λιγότερο.
( ) 2 ικανός να περιστραφεί 360 μοίρες με ασφάλεια αλλά αργά.
( ) 1 χρειάζεται κοντινή επίβλεψη ή λεκτικά παραγγέλματα.
( ) 0 χρειάζεται βοήθεια καθώς περιστρέφεται.

12. ΕΝΑΛΛΑΞ ΤΟΠΟΘΕΤΗΣΗ ΠΟΔΙΩΝ ΣΕ ΣΚΑΛΟΠΑΤΙ Ή ΣΚΑΜΝΙ ΚΑΤΑ ΤΗΝ ΟΡΘΙΑ ΣΤΑΣΗ ΧΩΡΙΣ ΥΠΟΣΤΗΡΙΞΗ

ΟΔΗΓΙΕΣ: Τοποθετήστε κάθε σας πόδι εναλλάξ στο σκαλοπάτι/σκαμνί. Συνεχίστε μέχρι κάθε πόδι να αγγίξει το σκαλοπάτι/σκαμνί 4 φορές.

( ) 4 ικανός να σταθεί ανεξάρτητος και με ασφάλεια και να ολοκληρώσει 8 πατήματα σε 20 δευτερόλεπτα.
( ) 3 ικανός να σταθεί ανεξάρτητος και να ολοκληρώσει 8 πατήματα σε > 20 δευτερόλεπτα.
( ) 2 ικανός να ολοκληρώσει 4 πατήματα χωρίς βοήθεια με επίβλεψη.
( ) 1 ικανός να ολοκληρώσει > 2 πατήματα χρειάζεται ελάχιστη βοήθεια.
( ) 0 χρειάζεται βοήθεια για να μην πέσει / ανίκανος να προσπαθήσει.

13. ΟΡΘΟΣΤΑΤΗΣΗ ΧΩΡΙΣ ΥΠΟΣΤΗΡΙΞΗ ΜΕ ΤΟ ΕΝΑ ΠΟΔΙ ΜΠΡΟΣΤΑ

ΟΔΗΓΙΕΣ: (ΕΠΙΔΕΙΞΤΕ ΣΤΟΝ ΕΞΕΤΑΖΟΜΕΝΟ) Τοποθετήστε το ένα σας πόδι κατευθείαν μπροστά από το άλλο. Αν αισθάνεστε ότι δεν μπορείτε να τοποθετήσετε το ένα πόδι ακριβώς μπροστά από το άλλο, δοκιμάστε να πατήσετε αρκετά μπροστά ώστε η πτέρνα του μπροστινού ποδιού να είναι μπροστά από τα δάκτυλα του άλλου ποδιού. (Για να βαθμολογήστε με 3 βαθμούς, το μήκος του βήματος θα πρέπει να ξεπερνά το μήκος του άλλου ποδιού και το πλάτος της τοποθέτησης να προσεγγίζει το φυσιολογικό πλάτος διασκελισμού του εξεταζόμενου).

( ) 4 ικανός να τοποθετήσει το πόδι ακριβώς μπροστά από το άλλο μόνος του και να μείνει σε αυτή τη θέση 30 δευτερόλεπτα.
( ) 3 ικανός να τοποθετήσει το πόδι μπροστά μόνος του και να μείνει σε αυτή τη θέση 30 δευτερόλεπτα.
( ) 2 ικανός να κάνει ένα μικρό βήμα μόνος του και να μείνει σε αυτή τη θέση 30 δευτερόλεπτα.
( ) 1 χρειάζεται βοήθεια με το βήμα αλλά διατηρείται σε αυτή τη θέση 15 δευτερόλεπτα.
( ) 0 χάνει την ισορροπία ενώ βηματίζει ή στέκεται.

14. ΟΡΘΟΣΤΑΤΗΣΗ ΣΤΟ ΕΝΑ ΠΟΔΙ

ΟΔΗΓΙΕΣ: Σταθείτε όρθιος στο ένα πόδι για όσο μπορείτε χωρίς να κρατιέστε.

( ) 4 ικανός να σηκώσει το πόδι μόνος του και να διατηρηθεί σε αυτή τη θέση> 10 δευτερόλεπτα.
( ) 3 ικανός να σηκώσει το πόδι μόνος του και να διατηρηθεί σε αυτή τη θέση 5-10 δευτερόλεπτα.
( ) 2 ικανός να σηκώσει το πόδι μόνος του και να διατηρηθεί σε αυτή τη θέση ≥ 3 δευτερόλεπτα.
( ) 1 προσπαθεί να σηκώσει το πόδι, ανίκανος να διατηρηθεί 3 δευτερόλεπτα αλλά ορθοστατεί μόνος του.
( ) 0 ανίκανος να προσπαθήσει, χρειάζεται βοήθεια για να προλάβει την πτώση.

GREEK BERG BALANCE SCALE

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Final version 22.08.2015
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