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Validity and reliability of the ABC-6 Scale Questionnaire: Cross-cultural adaptation study among Pejeng Village elders

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ABSTRACT

Introduction: The percentage of the elderly population in Bali increased to 12.47% in 2020, leading to heightened risks and fear of falling with age. One measure to assess fear of falling is the ABC-6 Scale, which gauges self-confidence in maintaining body balance. A well-measured instrument requires good validity and reliability. Testing the validity and reliability of the questionnaire is essential to demonstrate its usefulness in measuring fear of falling and screening fall risks in the future.
Methods: This study employed a descriptive survey method to assess content validity using expert evaluation and a cross-sectional design with a purposive sampling technique involving 49 subjects. Validity testing utilized Pearson product-moment correlation for construct validity and Content Validity Index for content validity assessment. Reliability testing employed Cronbach's alpha to assess internal consistency.
Results: The analysis revealed good construct validity values (0.509-0.823) and excellent content validity index scores (S-CVI/Ave=0.98). Reliability analysis using Cronbach's alpha demonstrated good reliability (0.775).
Conclusion: The modified Indonesian version of the ABC-6 Scale is valid and reliable for screening and evaluating fear of falling among older people.

Keywords: cross-cultural adaptation, Indonesia, ABC-6 Scale questionnaire, reliability, validity

INTRODUCTION

Ageing is an inevitable process, commonly measured by chronological age, where individuals aged 65 years and older are often referred to as elderly. However, the ageing process is only uniform across some populations due to genetic differences, lifestyle, and overall health.[1] The ageing in the elderly leads to a gradual decline in the structure and function of bodily organs, encompassing physical, psychological, social, and spiritual aspects, rendering them highly susceptible to various diseases.[2]

The World Health Organization (WHO) and Law Number 13 of 1998 concerning the welfare of older people in Chapter 1 Article 1 Paragraph 2 state that age 60 marks the beginning of old age. Based on the Central Statistics Agency survey results in 2021, the elderly population increased to 26.42 million people, indicating that 9.78% of Indonesia's total population in 2020 were elderly.[3] The prevalence of the elderly population in Bali also experienced an increase in line with the national statistics recorded by the Central Statistics Agency (BPS), with a rise of 12.47% in 2020.[4] As individuals age, the risk of falls among the elderly increases. Fall risk denotes the likelihood of experiencing falls, which can lead to physical injuries and trauma.[5] Based on the WHO, falls rank second as a cause of death worldwide, and Southeast Asia contributes to 60% of fall incidents globally.[6]

In line with the prevalence above, it is known that elderly individuals experience falls at least once a year. Many factors can influence the risk of falls, including intrinsic and extrinsic factors.[7] During ageing, muscle strength declines due to calcium leakage from the protein found within muscle cells, namely ryanodine, which triggers muscle contraction limitation. This reduces calcium levels, leading to restricted muscle contraction, particularly in the lower limb muscles. Consequently, the ability to maintain balance diminishes, leading to an increased risk of falls. [5,8] Elderly individuals with excess BMI (Body et al.) have a higher risk of falls than those with normal BMI. This is because elderly individuals with excess BMI tend to accumulate abdominal fat, leading to increased postural pressure and balance disturbances, resulting in changes in the center of body mass (COM).[9] As individuals age, the balance system tends to decline. Decreases in balance regulation and abnormal gait patterns are causes of the high incidence of falls and other motor issues among older people. This aligns with the triggering factors for fall risks, all leading to the same outcome: balance disturbances.[10]

Falling due to loss of balance is a serious issue associated with increased mortality and hospitalization among older people. Each fall event correlates with heightened risks of morbidity and mortality, often resulting in physical consequences such as bruises, wounds, and fractures, as well as psychosocial impacts like social limitations, fear of

falling, and depression. According to the World Health Organization (WHO), an estimated 684,000 people die from falls each year, with 80% of these occurrences happening in low- and middle-income countries. Elderly individuals aged 60 and above are at significantly higher risk of falling. Every year, 37.3 million fall incidents are severe enough to require medical attention (WHO, 2021). Fear of falling can be identified as an independent factor contributing to decreased quality of life, independence, and functionality among older people.[11,12] Fear of falling is defined as a state of extreme caution to avoid falling incidents, which ultimately leads older people to limit their activities of daily living (ADL). This syndrome is commonly encountered among the elderly population.[12] Fear of falling can resurface even in non-injurious fall incidents, creating a vicious cycle of excessive avoidance of daily activities, reduced physical activity, frequent falls, depression, and lower quality of life (fall risk screening).[13]

The prevalence of falls among older people in Indonesia is relatively high. According to Basic Health Research in 2013, the prevalence of falls among individuals aged 65-74 reached 67.1%, while it increased to 78.2% for those over 75 years old. A study conducted by Susilowati (2020) among elderly individuals in Jakarta, Bandung, and Yogyakarta found a high proportion of participants experiencing falls in the past 12 months, with 29% among community-dwelling elderly and 32.7% among institutionalized elderly. Factors associated with these incidents include older age, female gender, living in private institutional care, urban residence, visual impairment, memory impairment, and arthritis. [14]

The high prevalence, morbidity, and mortality associated with falls among older people underscore the importance of screening to detect fall risks and prevent such incidents among high-risk elderly individuals. Multifactorial fall prevention with risk assessment can help reduce falls by 23% compared to usual care or attention control and improve the quality of life for older people.[13] In fall risk assessment, an important aspect is the psychological aspect that influences falls. The psychological aspect may be as important, if not more so, in identifying individuals with potential fall risks. One psychological aspect related to fall risk is balance confidence. Balance confidence is a tool for measuring fear of falling; indeed, these two concepts are interconnected yet distinct. Confidence in maintaining balance may be more sensitive in detecting early changes in balance and is commonly used to predict falls.[15]

One of the fear of falling measurement tools translated into various versions, such as Chinese and Japanese, and has good validity and reliability in screening fall risk among community-dwelling elderly individuals is the ABC-6 Scale.[16] However, the literature review indicates that, to date, the ABC-6 Scale has yet to undergo validity and reliability testing as a fall risk screening tool assessing balance confidence aspects among older people in Indonesia. Although there have been attempts to adapt the ABC Scale to the Indonesian version culturally, filling out the ABC Scale requires more than 20 minutes. Therefore, a shortened version of the ABC Scale containing six daily activities with challenging balance levels has been developed to shorten the completion time, especially in clinical settings and research.[15] The ABC-6 Scale was designed to assess perceived confidence levels in maintaining balance or feeling unstable while performing various functional tasks with six daily activities with relatively high activity levels. This measurement tool has been validated for use in screening elderly populations residing in communities, individuals with Parkinson's disease, post-stroke patients, lower limb amputees, and vestibular disorders. The ABC-6 Scale has also been translated into English, German, Italian, and Korean.[17]

This study aims to culturally adapt the ABC-6 Scale, test its reliability and validity in assessing fear of falling in terms of balance confidence aspects among older people in Indonesia, and predict future fall incidents among community-dwelling elderly individuals.[15] The cross-cultural adaptation process aims to prevent measurement inequivalence due to differences in language, culture, socio-demographics, diseases, personal behaviours, and social environments.[18] Cross-cultural adaptation begins with the initial translation, translated into the target language by two native-speaking translators proficient in the target questionnaire language. The backward translation is then performed by two native-speaking translators proficient in the original questionnaire language. Subsequently, the translated questionnaire is provided to an expert committee for review to determine whether the translated and original versions achieve semantic, idiomatic, experiential, and conceptual equivalence. The expert committee members selected are individuals who understand the purpose of the questionnaire.[19] Afterwards, it is necessary to conduct validity and reliability testing on the questionnaire to demonstrate that it is valid and reliable. Validity refers to the accuracy of a measurement tool in providing results that align with the intended purpose of the measurement. Meanwhile, reliability measures the confidence level in the measurement tool, which is observed from relatively consistent measurement results after conducting measurements multiple times on the same subjects.[20]

Therefore, a study on cross-cultural adaptation and validation testing of the questionnaire is needed. Hence, research on "Validation and Reliability Testing of the Cross-Cultural Adaptation of ABC-6 Scale Indonesian Version among the Elderly in Pejeng Village" is necessary. This research aims to assess the validity and reliability of the Indonesian version of the ABC-6 Scale as a fall risk screening tool for elderly individuals aged 60 and above. By obtaining evidence that the Indonesian version of the ABC-6 Scale is valid and reliable as a fall risk screening tool for older people, it is hoped that it can be widely used among the elderly population in Indonesia.

METHOD

The study adopts a diagnostic study model using a descriptive survey method to determine content validity and an observational analytical cross-sectional method to establish construct validity and internal consistency reliability in assessing the psychometric properties of the ABC-6 Scale questionnaire. The accessible population in this study comprises all elderly individuals in Pejeng Village, Tampaksiring, aged 60 years and above, totalling 49 individuals.

The research sample is selected through purposive sampling, with the sample size determined based on the recommended subject-to-item ratio, 5:1.19. Since the ABC-6 Scale comprises six items, the minimum required sample size for the study is 30 individuals. The research sample comprises elderly individuals who meet the inclusion and exclusion criteria. Inclusion criteria include elderly individuals aged ≥60 years, able to mobilize independently, moving independently (with or without walking aids), and willing to participate in the research by signing informed consent.

Exclusion criteria include cognitive impairment as screened by the MMSE questionnaire, inability to communicate effectively (hearing impairment/not using hearing aids or speech impairment), and inability to perform balance tests due to lower limb pain. Dropout criteria include participants withdrawing from the study and being absent during data collection.

Applying these inclusion and exclusion criteria mitigates potential biases arising from physical disabilities, communication disorders, and cognitive impairment. This research was conducted in April 2023 in Pejeng Village, Tampaksiring, Gianyar. Data were collected through interviews using the Indonesian version of the ABC-6 Scale questionnaire, consisting of six daily activities with challenging balance levels for fall risk screening. Each questionnaire item was asked to older people to assess their confidence in maintaining balance while performing the activities listed in the questionnaire. Scores on the Indonesian version of the ABC-6 Scale range from 0%, indicating no confidence at all, to 100%, indicating very confident in maintaining balance.

This test evaluates the confidence of elderly individuals in maintaining balance during the activities considered, as reflected in the total score. A score of>80% indicates high physical activity, while a score of <67% indicates a higher risk of falls. To minimise bias, the examination was conducted by a research team previously trained to perform fall risk screening using the Indonesian version of the ABC-6 Scale. The team explained each item to older people, and a briefing was conducted beforehand.

The questionnaire translation process was conducted in three stages: initial translation, backward translation, and synthesis of translation results. Initial translation involved translating the questionnaire into Indonesian by a native Indonesian-speaking translator proficient in English, one of whom is a physiotherapy lecturer. Backward translation entailed translating the initial translation results into the original language, performed by two foreign nationals who have long resided in Indonesia and are proficient in Indonesian. The synthesis process involved three assessors, namely physiotherapy lecturers from Udayana University, who understand both languages and the content of each questionnaire item.

Data analysis for this study utilised Excel and SPSS software, divided into three sections: descriptive analysis to depict the research subject profile (such as age, gender, highest education level, BMI, fall history, and medical history), expert survey method to evaluate content validity, validity testing using Pearson's product-moment correlation coefficient, and reliability testing using Cronbach's alpha to measure internal consistency. This research was approved by Udayana University / Sanglah Hospital Faculty of Medicine Denpasar. The Ethical Clearance number used is 548/UN14.2.2.VII.14/LT/2023.

RESULTS

The target population for this study was elderly individuals aged 60 years and above, totalling 100 individuals. Due to some limitations, the population successfully reached 54 individuals. After screening based on the established criteria, the research sample consisted of 49 individuals. The flowchart determining the sample size can be seen in Figure 1.

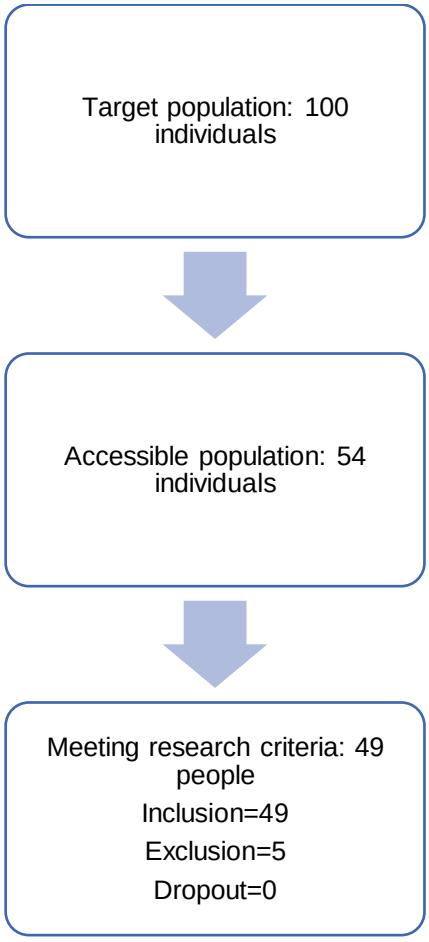

Figure 1. Research Sampling Stages

Based on Figure 1, it is evident that the total research sample consists of 49 elderly individuals aged ≥60 years. Below is a general overview of the research subjects, as listed in Table 1.

Table 1. Characteristics of Research Subjects

Characteristics	Frequency(n)	Persentage (%)
Gender		
Female	36	73.5
Male	13	26.5
Age		
60-65	10	20.4
66-70	20	40.8
71-75	8	16.3
76-80	8	16.3
81-85	3	6.1
Educational Status		
Illiterate	11	22.4
Primary School	17	34.7
Junior High School	3	6.1
Senior High School	5	10.2
Diploma	6	12.2
Bachelor Degree	6	12.2
Master Degree	1	2.0
Body Mass Index		
Underweight	2	4.1
Normal	30	61.2
Overweight	17	34.7
Fall History		
None	46	93.9
1 time in the past month	3	6.1
Disease History		
None	19	38.8
Hypertension	20	40.8
Diabetes Mellitus	6	12.2
Knee Pain	3	6.1
Cardiac Disease	1	2.0

Table 1 shows that the most common age group among the 49 samples is 66-70 years, with 20 individuals (40.8%). In this research sample, the majority are female, totalling 36 individuals (73.5%), while males amount to 13 individuals (26.5%). Most of the research sample have completed primary education, comprising 40 individuals (34.7%). Based on Table 1, elderly individuals with normal BMI are 30 individuals (61.2%), overweight individuals are 17 (34.7%), and underweight individuals are 2 (4.1%). Most of the research sample did not report experiencing any falls in the past month, with 46 individuals (93.9%). Hypertension is the most common medical history among the research sample.

Table 2. Content Validity Index Test Results

Item	Relevance	Clarity	Simplicity	Ambiguity	I-CVI
1	1	1	1	1	1
2	1	1	1	1	1
3	1	1	1	1	1
4	1	1	1	1	1
5	1	1	0.67	1	0.91
6	1	1	1	1	1
S-CVI/Ave					0.98

In Table 2, the data processing results indicate that the mean I-CVI value exceeds 0.79. Therefore, it can be concluded that all questions have good value and do not need to be removed. Additionally, the S-CVI/Ave value from the three assessors is 0.98, indicating that all questionnaire items are acceptable as the S-CVI value exceeds 0.80.

Table 3. Validity Testing Results

No.	Question	r Value	r Table	P Value	Conclusion
1.	Berjinjit dengan dua kaki tanpa alas kaki pada permukaan yang rata dan meraih sesuatu di atas kepala anda?* (Original: Stand on your tiptoes and reach for something above your head?)	0.605	0.2816	0.000	Valid

*Modified

Continuation of Table 3. Validity Testing Results

No.	Question	r Value	r Table	P Value	Conclusion
2.	Berdiri di atas kursi makan dengan dua kaki sembari berpegangan di tembok/lemari dan meraih sesuatu di atas kepala anda?* (Original: Stand on a chair and reach for something?)	0.793	0.2816	0.000	Valid
3.	Tersenggol oleh orang lain saat berjalan-jalan pada keramaian di tempat umum?* (Original: Are bumped into by people as you walk through the mall?)	0.509	0.2816	0.000	Valid
4.	Melangkah menaiki atau menuruni eskalator sambil berpengangan pada pegangan eskalator? (Original: Step onto or off an escalator while you are holding onto a railing?)	0.748	0.2816	0.000	Valid
5.	Melangkah menaiki atau menuruni eskalator dengan membawa bingkisan tanpa berpegangan pada pegangan eskalator? (Original: Step onto or off an escalator while holding onto parcels such that you cannot hold onto the railing?)	0.823	0.2816	0.000	Valid
6.	Berjalan di trotoar yang licin (seperti saat hujan, ada genangan air, atau lumutan)?* (Original: walk outside on slippery sidewalks?)	0.585	0.2816	0.000	Valid

In Table 3, validity testing yielded values ($p<0.05$) for all questionnaire items, and the obtained r value is ≥ the r table value, indicating that the instrument or questionnaire items have a significant relationship with the total score.

Table 4. Reliability Testing

Cronbach's alpha	Number of Questions
0.775	6

The reliability test results using Cronbach's alpha are shown in Table 4. Thus, the internal consistency reliability of the ABC-6 Scale questionnaire in the Indonesian version falls into the excellent category. An alpha value between 0.70 and 0.90 indicates good internal consistency and reliability.

DISCUSSION

Conducting validity and reliability tests after the cross-cultural adaptation phase is crucial. Cross-cultural adaptation is the process of modifying a questionnaire to align with specific social and cultural values, including language, while maintaining the original meaning of the questionnaire. In this study, we assessed content validity, construct validity, and internal consistency.

Content validity refers to the extent to which a question in an instrument and the score of each question can represent all possible questions that may be asked regarding the content or skill. Content validity is evaluated using the Content Validity Index (CVI), which experts in their respective fields conduct. Experts are expected to assess each item based on their opinions and views. The experts evaluate each instrument item based on relevance, clarity, simplicity, and ambiguity. The CVI is assessed by assigning scores to each questionnaire item on a scale of 1 to 4, where one indicates not relevant, two is slightly relevant, three is sufficiently relevant, and four is relevant. [21]

The Content Validity Index (CVI) is calculated for each dimension of content validity, with the highest score of 4 divided by the total number of experts. The overall Content Validity Index for each criterion is then summed and divided by the total number of assessors for each questionnaire item, resulting in the Item-level Content Validity Index (I-CVI). If evaluated by five assessors or fewer, the I-CVI score should be 1.00. If there are more than six evaluators, the criteria are more relaxed. However, Lynn (1986), cited in (Hendrayadi, 2017), suggests that the I-CVI should be at least 0.78.[22]

The average I-CVI scores are summed and divided by the total number of questionnaire items to obtain the Scale-level Content Validity Index/Average (S-CVI/Ave) score. An S-CVI/Ave value of ≥ 0.9 is considered to have excellent content validity. [23] Based on (Rodrigues et al., 2017; Lebet et al., 2018), as cited in (St. Marie, 2021), a content validity index between 0.80 to 1.0 is considered acceptable, 0.70-0.79 requires revision, and below 0.70 is considered unacceptable. [24] In Table 2, the data processing results indicate that the average I-CVI values of the three assessors are above 0.80; thus, it is concluded that there is no need to remove any questionnaire items. The S-CVI/Ave values of the three assessors are 0.98, and since the S-CVI value is above 0.80, all questionnaire items can be accepted.

The assessment of construct validity using Pearson product-moment correlation yielded an r-value of 0.2816, considering a sample size of 49 individuals. Referring to Table 3, it is observed that item number 1 obtained an r-value of 0.605, item number 2 obtained an r-value of 0.793, item number 3 obtained an r-value of 0.509, item number 4 obtained an r-value of 0.748, item number 5 obtained an r-value of 0.823, and item number 6 obtained an r-value of 0.585. The construct validity test resulted in a value of ($p<0.05$), and the obtained r values exceeded the critical r value from the table. Thus, it can be concluded that the instrument or items correlate significantly with the total score, indicating validity.

A robust construct validity test is crucial in supporting the authenticity and accuracy of the questionnaire. It assists in evaluating to what extent each questionnaire item can assess what is intended to be measured, aligning with the established concepts and objectives and ensuring that the obtained data are relevant and consistent with the research aims.[25]

Internal consistency reliability is a method used to assess the extent to which various test items measuring identical characteristics consistently produce similar results. This measurement of internal consistency reliability can be conducted in a single measurement to prevent issues that may arise from conducting retests. Internal consistency reliability can be measured using the Cronbach's alpha method.[26] Referring to Table 4, the reliability test result using Cronbach's Alpha for the six questionnaire items is 0.775. According to Ghozali (cited in Slamet and Wahyuningsih, 2022), a research instrument is considered reliable if Cronbach's Alpha value is > 0.60.[27] Meanwhile, according to Nunnally (cited in Streiner, 2003), as cited in the research conducted by Yusup (2018), an instrument is considered reliable if Cronbach's Alpha value is more significant than 0.70 (r > 0.70).[28] Indeed, it can be said that all six questionnaire items have shown good internal consistency and reliability. The implications of reliability values on questionnaire reliability lie in measuring measurement consistency, accuracy, and temporal precision. The higher the reliability value, the more consistent, relevant, and aligned with the research objectives the research results tend to be.[29]

This study has several strengths. Firstly, one of Indonesia's few studies adopted the ABC-6 Scale cross-culturally for use with the elderly and to conduct validity and reliability testing. Secondly, the study demonstrates construct validity, content validity index, and internal consistency of the ABC-6 Scale. Thirdly, the study yielded promising results in validity and reliability testing, making it suitable for screening fall risk in clinical settings or research purposes.

However, there are also limitations. Firstly, there were challenges in finding proficient English-speaking translators fluent in Bahasa Indonesia. Secondly, during interviews, most elderly subjects were more proficient in Balinese than in Bahasa Indonesia, while the research team had limited proficiency in Balinese. Thirdly, the small sample size resulted in heterogeneous data and diverse final analysis scores.

Despite these limitations, the study has important implications. Firstly, the Indonesian version of the ABC-6 Scale can be used to screen elderly communities in Indonesia. Secondly, the study will greatly assist researchers and clinical practitioners in screening fall risk among the elderly. Finally, the ABC-6 Scale offers several advantages in clinical applications or research compared to the ABC Scale, such as shorter completion time and fewer questionnaire items, thereby preventing a decrease in the adequate sample size.

Based on the research, the Indonesian version of the ABC-6 Scale has been proven valid and reliable as a screening tool for the elderly aged 60 and above. Therefore, the Indonesian version of the ABC-6 Scale can be widely utilised as a fall risk screening tool for the elderly, especially those living at home. Furthermore, it is hoped that this screening can be used as a preventive measure to prevent falls among the elderly in the community.

CONCLUSION

Based on the research findings, it can be concluded that the ABC-6 Scale questionnaire in its Indonesian version exhibits good validity and reliability, making it a valuable intervention tool for preventing falls among the elderly in the community. The implications of this study are as follows: Firstly, the Indonesian version of the ABC-6 Scale can be applied for screening purposes within the elderly community in Indonesia. Secondly, this research will significantly aid researchers and clinical practitioners in conducting fall risk screenings among the elderly. Lastly, the ABC-6 Scale offers several advantages in clinical or research applications compared to the ABC Scale, such as shorter completion time and less burden on participants due to fewer questionnaire items, thus ensuring the effective retention of sample size.

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