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Development of a short-form balance recovery confidence (SF-BRC) scale

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Research Article

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Abstract

Background: Identifying confidence in recovering balance following destabilizing events is essential for helping older adults prevent falls. However, existing measures primarily assess balance confidence. The Balance Recovery Confidence (BRC) scale was developed to address this gap, but its length may limit clinical feasibility. This study aimed to develop and validate a Short-Form Balance Recovery Confidence (SF-BRC) scale that retains the psychometric integrity of the original version while improving practicality. *Methods:* A cross-sectional dataset comprising 309 older adults (≥ 65 years) was analyzed. Exploratory factor analysis using unweighted least squares extraction on polychoric correlations was conducted to determine the underlying factor structure. Confirmatory factor analysis using the weighted least squares mean and variance adjusted (WLSMV) estimator evaluated model fit. Rasch modeling assessed item fit, item difficulty, and person separation reliability. Criterion and convergent validity were examined through correlations with the original BRC, Activities-specific Balance Confidence (ABC), and Falls Efficacy Scale–International (FES-I) scales. *Results:* The final 7-item SF-BRC demonstrated a unidimensional structure with excellent model fit (CFI = 0.99, TLI = 0.99, RMSEA = 0.06, SRMR = 0.02). Internal consistency was high (α = 0.94), and Rasch person separation reliability was 0.93. Criterion validity with the full BRC was strong (r = 0.99), while convergent validity with ABC and FES-I scales was moderate, supporting theoretical distinctiveness of the construct. *Conclusions:* The SF-BRC is a psychometrically robust instrument for assessing BRC. Its strong reliability and practical utility support its use in rehabilitation, fall prevention, and community-based settings.

Key messages

What is already known about this topic

Confidence in balance recovery after perturbations is essential for preventing falls, yet no brief, validated measure currently exists to assess this construct efficiently in older adults.

What does the study add

This study developed a 7-item Short-Form Balance Recovery Confidence (SF-BRC) scale. Initial evaluation demonstrated that the SF-BRC possesses good psychometric properties. The scale may be used to assess balance recovery confidence in community-dwelling older adults.

Introduction

Falls represent one of the most common and debilitating events among older adults. Globally, approximately 37.3 million falls require medical attention annually, placing a considerable financial strain on both individuals and healthcare systems [1]. Implementing a person-centered approach to help older adults prevent and manage falls is pivotal to reducing societal burden [2]. A key element within a person-centered approach involves understanding self-efficacy beliefs related to balance control. Balance confidence refers to an individual's self-efficacy in maintaining balance and remaining steady during everyday activities [3,4]. Another related but distinct form of self-efficacy associated with fall prevention refers to balance recovery confidence (BRC) [5]. BRC captures the individual's perceived ability to execute rapid and effective reactive responses to regain postural stability following perturbations, such as a slip, trip, or volitional movement that might otherwise result in a fall [6]. Given that successful balance recovery depends on various factors, including environmental context, nature of the perturbation, and the individual's physical abilities, the 19-item BRC scale was developed to comprehensively assess this construct [7]. Its development was underpinned by robust theoretical [8–10], conceptual [11,12], and empirical [5,13,14] foundations, enabling a nuanced understanding of reactive balance self-efficacy among older adults. Since its initial development, the concept of

BRC has received increasing attention from researchers and clinicians as a means of enhancing falls prevention practice. This is reflected in its application across diverse contexts, including cross-cultural validation of the BRC scale in Turkish older adults [15], validation in patients with subacute stroke in Thailand [16], and its potential role to reduce inpatient falls in Singapore [17].

While the 19-item BRC scale provides a comprehensive assessment of BRC, its length may limit its practicality in clinical and research settings where time constraints and respondent fatigue are important considerations [18]. Long assessment tools can be burdensome for both older adults and clinicians, potentially reducing completion rates and response accuracy. Short-form versions of commonly used measures assessing falls-related psychological constructs have been increasingly adopted in rehabilitation research and clinical practice to improve efficiency without compromising validity or reliability [19,20]. The development of a short form of the BRC (SF-BRC) scale is therefore warranted to enhance feasibility while retaining its psychometric robustness. By identifying and retaining the most informative items, the SF-BRC could streamline assessment, facilitate integration into multidisciplinary clinical workflows, and improve monitoring of rehabilitation outcomes over time. This would allow clinicians and researchers to capture a core construct of reactive balance confidence efficiently and meaningfully.

The SF-BRC could potentially be used to complement the World Falls Guidelines' recommendation to assess concerns about falling [2]. Individuals with excessively high levels of concern may become overly cautious and adopt activity avoidance behavior, whereas those with too little concern may engage in hazardous behaviors [21]. A "healthy" level of concern is therefore required to encourage appropriate behavioral modifications while maximize safety [21]. Within this context, the SF-BRC may offer clinically meaningful insights into an individual's perceived reactive ability to regain balance, thereby promoting greater agency among older adults in preventing falls. The SF-BRC may be used by nursing and allied health professionals in community and primary care settings to identify individuals who may benefit from further balance assessment or referral for a comprehensive falls risk evaluation. By indicating whether low BRC coexists with maladaptive levels of concern about falling, the SF-BRC can support more targeted and person-centered clinical decision-making. Examples of such strategies include enhancing health literacy to support fall prevention and self-management [22], implementing perturbation-based training [23], and addressing modifiable environmental risk factors and lifestyle habits in collaboration with older adults [24].

Recent studies have highlighted the importance of addressing falls-related self-efficacy beliefs in relation to stress system activity [25], with emphasis on the role of perceived control in stress regulation among older adults [25]. Empowering older adults to be able to overcome the threat of falls is therefore critical [26], underscoring the need for appropriate measurement instruments to assess BRC within contemporary falls prevention practice. By supporting older adults' understanding of their own reactive balance recovery ability, the SF-BRC may also facilitate structured discussion between clinicians and their clients to promote greater self-empowerment. The aim of this study is to develop a SF-BRC to measure BRC.

Methods

Study design and participants

The development of the SF-BRC involved a secondary analysis of data collected from two cross-sectional studies conducted by the study team between August 2020 and September 2024. Ethical approval for these studies was obtained from the Singapore Institute of Technology (RECAS0098 and RECAS0197). The datasets included information on age, gender, race, educational level, living situation, housing type, mobility status, fall experience, near-fall experience, and the scores of the BRC, the Activity-specific Balance Confidence (ABC) scale, and the Falls Efficacy Scale-International (FES-I). Three hundred and nine older adults were recruited through convenience sampling at the senior activity centers in Singapore. Eligibility criteria were: (1) 65 years and older, and (2) living independently in the community with or without using a walking aid. Exclusion criteria included: (1) clinically observable severe cognitive impairment; (2) need for physical assistance for indoor mobility; and (3) inability to provide written consent.

Measures

Balance recovery confidence (BRC) scale

The BRC scale is a 19-item self-reported measure designed to measure older adults' perceived ability to recover balance in response to destabilizing perturbations (e.g., slips, trips, or loss of balance from voluntary movements) [7]. Response is given on an 11-point scale (0 = "cannot do at all" to 10 = "highly certain can do") for each of the 19 items. The total score will be calculated by summing the item scores (range 0–190) and dividing by 19, yielding a mean confidence score, with higher scores indicating greater balance-recovery self-efficacy. Psychometric results demonstrated unidimensionality, good internal consistency (Cronbach's $\alpha = 0.97$), and high test–retest reliability ($ICC_{3,1} = 0.94$) [7].

Activities-specific balance confidence (ABC) scale

The ABC scale is a 16-item self-reported measure that assesses an individual's confidence in maintaining balance while performing various daily activities, such as walking around the house, sweeping the floor, or stepping onto an escalator [4]. Each item is rated on a 0–100% confidence scale (0 = "no confidence at all" to 100 = "completely confident"). The total score is derived by averaging item responses, with higher scores indicating greater balance confidence during everyday tasks. The ABC scale has demonstrated strong psychometric properties in community-dwelling older adults, including high internal consistency (Cronbach's $\alpha = 0.96$) and excellent test–retest reliability ($r = 0.92$) [4].

Falls efficacy scale-international (FES-I)

The FES-I is a 16-item questionnaire designed to assess fear of falling and concern about falling across a range of physical and social activities [27]. Respondents rate their concern for each activity on a 4-point scale (1 = "not at all concerned" to 4 = "very concerned"). Scores are summed to produce a total ranging from 16 to 64, with higher scores indicating greater fear of falling. The FES-I has demonstrated excellent internal consistency (Cronbach's $\alpha = 0.96$), strong test–retest reliability (ICC = 0.96), and cross-cultural validity across multiple languages [20]. It is recommended by the World Falls Guidelines as a standard measure of concern about falling among older adults [2].

Data analysis

Statistical analyses were conducted using R 4.5.1 and Winstep 5.6.4.

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Using the current dataset, we re-examined the factor structure and item loadings of the original 19-item BRC scale to inform the short-form development, with the a priori aim of retaining items that best represent the breadth of the construct and span the item difficulty continuum while maximizing measurement efficiency. A single factor was identified through scree plot and parallel analysis, supporting the unidimensionality of the original 19-item BRC. The retained factor had an SS loading of 12.26, corresponding to 64.5% of variance explained.

Item selection for the SF-BRC was guided by both empirical performance indices and conceptual clinical coverage. Exploratory factor analysis (EFA) was performed using the psych package with unweighted least squares extraction on polychoric correlations estimated via the polycor package to determine the underlying factor structure. This approach was selected because the empirical data deviated from normal distribution assumptions, exhibiting negatively skewed response patterns with clustering at the upper end of the scale. Distributional characteristics of the item responses revealed minimal floor effects (range: 0.3%–10.0%), whereas several items demonstrated ceiling effects exceeding the conventional 15% threshold (range: 12.3%–33.3%). Loadings ≥ 0.70 and communalities ≥ 0.60 were prioritized to ensure good representation of the underlying latent construct. Point-measure correlations (≥ 0.60) were also examined to evaluate whether items contributed meaningfully to the overall scale. Rasch analysis was conducted using the Rating Scale Model (RSM) with the TAM package to evaluate fit statistics, including Infit Mean Square (0.70–1.30) and Outfit Mean Square (0.70–1.40), to evaluate the extent to which each item conformed to model expectations. All items shared a similar response structure, and preliminary inspection of category probability curves indicated approximately equal threshold spacing across items. This supports the RSM assumption of invariant category thresholds and allows for parsimonious estimation of item difficulty and person ability on a common latent continuum. Items with mean square values within these ranges were considered to demonstrate acceptable item fit across respondents. Item difficulty estimates (logits) were evaluated using Winstep. Items through the item difficulty spectrum were considered to ensure an appropriate spread of item challenges across the continuum of balance recovery ability to support adequate measurement targeting both lower and higher ends of the construct. Items which met these criteria were reviewed by the study team for relevance and redundancy using literature [12,14].

Psychometric evaluation of the SF-BRC

The final items of the SF-BRC were evaluated for their clinical relevance and psychometric robustness, with the final model demonstrating good model fit. Confirmatory factor analysis (CFA) was performed using the Weighted Least Squares Mean and Variance adjusted (WLSMV) estimator was conducted to evaluate the validity of the SF-BRC. Model fit was evaluated using the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). An iterative process prioritized items with suboptimal psychometric characteristics while ensuring that retained items collectively spanned the breadth of BRC. At each step, the model was re-estimated using the retained item set to confirm stability of the one-factor structure. The final model would meet an acceptable fit as defined by CFI and TLI ≥ 0.95, RMSEA ≤ 0.06, and SRMR ≤ 0.08.

Internal consistency of the SF-BRC was evaluated using Cronbach's alpha (α), with coefficients ≥ 0.90 interpreted as excellent reliability. Corrected item–total correlations were also assessed to ensure that each item contributed meaningfully to the overall construct. In addition, Rasch-based Person Separation Reliability (PSR) was used to complement classical reliability estimates, reflecting measurement precision across the range of ability levels.

Criterion validity was assessed by correlating the total scores of the SF-BRC with those of the original version. A strong positive correlation ($r \geq 0.80$) was expected, indicating that the SF-BRC's capacity to retain the content validity and interpretive meaning of the full scale. Convergent validity was evaluated through associations with other falls-related psychological measures, including the Falls Efficacy Scale–International (FES-I), Activities-specific Balance Confidence (ABC) scale. Moderate positive correlations ($r = 0.4$–0.79) were hypothesized, reflecting theoretical alignment while maintaining conceptual distinctiveness between the constructs.

Results

Participants characteristics

The sociodemographic of participants is presented in Table 1. The mean age of the 309 participants was 72 years (SD = 5.3) and ranged between 65 and 91. Majority were female (75%) and of Chinese ethnicity (92.6%). Most participants had at least a secondary education (86.1%) and lived in public housing (71.8%). Nearly all participants (92.9%) were able to walk independently without a walking aid, and about a quarter (23.6%) experienced at least one fall in the preceding year.

Selection of items for the BRC scale

The SF-BRC

The overview of the psychometric and conceptual evaluation of items reviewed, as well as those retained for the SF-BRC, is presented in Table 2. The single-factor CFA of the SF-BRC demonstrated an average variance extracted of 67.2% across items (AVE = 0.67). The 7-item Short-Form Balance Recovery Confidence (SF-BRC) showed excellent model fit represented with CFI = 0.99, TLI = 0.99, RMSEA = 0.06, SRMR = 0.02. This reflects a unidimensional structure with minimal residual correlations and strong global fit to the observed data. The 7 items (BRC1, BRC4, BRC6, BRC7, BRC8, BRC11, and BRC13) capture a broad range of balance-recovery scenarios.

Internal consistency and composite reliability were excellent ($\alpha = 0.94$; $\omega = 0.92$). Corrected item–total correlations ($r = 0.78$–0.83) indicated that all seven items contributed meaningfully to the overall SF-BRC construct, with no evidence of item redundancy or poor discrimination. A polytomous Rasch model fitted to the 7-item SF-BRC demonstrated excellent reliability, with a PSR of 0.93, indicating strong measurement precision across the spectrum of BRC. The person separation index of 3.65 corresponded to approximately five distinct strata of respondent ability, suggesting the scale effectively discriminates between multiple levels of confidence. Item difficulty estimates ranged from −0.97 to + 1.01 logits, reflecting an even distribution of challenge across the latent continuum and supporting good targeting for both lower and higher levels of balance recovery ability.

Table 1. Sociodemographic characteristics of the participants

Variable	*n*
Number of participants	309
Age range	
65–69	117 (37.9%)
70–74	98 (31.7%)
75–79	63 (20.4%)
≥80	31 (10%)
Female gender	232 (75%)
Race	
Chinese	286 (92.6%)
Malay	14 (4.5%)
Others	9 (2.9%)
Educational	
Primary or no formal education	43 (13.9%)
Secondary	174 (56.3%)
College/University	92 (29.8%)
Mobility	
Independent	287 (92.9%)
Require the use of a walking aid	22 (7.1%)
Housing type	
2-room public housing	5 (1.6%)
3-room public housing	42 (13.6%)
4-room public housing	72 (23.3%)
5-room/Executive public housing	103 (33.3%)
Condominium and landed private property	87 (28.2%)
Experience one or more falls in the past year	73 (23.6%)
Experience near-fall in the past year	
Never	163 (52.8%)
Rarely	112 (36.2%)
Occasionally/Frequently	34 (11.0%)
ABC score, mean (SD)	86.8 (13.6)
BRC score, mean (SD)	7.0 (2.0)
FES-I score, mean (SD)	20.4 (8.4)

Note: Values are presented as *n (%)* unless otherwise stated. ABC, Activities-specific Balance Confidence scale (score range 0–100); BRC, Balance Recovery Confidence scale (score range 0–10); FES-I, Falls Efficacy Scale–International (score range 0–64). SD, standard deviation.

Criterion validity of the SF-BRC was confirmed through a strong correlation between the SF-BRC and the original BRC scale ($r = .99$, $p < .001$). Convergent validity was supported by a moderate positive correlation with the ABC Scale ($r = .65$), indicating that individuals with higher BRC also reported greater confidence in performing balance-related activities. The SF-BRC showed a moderate negative correlation with the Falls Efficacy Scale–International ($r = -.41$), consistent with theoretical expectations that lower fear of falling corresponds to higher BRC. These findings indicate that the SF-BRC retains strong conceptual alignment with related measures while maintaining discriminant distinctiveness.

Discussion

This paper presented the development and the initial validation of the SF-BRC, a 7-item measure, designed to assess individuals' confidence in their ability to recover balance following perturbations. The development approach applied best practice measurement methods, integrating both Classical Test Theory [27] and Rasch modeling [28], with an overarching emphasis on clinical utility, brevity and psychometric rigor. This approach ensured that the SF-BRC retained the essential measurement characteristics of the original BRC scale while enhancing its practicality for both clinical and research applications.

The SF-BRC demonstrated excellent psychometric properties in this study. Preliminary information of construct validity, supported by strong internal consistency and robust Rasch reliability indices, provides evidence that the SF-BRC is a valid measure of balance recovery confidence. Criterion validity was high (0.99) when compared with the 19-item BRC scale. The scale also exhibited excellent internal consistency (0.94) and high person separation reliability (0.93), reflecting precise discrimination across varying confidence levels. Confirmatory factor analysis further supported the unidimensional structure of the SF-BRC with model fit indices (CFI = 0.99, TLI = 0.99, RMSEA = 0.057, SRMR = 0.015) indicating a well-fitting, coherent single-factor model. Convergent validity was demonstrated through moderate positive correlations with the ABC scale and moderate negative correlations with the FES-I scale. These relationships align with theoretical expectations and support the interpretation that the SF-BRC is a related yet distinct measure that specifically captures confidence in recovering balance following destabilizing events, rather than general balance confidence or fear of falling. Collectively, these findings confirmed that the SF-BRC represents a cohesive, psychometrically sound construct consistent with theoretical expectations of BRC.

Measuring BRC is a relatively new yet conceptually important advancement in understanding balance-related self-efficacy [6]. In the context of contemporary, person-centered rehabilitation, increasing emphasis is placed on integrating individuals' beliefs, perceptions, and self-evaluations into fall prevention and balance management strategies. Unlike traditional measures of balance confidence, which primarily assess an individual's perceived ability to remain steady, the BRC framework focuses on confidence in one's ability to recover balance following destabilizing events. There is a growing body of evidence supporting interventions that target reactive balance control through perturbation-based training [23,29–32]. However, despite these advances, there has been limited insight into individuals' confidence in executing balance recovery strategies, largely due to the absence of specific tools designed to measure this construct [11]. Understanding and assessing BRC is critical because successful recovery often relies on rapid and adaptive change-in-support strategies, such as compensatory stepping or reach-to-grasp actions, that help establish a new base of support after perturbations such as slips or trips. More recently, other reactive mechanisms, including directional stepping, trunk adaptations, and hopping responses, have also been recognized as essential components of real-world balance recovery [33]. Given the importance of these mechanisms, valid and reliable instruments like the SF-BRC are needed to capture the perceived confidence in these reactive balance recovery abilities, thereby enhancing both assessment precision and intervention design.

This study has several limitations. First, the sample primarily comprised high-functioning older adults living independently in

Table 2. Psychometric and conceptual evaluation of items for the balance recovery confidence (BRC) scale

		Psychometric evaluation						Conceptual and content coverage	Decision
BRC items	Type of perturbation	EFA loading	Communalities (h^2)	Point–measure correlation	Infit MNSQ	Outfit MNSQ	Item difficulty estimates (logits)	Indoor/outdoor environments, potential balance recovery mechanisms, and perturbations (e.g., slip, trip, or volitional movements)	Retained/ Removed
BRC 1	Loss of balance while walking up a flight of steps without railings	0.81	0.66	0.72	1.10	1.20	0.34	Outdoor, lower limb, volitional movement	Retained
BRC 2	Loss of balance while walking down a flight of steps without railings	0.78	0.61	0.71	1.25	1.33	0.35	Outdoor, lower limb, volitional movement	Removed
BRC 3	Loss of balance while walking to the toilet	0.74	0.55	0.64	1.21	1.03	−0.47	Indoor, upper and lower limb, volitional movement	Removed
BRC 4	Minor slip on a puddle of water	0.83	0.68	0.73	1.04	1.03	0.30	Indoor, lower limb, slip	Retained
BRC 5	Falling backwards when a vehicle (e.g. bus, train or tram) accelerates suddenly	0.80	0.64	0.70	1.06	1.43	0.21	Outdoor, upper and lower limb, volitional movement	Removed
BRC 6	Falling forwards when a vehicle (e.g. bus, train or tram) stops suddenly	0.83	0.69	0.73	0.87	0.90	0.16	Outdoor, upper and lower limb, volitional movement	Retained
BRC 7	Minor slip while taking a shower	0.81	0.68	0.73	0.89	0.88	0.09	Indoor, upper and lower limb, slip	Retained
BRC 8	Loss of balance while stepping onto an escalator	0.80	0.64	0.70	1.05	0.99	−0.08	Outdoor, upper and lower limb, volitional movement	Retained
BRC 9	Loss of balance while stepping off an escalator	0.81	0.65	0.70	0.99	0.82	−0.20	Outdoor, lower limb, volitional movement	Removed
BRC 10	Loss of balance while doing light exercises (e.g. stretching)	0.79	0.63	0.68	0.95	0.87	−0.47	Outdoor, lower limb, volitional movement	Removed
BRC 11	Falling forwards while walking down a gentle slope	0.82	0.68	0.72	0.85	0.82	−0.13	Outdoor, lower limb, volitional movement	Retained
BRC 12	Trip while carrying groceries with both hands	0.80	0.64	0.72	1.04	1.11	0.27	Outdoor, lower limb, trip	Removed
BRC 13	Loss of balance while stepping over an object or obstacle (e.g. a 12-inch/30.48 cm wide drain)	0.83	0.74	0.75	0.84	0.92	0.26	Outdoor, lower limb, volitional movement	Retained
BRC 14	Loss of balance while avoiding a collision with another person (e.g. a jogger or a child on a bicycle)	0.86	0.76	0.75	0.70	0.74	0.05	Outdoor, lower limb, volitional movement	Removed
BRC 15	Loss of balance while reaching for overhead objects	0.87	0.66	0.75	0.71	0.65	−0.01	Indoor, upper and lower limb, volitional movement	Removed
BRC 16	Loss of balance while standing on a stool	0.81	0.66	0.73	1.16	1.21	0.47	Indoor, upper and lower limb, volitional movement	Removed
BRC 17	Loss of balance while getting dressed in a standing position	0.75	0.56	0.64	1.51	1.28	−0.29	Indoor, upper and lower limb, volitional movement	Removed

(*Continued*)

Table 2. (*Continued*)

BRC items	Type of perturbation	Psychometric evaluation						Conceptual and content coverage	Decision
		EFA loading	Communalities (h^2)	Point-measure correlation	Infit MNSQ	Outfit MNSQ	Item difficulty estimates (logits)	Indoor/outdoor environments, potential balance recovery mechanisms, and perturbations (e.g., slip, trip, or volitional movements)	Retained/ Removed
BRC 18	Loss of balance while getting out of bed	0.76	0.58	0.63	1.22	1.01	−0.61	Indoor, upper and lower limb, volitional movement	Removed
BRC 19	Falling backwards after standing up from a chair	0.74	0.55	0.63	1.45	1.31	−0.24	Indoor, upper and lower limb, volitional movement	Removed

Note: BRC, Balance Recovery Confidence Item; EFA, Exploratory Factor Analysis; h^2, Communalities; MNSQ, Mean Square; logits, Log-odds units of item difficulty. The "Decision" column indicates whether the item was retained or removed for inclusion in the Short-Form Balance Recovery Confidence (SF-BRC) scale, informed by psychometric indices, item redundancy, and conceptual coverage. Predefined criteria included: Point–measure correlations between each item and the overall scale score, with values ≥ 0.60 indicating acceptable discrimination; Infit MNSQ statistics (acceptable range = 0.7–1.3) and outfit MNSQ statistics (acceptable range = 0.7–1.4); support a wide range of item difficulty estimates and a broad range of conceptual coverage reflected by the perturbation type and context. Italicized values indicate psychometric indices that meet the predefined criteria.

the community. Although the included items may remain relevant for individuals with lower functional abilities, further research is required to evaluate the SF-BRC's psychometric properties in clinical populations such as those with stroke, Parkinson's, or other mobility impairments. Second, subgroup analyses were not conducted in this study. Future validation work should include differential item functioning (DIF) analyses to examine potential measurement invariance across key demographic or clinical subgroups. Third, the criterion validity of the SF-BRC against performance-based measures remains to be established. This study identified a moderate correlation with other self-reported measurement instruments, including the ABC and the FES-I scales. While these findings support conceptual relatedness, they also indicate that the SF-BRC captures a distinct aspect of falls-related self-efficacy. Future studies should compare the SF-BRC with objective assessments of reactive balance control, such as perturbation-based testing or compensatory step response evaluations, to further strengthen evidence of its clinical validity and ecological relevance.

Conclusion

The SF-BRC offers a brief, practical, and psychometrically sound measure of reactive BRC. Its brevity and strong measurement properties make it particularly suited for clinical settings where time and resources are limited, such as community fall prevention programs and rehabilitation centers. The SF-BRC also holds potential for inclusion in large-scale research or population-based studies requiring efficient yet valid assessment of balance-related self-efficacy. Future work should continue to evaluate its responsiveness and predictive validity across diverse populations and clinical contexts to fully establish its utility as a core measure of BRC.

Author contributions. **Shawn Leng-Hsien Soh:** Conceptualization, Formal analysis, Methodology, Writing-original draft; **Chong Wei Ang:** Data curation, Formal analysis, Investigation; **Clarice Zi Ying Chan:** Data curation, Formal analysis, Investigation; **Rizka Xiang Ling Goh:** Data curation, Formal analysis, Investigation; **Jun Jie Kuoh:** Data curation, Formal analysis, Investigation; **Zhi Yun Lim:** Data curation, Formal analysis, Investigation; **Hazel Xu Teng Ting:** Investigation, Writing-review and editing; **Jiaying Ho:** Data curation, Formal analysis, Investigation; **Rumpa Boonsinsukh:** Supervision, Writing-review and editing; **Karl Martin Sattelmayer:** Supervision, Writing-review and editing.

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