Faculty of Medical and Health Sciences, University of Poonch Rawalakot
Journal of Pharma and Biomedics
ISSN: 3007-1984(online), 3007-1976 (Print)
https://www.jpbsci.com/index.php/jpbs

Relevance and Research Implications of Unified Balance Scale in Physiotherapy Beyond Neurological Rehabilitation

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Received: July 20, 2024; *Revised: November 20, 2024;* *Accepted: December 13, 2024*

A B S T R A C T

The Unified Balance Scale (UBS) is a clinically validated, activity-based tool developed initially for assessing balance in neurological rehabilitation settings. Despite its established efficacy in patient populations, its broader application in physiotherapy research, particularly among healthy individuals, has received limited attention. This review critically examines the UBS's structure, clinical utility, and psychometric strengths compared to widely used tools such as the Berg Balance Scale (BBS), the Balance Evaluation Systems Test (BESTest), and force plate analysis. While these traditional instruments offer valuable insights into static and dynamic balance, they often lack the comprehensive, functionally oriented assessment provided by the UBS. The UBS evaluates real-life balance tasks, making it especially relevant for clinical, community-based, and preventive physiotherapy settings. Furthermore, it offers a cost-effective, standardized, and easily administered option for researchers seeking to assess postural stability across diverse populations. The review also discusses the potential of UBS to contribute meaningfully to evidence-based physiotherapy practice and outlines future directions for its application in clinical and research contexts. This synthesis affirms the value of the UBS as a flexible and robust instrument that can enhance physiotherapy research beyond its traditional rehabilitation scope.

Keywords: Unified Balance Scale, Balance assessment, Physiotherapy research, Postural stability, Rehabilitation tools, Clinical evaluation, Functional balance

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INTRODUCTION

Postural stability and balance are foundational in maintaining functional independence and preventing falls across all age groups (Liao et al., 2011; Zemková & Zapletalová, 2022). Maintaining a stable, upright posture is essential for performing activities of daily living, and impaired standing balance may impact an individual's quality of life (Noamani et al., 2023). Numerous assessment tools in physiotherapy and rehabilitation sciences have been developed to evaluate balance across varying conditions and populations. Physical therapists' use of various balance assessment tools is essential for accurately identifying deficits and guiding rehabilitation plans (Albalwi et al., 2025). While traditional tools such as the Berg Balance Scale (BBS), the Balance Evaluation Systems Test (BESTest), and force plate analyses remain widely used, recent years have seen increasing interest in more functionally integrated, activity-oriented tools.

The Unified Balance Scale (UBS) emerged as a multidimensional instrument developed explicitly for neurorehabilitation settings to overcome well-established tools' shortcomings (Caselli et al., 2023). It is designed to

assess balance capacities from a "bed-to-community" perspective, particularly in patients recovering from neurological impairments such as stroke, Parkinson's disease, and traumatic brain injury (La Porta, Franceschini, Caselli, Cavallini et al., 2011; La Porta, Franceschini, Caselli, Susassi et al., 2011).

The Unified Balance Scale (UBS), a relatively recent scale, represents a significant advancement in assessing postural control and functional balance, particularly within physiotherapy and rehabilitation sciences (Sibley et al., 2015). It is a tool that is formulated by combining items from the Balance Evaluation Systems Test (Horak et al., 2009), Fullerton Advanced Balance Scale (Rose, Lucchese, & Wiersma, 2006), and Performance Oriented Mobility Assessment (Tinetti, 1986) to gain comprehensive nature and appropriateness for a wide range of physical abilities [bed to community] (Sibley et al., 2015). However, the UBS's holistic approach extends its potential application beyond neurological conditions, encompassing general physiotherapy, sports medicine, outpatient rehabilitation, community screening, and preventive health care. This review critically evaluates UBS's features, comparative performance, and broader applicability in clinical and non-clinical populations.

Overview of the Unified Balance Scale (UBS)

Although initially developed for neurological patients, the Unified Balance Scale (UBS) has key features facilitating its crossover into broader clinical and community contexts (Cash et al., 2023). Its activity-based design includes tasks ranging from bed-level functions to community-level movements, such as sitting balance and tandem walking (La Porta et al., 2011). UBS is aetiology-independent, having been validated initially in populations with mixed neurological conditions, including stroke, Parkinson's disease, and traumatic brain injury (La Porta et al., 2011a; La Porta et al., 2011). It also demonstrates high responsiveness, with an effect size of 1.13 in neurological rehabilitation settings, suggesting strong sensitivity to change across diverse populations (La Porta et al., 2011).

The structure of UBS encompasses a wide range of balance dimensions. These include static balance (e.g., standing still with eyes open or closed), dynamic balance (e.g., walking, turning, transferring), anticipatory postural control (e.g., reaching or stepping), reactive balance (e.g., responding to perturbations), and functional mobility tasks such as stair navigation (La Porta et al., 2011). Each task is scored on a standardized ordinal scale, and the total score reflects the individual's overall balance capability. This multidimensional structure allows physiotherapists to assess balance across various daily activities.

Regarding its intended use and psychometric strength, UBS has demonstrated a broader operational range than its source scales, making it effective for assessing low and high balance abilities (La Porta et al., 2011). It also exhibits minimal floor and ceiling effects—just 1% each—indicating excellent discriminatory capability across different ability levels (La Porta et al., 2011). Unidimensionality has been confirmed through factor analysis, supporting the interpretation of UBS as a single, comprehensive measure (La Porta et al., 2011). Additionally, UBS has shown high responsiveness and outperformed its source scales in detecting clinically meaningful improvements over time (La Porta et al., 2011).

Comparative Analysis with Other Established Balance Scales

In assessing postural stability and balance, physiotherapists and rehabilitation researchers have traditionally relied on various standardized tools. Each tool serves distinct clinical purposes with specific strengths and limitations. While relatively new, the Unified Balance Scale (UBS) deserves critical comparison with widely recognised tools (Table 1).

Research Applications and Evidence of UBS Use Beyond Neurological Settings

The Unified Balance Scale (UBS**)** is primarily associated with neurorehabilitation contexts (La Porta et al., 2011). However, its utility has expanded in recent years across a broader range of populations and clinical conditions. The scale's multidimensional assessment framework—capturing static, dynamic, anticipatory, and reactive balance—makes it an adaptable tool for evaluating balance during various physiological and functional movements (Straudi et al., 2017). This section critically discusses the emerging research domains where UBS finds increased relevance in physiotherapy research.

Use of UBS in Healthy Populations

Sinnarwala and Joshi (2021) compared the Unified Balance Scale (UBS) with the Four-Square Step Test (FSST) in healthy older adults (mean age: 68.5 years). They found that UBS demonstrated superior predictive accuracy for falls. Specifically, UBS showed 82.6% sensitivity and 78.6% specificity at a cutoff score of 50, outperforming FSST, which had 60.9% sensitivity and 64.3% specificity. The UBS's Rasch-calibrated scoring system allows for precise measurement across varying ability levels (La Porta et al.,

2011), enabling the detection of subtle improvements in balance, a critical feature for fitness-focused rehabilitation. These findings highlight UBS's potential value in community-based fall prevention programs for ageing populations without neurological diagnoses (Table 2). Healthy individuals can exhibit subclinical balance deficits due to sedentary behaviour, poor posture, or musculoskeletal imbalances (Orr et al., 2006). UBS's activity-based items can detect these subtle impairments more sensitively than static balance tests (La Porta et al., 2011).

Table 1: Comparative overview of different scales.

Scale	Strengths	Limitations	UBS Advantages
Berg Balance Scale (BBS)	Widely used for frail elderly and severe balance deficits (Inoue et al., 2024; King et al., 2012).	Ceiling effects in milder cases: limited coverage of dynamic task deficits (King et al., 2012), lack of items measuring external postural responses, and dynamic balance (Caselli et al., 2023).	UBS covers a wider measurement range, reducing ceiling/floor effects and measuring the external postural responses and dynamic balance (La Porta et al., 2011)
Mini-BESTest	Sensitive to mild deficits, less ceiling effect, suitable for early PD deficits (Inoue et al., 2024; King et al., 2012).	May not distinguish well in severe cases; newer tool deficits (King et al., 2012)	UBS incorporates items from multiple scales, increasing generalizability (La Porta et al., 2011)
Four-square step test (FSST)	Quick, simple, focus on dynamic balance (Sinnarwala & Joshi, 2021)	Lower sensitivity/specificity for fall prediction (Sinnarwala & Joshi, 2021)	UBS is more comprehensive and accurate for fall risk (Sinnarwala & Joshi, 2021)
Performance-oriented mobility assessment (POMA)	Assesses both gait and balance, widely used (La Porta et al., 2011)	May not cover the full spectrum of balance tasks (La Porta et al., 2011)	UBS includes POMA items, extending its coverage (La Porta et al., 2011)
Fullerton Advanced balance test (FAB)	Challenging covers advanced balance (La Porta et al., 2011)	Less popular and more difficult for frail patients (La Porta et al., 2011)	UBS integrates FAB items, balancing difficulty levels (La Porta et al., 2011)
Force plate analysis	gold-standard laboratory tool for assessing postural sway, center of pressure (COP), and weight distribution, highly sensitive (Matłosz et al., 2020)	High cost, Requirement of technical expertise, Limited ecological validity in clinical or real-world settings	Practical, low-cost alternative that captures performance in context and can be applied by clinicians in non-laboratory environments, increasing accessibility and translational relevance (La Porta et al., 2011)

Source: literature published in scholarly journals

Table 2: Prospects of UBS scale.

Deficit Level	UBS Features	Example Tasks
Severe	Bed/chair-focused items with minimal exertion	Sitting balance, assisted transfers
Moderate	Standing balance and basic gait tasks	Tandem stance, 5-step forward walking
Mild	Advanced dynamic challenges	Backward walking, stair navigation
High-functioning	Sport-like coordination tasks	Rapid directional changes, dual-task

UBS in Preventive Physiotherapy

In elderly populations (including healthy older women), UBS demonstrated superior fall-prediction accuracy (82.6% sensitivity) compared to the Four-Square Step Test (Sinnarwala and Joshi, 2021). While direct evidence in younger healthy females is lacking, its cutoff scores (e.g., ≤50/65 for high fall risk) (Sinnarwala and Joshi, 2021) could theoretically identify balance deficits in post-injury, postpartum, or peri-menopausal women and help in formulating the preventive health strategies.

Use in Community-Based and Outpatient Settings

Traditional balance assessment tools often depend on clinical or laboratory infrastructure, limiting their

accessibility in specific settings. Although objective measures of balance control using computerized systems are becoming feasible and valuable for clinical practice (Mancini and Horak, 2010). In contrast, the Unified Balance Scale (UBS) is portable, time-efficient, and cost-effective (La Porta et al., 2011). It is well-suited for community physiotherapy, home-based rehabilitation, and low-resource outpatient clinics. Its practicality is evident in various real-world applications, such as monitoring rehabilitation progress in post-orthopaedic surgery patients, tracking functional mobility improvements after stroke in home-based care, and evaluating older adults' responses to community exercise programs (La Porta et al., 2011b).

Limitations and Future Potential

As physiotherapy continues to integrate multidimensional assessment tools, the Unified Balance Scale (UBS) emerges as a promising yet underutilized measure beyond its established role in neurorehabilitation. Despite its potential, several gaps warrant attention from researchers, clinicians, and educators. Notably, no studies to date have explicitly explored sex-specific responses to UBS, highlighting the need for a more gender-neutral focus in future research. Furthermore, most available data stem from studies involving neurological patients (La Porta et al., 2011) or elderly populations (Sinnarwala & Joshi), leaving a significant gap in its application among healthy individuals. Additionally, the administration time of 20–30 minutes (La Porta et al., 2011) may pose practical limitations for its use in non-clinical or community-based settings, especially when assessing healthy populations. Addressing these issues could broaden the scope and utility of UBS across diverse physiotherapy contexts.

Comparative Validity and Reliability Studies

Comparative studies are crucial for advancing the clinical applicability of the Unified Balance Scale (UBS). Specifically, they are needed to examine its convergent and discriminant validity by comparing UBS with other established balance assessment tools such as the Berg Balance Scale (BBS) (Lima et al., 2018), the Balance Evaluation Systems Test (BESTest) (Horak et al., 2009), and the Mini-BESTest (Lopes et al., 2020). Additionally, establishing UBS's inter-rater and intra-rater reliability across diverse clinical settings is essential for consistent use. Future research should also explore the correlation between UBS performance and force platform metrics, which could help bridge the gap between laboratory-based assessments and functional, field-based evaluations. To support widespread clinical adoption, a pressing need is to develop standardised clinical practice guidelines for administering UBS in orthopaedic, geriatric, and sports medicine contexts. These guidelines should also include strategies for tailoring interventions based on specific UBS sub-component deficits, such as anticipatory or reactive postural control impairments. Ultimately, endorsement of such guidelines by professional bodies, including the World Confederation for Physical Therapy (WCPT) or national physiotherapy councils, could help standardise and expand UBS use globally.

Integration into Multidisciplinary Care Models

Encouraging the use of the Unified Balance Scale (UBS) across various healthcare disciplines can significantly enhance its impact on patient care. Occupational therapists can employ UBS for task-specific mobility evaluations, while geriatricians and neurologists may integrate it into comprehensive care planning for older adults and individuals with neurological conditions (La Porta et al., 2011). Public health teams can also utilize UBS in community-based screening and fall prevention initiatives. Broadening its application in this way positions UBS as a cross-disciplinary assessment tool, fostering more patient-centered care and promoting interprofessional collaboration in clinical and community settings.

Relevance and Advantages of UBS in Physiotherapy Research

The Unified Balance Scale (UBS) is emerging as a versatile and robust tool in the field of physiotherapy, particularly in the domain of balance assessment (Sibley et al., 2015). While it has traditionally been applied in neuro-rehabilitation settings, its underlying design and functional components make it highly relevant to physiotherapy research. This section critically discusses the key advantages of UBS and why it holds substantial value for current and future physiotherapy investigations.

Functional and Task-Oriented

The tasks embedded in UBS mimic everyday functional activities such as standing, turning, stepping, and transferring. This real-world relevance makes UBS highly suitable for physiotherapy research aimed at:

- Evaluating the impact of interventions on day-to-day mobility
- Investigating balance as a predictor of fall risk and injury prevention

Research outcomes derived from UBS assessments are more readily translatable to clinical practice and patient-centered care models.

Broad Applicability Across Populations

Although initially validated for neurological rehabilitation, UBS has been used in diverse populations, including:

- Geriatric patients
- Stroke survivors
- Individuals with Parkinson's disease
- Patients recovering from orthopaedic surgeries

Emerging research supports its feasibility among healthy adults, including athletes and community-dwelling individuals. This wide applicability allows physiotherapy researchers to use UBS in cross-sectional, longitudinal, and comparative studies involving varied populations.

Easy Administration and Low-Cost Implementation

UBS does not require expensive force plates or motion analysis systems. It can be:

- Administered in clinics, hospitals, and community settings
- Performed using minimal equipment (e.g., chairs, stopwatch, cones)
- Easily standardized with a trained assessor

Low resource demands make UBS particularly valuable in low- and middle-income countries (LMICs) or community-based field studies.

Bridge Between Rehabilitation and Community Function

The UBS is uniquely positioned to assess individuals transitioning from clinical rehabilitation to community integration. Its structure aligns well with:

- Assessing readiness for independent living
- Monitoring progress in home-based therapy
- Tailoring community reintegration programs

UBS can help evaluate whether therapeutic goals translate into meaningful improvements in daily function, a key concern in modern physiotherapy.

CONCLUSION

The Unified Balance Scale (UBS) represents an essential advancement in assessing postural control and functional balance, particularly within physiotherapy and rehabilitation sciences. While initially designed for neurological rehabilitation, its structured, activity-based approach and multidimensional assessment framework make it a highly relevant and underutilized tool in broader physiotherapy research, including in healthy populations.

This review highlights the comparative strengths of UBS when measured against more traditional tools like the BESTest, Berg Balance Scale, and force plate analysis. Its real-world applicability, ease of use, and sensitivity to clinical change make it ideal for evaluating rehabilitation outcomes and assessing balance as part of preventative, community-based, or performance-enhancing interventions.

Given the increasing need for functional, cost-effective, and adaptable assessment methods in high-resource and resource-limited settings, UBS holds excellent potential for expanded use in research. Future studies should continue to explore its validity in different populations, investigate its psychometric properties in diverse cultural contexts, and consider its integration with emerging technologies such as wearable sensors and tele-rehabilitation platforms.

The Unified Balance Scale deserves greater recognition as a reliable and meaningful measure in physiotherapy research. It bridges the gap between clinical assessment and community relevance, offering a practical and comprehensive tool for enhancing evidence-based practice in balance assessment.

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