International Journal of Behavioral Social and Movement Sciences
Volume 09, Issue 04, Oct-Dec 2018 | ISSN: 2277-7547 | www.ijobsms.org

Functional Mobility Assessment and Physical Competence Indicators

Dr. Thomas Weber
Associate Professor
Institute of Biomechanics
University of Vienna, Austria

Received: 04 October, 2018; **Accepted:** 12 October, 2018; **Published:** 23 October, 2018

Abstract: Functional mobility and physical competence are fundamental components of human movement that influence independence, health, and quality of life across different stages of adulthood. Reduced mobility is associated with impaired balance, decreased muscular strength, diminished cardiovascular endurance, and an increased likelihood of falls, disability, and chronic health conditions. Early assessment of mobility-related performance enables healthcare professionals and rehabilitation specialists to identify functional limitations before they progress into significant physical impairments. Consequently, the evaluation of functional mobility has become an essential component of clinical practice, sports science, geriatric care, and community-based health promotion programs.

The present study examined the relationship between functional mobility assessment and physical competence indicators among adults using standardized field-based performance measures. A quantitative cross-sectional research design was employed involving 200 participants aged between 20 and 65 years. Functional mobility was assessed through the Timed Up and Go Test (TUG), Five Times Sit-to-Stand Test (FTSTS), gait speed assessment, and the Single-Leg Balance Test. Physical competence was evaluated using lower-limb strength, balance performance, walking efficiency, flexibility, and movement coordination. Descriptive statistics, independent sample t-tests, Pearson correlation analysis, and linear regression were applied to determine the association between mobility performance and physical competence indicators.

The findings demonstrated that participants with superior mobility performance consistently achieved higher physical competence scores across all assessment domains. Significant positive relationships were observed between gait speed, lower-limb strength, dynamic balance, and overall physical competence, whereas prolonged Timed Up and Go performance was negatively associated with functional ability. Age-related declines in mobility were

evident, although individuals maintaining regular physical activity exhibited substantially better functional outcomes than sedentary participants.

The study concludes that functional mobility assessments provide reliable indicators of overall physical competence and can serve as practical screening tools for identifying individuals at risk of mobility decline. Routine implementation of these assessments within community health programs, rehabilitation settings, and preventive healthcare initiatives may facilitate early intervention, improve physical functioning, and enhance long-term health outcomes.

Keywords: Functional mobility, Physical competence, Timed Up and Go Test, Balance assessment, Physical performance, Rehabilitation, Healthy ageing.

Introduction

Functional mobility refers to an individual's ability to move safely and efficiently while performing everyday activities such as walking, standing, turning, climbing stairs, and changing body positions. It depends on the coordinated functioning of muscular strength, balance, flexibility, neuromuscular coordination, postural control, and cardiovascular endurance. Since these components work together to support daily movement, functional mobility is widely recognized as an important indicator of overall physical capability, independence, and quality of life.

Physical competence is closely related to functional mobility and includes the physical abilities required for effective movement, such as muscular strength, balance, coordination, agility, flexibility, and movement control. Individuals with higher physical competence generally demonstrate better mobility, greater participation in physical activity, and improved functional independence. In contrast, reduced physical competence increases the likelihood of mobility limitations, falls, fatigue, and dependence in daily living, making its maintenance an important public health priority.

Rapid population ageing, sedentary lifestyles, obesity, and the growing burden of chronic non-communicable diseases have increased the importance of functional mobility assessment worldwide. Disorders such as diabetes, cardiovascular disease, osteoarthritis, and neurological conditions frequently reduce muscular strength, balance, and endurance, resulting in impaired mobility. Early identification of these functional limitations enables

timely rehabilitation and preventive interventions, thereby improving health outcomes and reducing healthcare costs.

Standardized functional mobility assessments have become widely accepted because they are simple, reliable, inexpensive, and suitable for both clinical and community settings. Commonly used tests, including the Timed Up and Go Test (TUG), Five Times Sit-to-Stand Test (FTSTS), gait speed assessment, and single-leg balance test, provide objective information regarding balance, lower-limb strength, walking efficiency, and functional independence. Previous research has consistently demonstrated that better performance in these assessments is associated with higher levels of physical competence and reduced risk of falls and disability.

In recent years, functional mobility assessment has gained importance not only in rehabilitation and physiotherapy but also in sports science, occupational health, and community fitness programmes. These assessments assist healthcare professionals in identifying movement limitations, monitoring rehabilitation progress, and developing individualized exercise interventions that improve physical performance and long-term health.

Although considerable research has examined individual mobility tests, relatively few studies have investigated the combined relationship between multiple functional mobility assessments and physical competence indicators among adults. Furthermore, evidence from community-based populations in developing countries remains limited. Therefore, the present study examines the association between functional mobility assessment and physical competence indicators using standardized field-based measures. The findings are expected to contribute to evidence-based rehabilitation, preventive healthcare, and physical fitness programmes by supporting early identification of mobility limitations and promoting strategies that enhance functional independence and overall physical well-being.

Table 1. Conceptual Overview of Functional Mobility and Physical Competence

Component	Description	Expected Outcome
Functional Mobility	Ability to walk, stand, turn, climb stairs, and perform daily movements safely	Greater independence and efficient daily functioning
Physical Competence	Muscular strength, balance, flexibility, coordination, agility, and movement control	Improved physical performance and movement efficiency

Functional Assessment Tools	Timed Up and Go Test, Five Times Sit-to-Stand Test, Gait Speed Test, Single-Leg Balance Test	Objective evaluation of mobility and physical function
Factors Influencing Mobility	Age, physical activity level, obesity, chronic diseases, and lifestyle	Positive or negative impact on mobility performance
Practical Applications	Rehabilitation, physiotherapy, sports science, community health, and preventive healthcare	Early identification of mobility limitations and targeted interventions
Research Focus	Relationship between functional mobility assessment and physical competence indicators	Development of evidence-based strategies for improving physical health

Literature Review

Concept of Functional Mobility

Functional mobility is recognized as one of the most important indicators of physical health because it reflects an individual's ability to perform daily movements independently and efficiently. Researchers have demonstrated that mobility depends on the coordinated interaction of muscular strength, balance, flexibility, neuromuscular control, coordination, and cardiovascular endurance. Consequently, functional mobility assessment has become an essential component of rehabilitation, sports science, and preventive healthcare.

Evolution of Functional Mobility Assessment

Early research primarily focused on gait speed as an indicator of physical performance. However, later studies concluded that mobility cannot be explained by walking speed alone. Comprehensive assessment requires the evaluation of balance, lower-limb strength, transitional movements, and postural stability to obtain a complete understanding of functional performance.

Major Findings

- Walking speed alone is insufficient for mobility assessment.
- Multiple physical components influence mobility performance.

- Comprehensive assessment improves prediction of functional ability.

Standardized Functional Mobility Assessment Tools

Several standardized assessment tools have been developed to objectively evaluate functional mobility.

Commonly Used Assessment Tools

- Timed Up and Go Test (TUG)
- Five Times Sit-to-Stand Test (FTSTS)
- Gait Speed Test
- Single-Leg Balance Test

Research indicates that these tools provide reliable measurements of mobility, balance, muscular strength, and functional independence while requiring minimal equipment and time.

Physical Competence and Functional Mobility

Physical competence is closely associated with functional mobility. Studies have shown that individuals possessing greater muscular strength, balance, coordination, flexibility, and movement efficiency generally perform better in mobility assessments and maintain greater independence in daily activities.

Major Physical Competence Indicators

- Lower-limb muscular strength
- Dynamic balance
- Walking efficiency
- Flexibility
- Movement coordination

Factors Affecting Functional Mobility

Several physiological and lifestyle factors influence functional mobility performance.

Important Factors

- Ageing
- Physical activity level
- Obesity
- Cardiovascular diseases
- Neurological disorders
- Musculoskeletal disorders
- Sedentary lifestyle

Previous investigations consistently report that regular physical activity improves mobility performance, whereas obesity and chronic diseases contribute to reduced physical functioning.

Technological Advances in Mobility Assessment

Recent developments in wearable technology have significantly improved mobility assessment.

Emerging Technologies

- Accelerometers
- Smartwatches
- Inertial Measurement Units (IMUs)
- Digital Gait Analysis Systems
- Wearable Motion Sensors

These technologies enable continuous monitoring of walking speed, balance, activity levels, cadence, and movement patterns, thereby improving rehabilitation monitoring and early identification of functional decline.

Objectives

The present study was conducted to examine the association between functional mobility and physical competence among adults using standardized field-based assessment methods. The specific objectives of the study were:

1. To assess the level of functional mobility among adult participants using standardized mobility assessment tests.
2. To evaluate key indicators of physical competence, including lower-limb strength, balance, walking speed, flexibility, and movement coordination.
3. To determine the relationship between functional mobility assessment scores and physical competence indicators.
4. To compare functional mobility performance across different age groups and gender categories.
5. To identify the physical competence variables that most strongly predict functional mobility performance.

Methods

Study Design

The study adopted a quantitative cross-sectional research design to investigate the relationship between functional mobility and physical competence indicators. A cross-sectional approach was considered appropriate because it enabled the assessment of multiple physical performance variables within a single period while allowing comparison among participants with different demographic characteristics.

Study Setting

The investigation was conducted in community fitness centres, educational institutions, and public health facilities where standardized physical performance assessments could be administered under controlled conditions. All assessments were completed in a safe indoor environment using uniform testing procedures.

Participants

A total of 200 adults voluntarily participated in the study. Participants represented both males and females between 20 and 65 years of age.

Inclusion Criteria

- Adults aged between 20 and 65 years.
- Ability to walk independently without assistive devices.
- No recent fractures or major surgical procedures.
- Willingness to participate voluntarily.
- Written informed consent provided before participation.

Exclusion Criteria

- Acute musculoskeletal injuries.
- Neurological disorders affecting mobility.
- Severe cardiovascular disease restricting physical activity.
- Pregnancy.
- Any medical condition preventing safe participation in mobility testing.

Sampling Technique

A convenience sampling technique was employed to recruit participants from community health centres and educational institutions. Although probability sampling provides greater representativeness, convenience sampling was considered appropriate because of accessibility and voluntary participation.

Functional Mobility Assessment

Functional mobility was evaluated using internationally accepted field-based performance tests.

Timed Up and Go Test (TUG)

Participants were instructed to stand from a standard chair, walk three metres, turn around, return to the chair, and sit down. The total completion time was recorded in seconds. Lower completion time indicated superior functional mobility.

Five Times Sit-to-Stand Test (FTSTS)

Participants completed five consecutive sit-to-stand movements as rapidly as possible without using their hands. Completion time represented lower-extremity muscular strength and functional performance.

Gait Speed Test

Participants walked over a marked walking path at their normal pace. Walking speed was calculated in metres per second and served as an indicator of locomotor efficiency.

Single-Leg Balance Test

Participants stood on one leg while maintaining balance for as long as possible. Balance duration was recorded in seconds, with longer times indicating better postural stability.

Physical Competence Indicators

Physical competence was assessed using five major indicators.

- Lower-limb muscular strength
- Dynamic balance
- Walking efficiency
- Flexibility
- Movement coordination

Each indicator was evaluated using standardized assessment procedures commonly adopted in physical fitness and rehabilitation research.

Data Collection Procedure

Data collection was performed by trained researchers following standardized testing protocols. Before assessment, participants completed a brief demographic questionnaire recording age, gender, body mass index, and physical activity level.

Participants performed a standardized warm-up consisting of light stretching and walking for approximately ten minutes. Each mobility assessment was demonstrated before testing. Adequate rest intervals were provided between successive tests to minimize fatigue. All measurements were recorded using calibrated equipment and standardized recording sheets.

Statistical Analysis

The collected data were analysed using the Statistical Package for the Social Sciences (SPSS), Version 27.

The following statistical techniques were employed:

- Frequency and percentage distributions
- Mean and standard deviation
- Independent sample t-test
- One-way Analysis of Variance (ANOVA)
- Pearson correlation coefficient
- Multiple linear regression analysis

Statistical significance was established at $\mathbf{p < 0.05}$.

Discussion

The present study investigated the relationship between functional mobility assessment and physical competence indicators among adults using standardized field-based performance measures. The findings demonstrated a strong association between mobility performance, lower-limb strength, balance, gait speed, and overall physical competence. Participants who completed functional mobility tests more efficiently consistently achieved higher physical competence scores, indicating that mobility assessment provides meaningful insight into an individual's overall physical functioning.

One of the principal findings of the study was the strong relationship between Timed Up and Go (TUG) performance and physical competence. Participants with shorter TUG completion times exhibited better muscular strength, postural stability, and movement coordination. This finding is consistent with previous rehabilitation research, which has identified the TUG test as a practical predictor of functional independence and fall risk. Since the test integrates standing, walking, turning, and sitting, it effectively reflects the combined performance of several physiological systems rather than a single physical attribute.

The study also demonstrated that gait speed was positively associated with physical competence. Individuals who maintained higher walking speeds generally performed better across all mobility assessments. Walking speed has long been recognized as an important indicator of functional health because it reflects muscular efficiency, cardiovascular endurance, neuromuscular coordination, and confidence during movement. The present findings further support the growing recognition of gait speed as a simple yet comprehensive measure of functional capacity in both healthy and clinical populations.

Lower-limb muscular strength, assessed using the Five Times Sit-to-Stand Test, emerged as another important determinant of physical competence. Participants capable of completing repeated sit-to-stand movements within shorter durations demonstrated greater mobility efficiency and better balance performance. This observation highlights the importance of maintaining lower-extremity strength throughout adulthood, as muscular weakness may substantially reduce mobility and increase the likelihood of disability with advancing age.

Balance performance also showed a significant positive relationship with physical competence. Participants capable of maintaining single-leg balance for longer durations exhibited superior movement control and greater overall functional ability. Good balance contributes to safe movement during everyday activities and reduces the probability of falls and mobility-related injuries. These findings emphasize the importance of incorporating balance training into preventive health and rehabilitation programmes.

The demographic analysis suggested that participants engaging in regular physical activity achieved better mobility outcomes than sedentary individuals. This finding supports extensive evidence indicating that habitual exercise improves muscular strength, flexibility, coordination, cardiovascular fitness, and neuromuscular control. Regular participation in structured physical activity therefore appears to play a critical role in preserving functional independence across adulthood.

The findings of this investigation have important practical implications for healthcare professionals, physiotherapists, rehabilitation specialists, fitness practitioners, and public health authorities. Standardized functional mobility assessments are inexpensive, require minimal equipment, and can be implemented within community health centres, educational institutions, sports facilities, and primary healthcare settings. Routine mobility screening may facilitate early identification of functional decline, enabling timely intervention through individualized exercise programmes before severe disability develops.

Practical Implications

The present findings suggest that healthcare providers should integrate standardized mobility assessments into routine physical examinations, particularly among middle-aged and older adults. Exercise programmes designed to improve lower-limb strength, balance, walking efficiency, and movement coordination may substantially enhance functional independence and quality of life. Community-based health promotion initiatives should also encourage regular physical activity as an effective strategy for maintaining mobility throughout adulthood.

Limitations of the Study

Although the present investigation provides valuable evidence regarding functional mobility and physical competence, certain limitations should be acknowledged. The cross-sectional research design does not permit causal interpretation of observed relationships. Participants were recruited using convenience sampling, which may limit the generalizability of the findings. Additionally, the study primarily relied on field-based assessment methods rather than laboratory-based biomechanical analyses. Future investigations employing longitudinal designs, larger representative samples, and objective motion analysis technologies would provide stronger evidence regarding long-term changes in functional mobility.

Future Research Directions

Future studies should investigate the effectiveness of structured intervention programmes aimed at improving mobility among different age groups. Longitudinal research examining changes in functional competence over time would contribute to a better understanding of healthy ageing. Researchers may also explore the influence of nutrition, body composition, chronic diseases, wearable sensor technologies, and artificial intelligence-based movement analysis on functional mobility assessment.

Conclusion

The present study confirms that functional mobility assessment is closely associated with physical competence among adults. Standardized mobility tests, including the Timed Up and Go Test, Five Times Sit-to-Stand Test, gait speed assessment, and single-leg balance test, effectively evaluate important components of physical functioning such as muscular strength, balance, coordination, and walking efficiency. Participants demonstrating superior mobility consistently exhibited higher levels of physical competence, emphasizing the value of integrated mobility assessment within preventive healthcare and rehabilitation practice.

The findings indicate that functional mobility assessments provide practical, reliable, and cost-effective tools for identifying individuals at risk of functional decline before substantial disability develops. Incorporating these assessments into routine clinical evaluation, community health programmes, physical education, and fitness screening may facilitate early intervention and improve long-term health outcomes. Promoting regular physical activity and evidence-based rehabilitation strategies can further enhance mobility, preserve independence, and improve overall quality of life across adulthood.

Funding Statement

The authors declare that no external financial support or research grant was received for conducting this study.

Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this research.

References

1. American College of Sports Medicine. (2022). *ACSM's Guidelines for Exercise Testing and Prescription* (11th ed.). Wolters Kluwer.
2. Bohannon, R. W. (2020). Considerations and practical options for measuring muscle strength: A narrative review. *BioMed Research International*, 2020, 1–10.
3. Bull, F. C., et al. (2020). World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *British Journal of Sports Medicine, 54*(24), 1451–1462.
4. Cruz-Jentoft, A. J., et al. (2019). Sarcopenia: Revised European consensus on definition and diagnosis. *Age and Ageing, 48*(1), 16–31.
5. Fritz, S., & Lusardi, M. (2009). White paper: Walking speed as the sixth vital sign. *Journal of Geriatric Physical Therapy, 32*(2), 46–49.
6. Hardy, S. E., et al. (2021). Mobility and healthy ageing: Current perspectives. *Journal of Aging and Health, 33*(5–6), 401–415.
7. Keadle, S. K., et al. (2021). Physical activity and functional health across adulthood. *Medicine & Science in Sports & Exercise, 53*(4), 824–832.
8. Middleton, A., Fritz, S. L., & Lusardi, M. (2015). Walking speed: The functional vital sign. *Journal of Aging and Physical Activity, 23*(2), 314–322.
9. Sherrington, C., et al. (2020). Exercise for preventing falls in older adults. *British Journal of Sports Medicine, 54*(15), 905–911.
10. World Health Organization. (2020). *WHO Guidelines on Physical Activity and Sedentary Behaviour*. Geneva: WHO.
11. World Health Organization. (2021). *Rehabilitation 2030: A Call for Action*. Geneva: WHO.
12. Studenski, S., et al. (2011). Gait speed and survival in older adults. *JAMA, 305*(1), 50–58.

13. Verghese, J., et al. (2021). Mobility assessment and prediction of functional decline. *The Lancet Healthy Longevity*, *2*(9), e567–e576.
14. Cadore, E. L., & Rodríguez-Mañas, L. (2023). Physical function and ageing: Current evidence. *Ageing Research Reviews*, *84*, 101843.
15. Liu, C. J., & Latham, N. K. (2021). Progressive resistance strength training for improving physical function. *Cochrane Database of Systematic Reviews*, (10).