

# Application Fields and Innovative Technologies

## Assessing Walking Aid Use in Older Adults: An Exploratory Review of Measurement Approaches

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**Purpose** Mobility limitations are highly prevalent among older adults due to aging and musculoskeletal conditions, increasing the risk of falls, injury, and social isolation. To support safer mobility, walking aids such as canes and (wheeled) walkers are widely prescribed.<sup>1</sup> Clinical evidence suggests that these devices can improve balance, gait, participation, and quality of life.<sup>2,3</sup> Despite these benefits, real-world use of walking aids is highly variable, and many users report difficulties associated with device use. Observational studies indicate that incorrect device use (e.g., improper loading/coordination) is common and associated with unsafe events, including falls.<sup>3</sup> Non-use and abandonment are also frequent, often reflecting a poor fit between the user, the device, and the environment.<sup>4</sup> Given that mobility outcomes depend on how devices are used in everyday contexts, there is a critical need to assess and characterize user-device-environment interactions during free-living mobility. **Method** We conducted an exploratory literature review to identify approaches for assessing walking aid use among older adults. Relevant literature was identified through Google Scholar, supplemented by reference checking of key articles (January 2026). Search terms included combinations of *older adults*, *walking aids*, and *mobility assessment*. A single reviewer screened titles and abstracts and extracted data on assessment strategy, setting (clinical vs. free-living), and key outcomes. Studies were grouped by assessment strategy and appraised qualitatively for ecological validity, ability to capture user-device interaction, and applicability to real-world settings. As this review was exploratory and non-exhaustive, findings should be interpreted as a focused synthesis rather than a comprehensive review. **Results and Discussion** Three assessment strategies were identified. (1) Clinical assessments rely on brief, structured, and supervised tests that may be performed with an assistive device (e.g., Timed Up & Go).<sup>5</sup> While useful for standardized evaluation, they provide limited insight into daily mobility patterns or unsupervised device use. (2) Wearable sensors placed on the individual have been used to assess mobility across indoor and outdoor settings and characterize free-living gait characteristics.<sup>6-8</sup> Although reviews support their ability to monitor gait and detect changes across contexts, user-only sensing is often limited in distinguishing intrinsic gait impairment from device reliance or environmental challenges. (3) Sensors integrated into walking aids (e.g., motion or force sensing) can capture device-related characteristics such as weight distribution and estimate gait and activity patterns.<sup>9,10</sup> These approaches show promise for quantifying device-specific and user-device parameters, but many studies remain laboratory-based and lack long-term validation in real-world settings. These findings suggest that current methods incompletely capture *functional device use*, *user-device coordination*, *context-dependent variability*, and *longitudinal patterns* needed to inform clinical decision-making. A promising direction is dual instrumentation (sensors on both the user and device). User- and device-level measurements can enable quantification of functional device use and user-device coordination by distinguishing gait characteristics from device loading and support. Real-world monitoring can capture context-dependent variability in mobility across environments and tasks, while longitudinal deployment allows characterization of changes in device reliance, adaptation, and use over time. When complemented by qualitative user perspectives, these approaches may support personalized walking aid prescription, training, and fall-prevention interventions.

### References

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