



# Reliability of the GAITRite® walkway system for the quantification of temporo-spatial parameters of gait in young and older people

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## Abstract

The purpose of this study was to evaluate the test–retest reliability of an instrumented walkway system (the GAITRite® mat) for the measurement of temporal and spatial parameters of gait in young and older people. Thirty young subjects (12 males, 18 females) aged between 22 and 40 years (mean 28.5, S.D. 4.8) and 31 older subjects (13 males, 18 females) aged between 76 and 87 years (mean 80.8, S.D. 3.1) walked at a self-selected comfortable walking speed across the pressure-sensor mat three times and repeated the process approximately 2 weeks later. Intra-class correlation coefficients (ICC), coefficients of variation (CV) and 95% limits of agreement were then determined. For both groups of subjects, the reliability of walking speed, cadence and step length was excellent (ICCs between 0.82 and 0.92 and CVs between 1.4 and 3.5%). Base of support and toe in/out angles, although exhibiting high ICCs, were associated with higher CVs (8.3–17.7% in young subjects and 14.3–33.0% in older subjects). It is concluded that the GAITRite® mat exhibits excellent reliability for most temporo-spatial gait parameters in both young and older subjects, however, base of support and toe in/out angles need to be viewed with some caution, particularly in older people.

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## 1. Introduction

Measurements of temporal and spatial parameters of gait are commonly used for the identification of gait disorders [1] and for the evaluation of therapeutic interventions such as exercise [2,3]. A variety of techniques have been used for this purpose, including simple visual observation [4–6], stopwatches [7,8] and paper walkways [9–11]. More recently, sophisticated gait analysis tools have become commercially available, including the in-shoe Clinical Stride Analyser® [12,13] and the GAITRite® mat [14–17]. Although the reliability of the Clinical Stride Analyser® is well established [12,13], there is limited information available pertaining to the reliability of the GAITRite® system.

The GAITRite® mat is a portable walkway embedded with pressure sensors that detect footfalls as the subject walks the length of the mat. The software enables the

documentation of a wide range of temporo-spatial gait parameters, including walking speed, cadence, step length, base of support and foot placement angles. A number of studies have been performed to evaluate the validity of these measurements against existing techniques. A single case study by McDonough et al. [14] evaluated the concurrent validity of the GAITRite® mat against chalk footsteps and a hand-held stopwatch. The results revealed that while there was good agreement for spatial variables between the GAITRite® mat and the chalk footprints, the association between the GAITRite® mat temporal parameters and timed measures with the stopwatch was somewhat lower. The authors attributed this poor association to the subjectivity involved in timing gait events with a stopwatch. A similar investigation by Selby-Silverstein and Besser [15] compared the GAITRite® mat to powdered footprints and an in-shoe pressure measurement tool (the Parotec® system), and reported moderate correlations for temporal variables. Cutlip et al. [16] compared the GAITRite® mat to the Peak Performance Technologies Motus 3.1® system, and reported strong associations between the systems for

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