

TOURO COLLEGE
Department Of Physical Therapy
Senior Research Presentations - DPT 2008
May 06, 2008

The Reliability and Validity of Select Gait Parameters of the SmartStep™ System

Garcia RK, Onefactor G, Kolodoly Y

Background and Purpose: Gait analysis is an important tool in the clinic. Physical therapists analyze gait to assess deviations & pathologies, which subsequently lead to goal-setting and treatment planning. Many different methods have been used to assess gait in the clinic, such as chalk and paper, Clinical Stride Analyzer™, 3-D motion analysis, and the GAITRite® Portable Walkway System. New equipment must be assessed for reliability and validity of measurements before being used for clinical or research purposes. The SmartStep™ System is a relatively new piece of equipment that has been used primarily in Europe. It was developed primarily as a biofeedback unit for training patients with maintaining % body weight after LE surgery, trauma, etc. In addition, the device has the capability of assessing select gait parameters, such as velocity and cadence. The reliability and validity of the measurement of % body weight has been established, however, there is no reliability or validity information available for the gait parameters. Therefore, the purpose of this study was to establish the test-retest reliability and concurrent validity of select gait parameters measured by the SmartStep™ System. **Subjects:** A sample of convenience of 33 healthy male or female volunteers, between the ages of 18-40 years old participated. **Design:** Methodological Research Design assessing velocity, cadence, cycle time, stance time, and swing time. **Methods:** Before data was collected, both systems were calibrated. The subjects was then positioned 2m from the GAITRite® walkway and instructed to 'walk across the carpet at your own pace'. Both systems were activated simultaneously as the subjects began walking. The best 3 trials for each system were saved and used for analysis. Approximately 6 weeks later, gait parameters assessed from the SmartStep™ System were remeasured using the same procedures as before. **Results:** The reliability from the first testing session to the second testing session was good to excellent for all variables (ICC =.91-.66). Velocity and cadence demonstrated the strongest reliability. When correlated to the GAITRite® measurements, the SmartStep™ System demonstrated ICC values ranging from .89 to .36. The strongest values were established for velocity and cadence followed by stance time and cycle time. The lowest value was obtained for swing time.

Discussion and Conclusion: All variables demonstrated excellent to good test-retest reliability. Concurrent validity was established for velocity, cadence, cycle time, and stance time. The discrepancies in the literature concerning the test-retest reliability of the %GC for the GAITRite® may account for the low values for demonstrated for concurrent validity. The moderate reliability values for cycle time, swing time, and stance time may be attributed to how the systems measure these variables, i.e. the GAITRite® measures them bilaterally, whereas the SmartStep™ measures them unilaterally. In addition, stance and swing time were assessed as %GC as opposed to the more objective measure of time in seconds. The SmartStep™ System seems to be a reliable and valid tool to measure select gait parameters and may be a viable alternative to use in the clinic as it is small, portable, and easy to use.