ABSTRACT

Background: Accurate assessment of recovery following mild traumatic brain injury in adolescents can be difficult. When compared to single-task models, dual-task models that combine cognitive and motor demands may more accurately identify residual deficits that manifest during daily life and athletic play in adolescents with concussion. Previous studies have examined gait changes during a concurrent auditory task, or cognitive task.

Purpose: The purpose of this study was to collect and present data from a sample of healthy 14-18 year old male and female athletes on spatiotemporal parameters of gait for walking with and without a concurrent visuospatial memory task presented on a hand-held tablet.

Study Design: A two-way repeated measures study of spatiotemporal gait parameters in a cross-sectional convenience sample of adolescent subjects participating in high school athletics.

Methods: Subjects comprised a total of 178 adolescent athletes (128 males; 50 females) ages 14-18 years old at six area high schools. Subjects were instructed to walk “how you normally do” on the GAITRite® portable gait analysis walkway for three undivided and three divided attention trials performing a visuospatial memory task on a hand-held tablet.

Results: Significant differences (p<0.0001) were present between males and females during typical gait in each of the measured parameters except step length (p = 0.0715). Female participants walked with a significantly faster gait velocity (by 0.21 m/s) than male participants (p<0.0001). The females spent a significantly smaller (-2.27%) percent of the gait cycle in double limb support (p < 0.0001) and a significantly greater (+1.10%) percent of the gait cycle in single limb support (p < 0.0001) than did the males. Both groups experienced a similar, dual-task cost during the divided attention trials (p < 0.0001) for each of the four gait parameters. Previous studies have shown that adults decrease their gait velocity by approximately 33% when performing a task on a hand-held device. The current study revealed that adolescents decreased their gait velocity by 8-9% by shortening their step length by 7.4 centimeters (p < 0.0001), increased the percent of the gait cycle spent in double limb support (2.73%, p < 0.0001) and decreased the percent of the gait cycle spent in single limb support (1.38%, p < 0.0001) during the dual-task.

Conclusion: These data provide preliminary reference values specific to the adolescent population for the dual-task cost during a visuospatial memory task. More research is needed to determine the dual-task cost during a visuospatial memory task for adolescents with concussion.

Level of Evidence: 2b

Keywords: adolescent, concussion, dual-task, gait, movement system

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