INTRODUCTION
Amputation markedly alters the musculoskeletal and motor control systems of the human body and often requires persons with lower limb loss (LLL) to use a prosthesis to achieve functional ambulation. Contemporary prosthetic interventions do not directly exchange neural information with the user, limiting the degree of control they offer a user. The indirect connection between the motor control system and the prosthesis requires the user to consciously and continuously monitor their movements. The need for constant attention to monitor and maintain stability while walking may contribute to the reported increased falls and elevated fear of falling among prosthetic users compared to non-amputees. Prosthetic users have reported a perceived, heightened cognitive load associated with ambulation in prior research (Miller, 2001). However, studies that have measured cognitive load with objective measures have shown inconclusive results (Guerts, 1991, Lamoth, 2010). One potential explanation for this discrepancy is that prior studies have typically included small, heterogeneous samples. The purpose of this research was therefore to objectively quantify the effects of increased cognitive load in persons with transfemoral amputation (TFA) compared to controls.

METHOD
Participants with TFA using a microprocessor-controlled knee and age/gender-matched controls were recruited. Participants walked at a self-selected speed under single-task (walking only) and dual-task (walking while performing an auditory analogue of the Stroop test) conditions. Three-dimensional marker position data was collected in order to assess speed and stride-to-stride variability for walking tasks. Response latency and accuracy were assessed for the cognitive task under single-task (seated) and dual-task (while walking) conditions. The dual-task effect (DTE) was calculated for all parameters.

DTE = \frac{DT \text{ Performance} - ST \text{ Performance}}{ST \text{ Performance}} \times 100

RESULTS
Twelve participants with TFA and twelve matched controls were assessed. Preliminary data indicate that in simple walking conditions, people with TFA and controls have similar walking and cognitive DTEs.

DISCUSSION
Over flat, level ground, concurrent cognitive tasks do not appear to have greater effects on walking in persons with TFA than compared to non-amputee controls. This finding is in contrast to previous self-report of heightened cognitive load while walking in persons with LLL (Miller, 2001). As previous self-report encompasses real-world conditions, this apparent discrepancy may suggest that more challenging environmental conditions (e.g., uneven terrain) may require additional cognitive resources while walking with a prosthesis than level terrain.

CONCLUSION
Dual-task methods can be used to quantify the effects of cognitive load on walking in persons with TFA. The degree to which a cognitive task interferes with walking in people with TFA may increase with complex walking tasks or environmental conditions.

CLINICAL APPLICATIONS
The presence of heightened cognitive load when walking likely contributes to mobility challenges experienced by persons with LLL, but walking conditions in clinical and laboratory environments may be too simple to elicit an increase in attention to walking. Clinical assessment of prosthetic technology should include challenging environmental conditions (e.g., uneven terrain) for assessment of cognitive load when ambulating with a prosthesis.

REFERENCES
Miller, W. Arch Phys Med Rehabil 82, 1031-7, 2001