INTRODUCTION
There is a lack of objective measures to support prosthetic prescription and to assess prosthetic rehabilitation outcomes (Hofstad, 2009). Recently, measures such as the 6 minute walk test (6MWT) and step activity monitoring (SAM) have been considered as potentially viable options. In order for either to be valuable outcomes tools for the rehabilitation team, they would need to be able to distinguish between different functional prostheses. More specifically, for purposes of third party payers, they would need to show a distinct difference between activity levels according to Medicare K-levels (Gailey, 2002). Therefore, the purpose of this study was to determine whether the 6MWT or SAM over an extended period could distinguish a change in functionality for individuals wearing a low activity prosthesis and a high activity prosthesis.

METHOD
Subjects: 26 transtibial amputees (23 unilateral; age: 54.7 ± 10.4 yrs; ht: 177.1 ± 8.0 cm; mass: 99.3 ± 19.8 kg; yrs since amputation: 8.1 ± 9.5 yrs) consented to participate in this University IRB approved study. All subjects were previously classified as either K3 or K4 level by their prescribing physician and/or prosthetist.

Procedures: Subjects participated in a randomized, 6-week crossover design, study. Subjects were initially randomly assigned to begin wearing either a low activity foot (K2 level, e.g. SACH foot) or a high activity foot (K3 level). The subjects’ current prosthetic foot was removed and replaced with the assigned foot. The prosthesis was then properly aligned by a certified prosthetist. A step activity monitor (Actigraph, Pensacola, FL, USA) was attached to the subject’s pylon. The subject then wore the prosthesis for 3 weeks, coming to the lab every 1.5 weeks to download data and recharge the monitor. At the end of the 3 week wear period, subjects performed a 6MWT. Then, the prosthetic foot was switched and another 3 week period repeated with the same testing. Subjects used their prescribed socket and suspension method for the entirety of the study.

Data Analysis: The average daily step count was calculated for each 3 week period excluding days the person came to the lab. Differences in average daily step count and total distance for the 6MWT were tested through a dependent t-test (α=0.05).

RESULTS
SAM could only be obtained from 24 subjects and 1 subject refused to do 6MWT. There were no differences for 6MWT (p=0.757; Fig 1A) or for average daily step count (p=0.078; Fig 1B) between prostheses.

DISCUSSION
Due to previous work showing differences in patients’ performance in the 6MWT (Gailey, 2002), it was thought that a similar difference in performance would be seen when patients wore a higher activity foot compared to a lower activity foot. However, there was no difference in the 6MWT when individuals wore either a K2 or K3 foot. SAM is also being marketed to as a viable prosthetics outcomes measure. We similarly expected to see the step activity to be increased in a higher activity foot. However, this was not the case and in fact the SAM failed to show any difference between the two different prostheses. Similar results have been found for shock absorbing pylons and microprocessor knee joints (Klute, 2006). The lack of sensitivity of these measures is possibly due to oversight of mechanistic causes for differences in prosthetic components.

CONCLUSION
The 6MWT and step activity monitoring’s failed to identify a change in functionality for individuals wearing a low activity prosthesis and a high activity prosthesis.

CLINICAL APPLICATIONS
The use of a low activity foot (e.g. SACH foot) or a high activity foot does not affect a patient’s functional ability or day-to-day ambulatory activity as measured by the 6MWT and step activity monitoring. As such, these assessments are not recommended for prosthetists.

REFERENCES

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