



STROKE SPECIAL INTEREST GROUP

Academy of Neurologic Physical Therapy

In this newsletter...

- **NEW Article Review! See below for video link to listen!
- Student Resources Exam Question and Answer!
- New Evidence Elevates Podcast!



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Summary topic title: Beyond steps per day: other measures of real-world walking after stroke related to cardiovascular risk.

Article reference: Miller A, Collier Z, Reisman DS. Beyond steps per day: Other measures of real-world walking after stroke related to cardiovascular risk. *Journal of NeuroEngineering and Rehabilitation*. 2022;19(1). doi:10.1186/s12984-022-01091-7

Definitions:

- 1) Real-World activity: Physical activity that occurs outside a laboratory or a clinic.
- 2) Cadence: Number of steps per minute
- 3) Activity Volume: Captures the overall volume of activity over a particular period of time. E.g. average steps/day, time walking per day.
- 4) Activity Frequency: Frequency or bouts in which activity is accumulated over the day. E.g. Long bouts (> 300 steps), short bouts (<40 steps), and overall walking bouts per day.
- 5) Activity Intensity: Time spent in different intensities of real word activity. E.g. Peak 30 and average bout cadence.
- 6) Peak 30: 30 highest minutes (not necessary together) of activity in a day. Intended to capture the highest stepping activity per day.
- 7) Average Bout Cadence: can be described as the average number of steps per minute across all bouts of walking.
- 8) Sedentary Behavior: Includes percentage of time spent being sedentary (sitting or standing), the average number of long sedentary bouts/day (>30 min), and fragmentation index.
- 9) Fragmentation Index: Measure that quantifies interruptions seen in sedentary behavior.

Purpose of the article: Reduced physical activity is the second most important modifiable risk factor after a stroke. There is a lot of ambiguity seen in how previous studies have measured real-world activity among stroke survivors. Therefore the purpose of this study is to:

- 1.) Identify which walking activity metrics measured in a real-world setting are associated with systolic blood pressure (SBP) among stroke survivors.
- 2.) Determine if, after accounting for walking capacity measured in the laboratory setting, these real-world walking activity measures still continue to be associated with SBP.

Methods of interest: This study is a cross-sectional analysis of data from 276 chronic stroke survivors collected from a previous multi-site clinical trial. After an in-depth review of previous literature, the authors developed a theoretical framework that describes activity behavior. Activity behavior in this framework is broken down into four domains - Activity Volume, Activity Frequency, Activity Intensity, and Sedentary Behavior. Each walking activity measure is sub-classified under these four activity domains.

At baseline, all study participants' resting SBP was collected following the American College of Sports Medicine guidelines. Walking Capacity was measured using the 6-minute walk test (6MWT). Real World walking activity was measured by providing participants with a Fitbit One or Fitbit Zip to wear on their non-paretic ankle. Participants were instructed to wear the device for 7 days, however, **a minimum of 3 days** of activity was required. Participants went about their usual activity while wearing the activity monitor and removed the device during sleep and water-based activity.

Participants' step data was exported by the device in 60-sec sampling epochs. **Non-Wear time** was defined as 4 hours (continuous) with 0 steps allowing for 2 minutes of activity of up to 2 steps per minute. **Active minutes** were minutes with at least 1 step that could not have 0 steps before or after it. All other active minutes that did not meet this criterion were considered **sedentary**.

Results of interest: Activity intensity (Average bout Cadence) and a number of long sedentary bouts (> 30 min) were most strongly associated with SBP. After accounting for covariates and walking capacity, these measures continued to be significantly associated with SBP. Higher SBP was associated with older age, male gender, black race, and slower average bout cadence.

Discussion, take-home message: Average bout cadence and long number of sedentary bouts are important measures of real-world walking activity and should be taken into account to determine cardiovascular risk among stroke survivors. Laboratory-based measures of walking capacity are insufficient in understanding the relationship between cardiovascular risk factors and walking activity. In addition, the authors found that long sedentary bouts were associated with higher SBP. Interestingly in the current model average steps per day were not found to be associated with SBP. Laboratory-based measures of walking capacity are insufficient in understanding and modifying real-world walking behaviors with the goal of lowering cardiovascular risk among stroke survivors. Therefore real-world monitoring of activity is important in these scenarios.

It is important to remember that walking is a subset of physical activity, as physical activity is considered any body movement that requires energy expenditure. Physical activity can also include a broad range of other activities which could help to modify cardiovascular risk factors.

Additional References:

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- Thilarajah S, Mentiplay BF, Bower KJ, et al. Factors associated with post-stroke physical activity: A systematic review and meta-analysis. *Archives of Physical Medicine and Rehabilitation*. 2018;99(9):1876-1889. doi:10.1016/j.apmr.2017.09.117
- Caspersen CJ, Powell KE, Christenson G. Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. *Public Health Reports*. 1985;100(2):126-131.
- Bjornson KF. Measurement of community-based walking activity in Cerebral Palsy. *Developmental Medicine & Child Neurology*. 2019;61(11):1245-1245. doi:10.1111/dmcn.14226

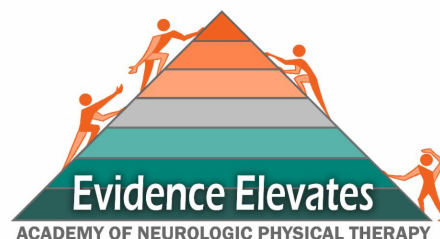


Exam Question and Answer!

A patient presents with right arm numbness, blurred vision, and speech deficits. Neurological examination findings included mild fluent aphasia with some word substitutions, difficulty seeing fingers on the right side, mild right pronator drift and absent graphesthesia/stereognosis of the right hand. Where is the most likely location of the lesion?

- a. **Left-sided injury to: postcentral gyrus, primary somatosensory cortex, and parietal cortex**
- b. Right-sided injury to: frontal lobe, primary somatosensory and primary motor cortex
- c. Right-sided injury to: lateral and caudal pons
- d. Left-sided injury to: medulla and medial pons

Taken from Case 7.1 in *Neuroanatomy through Clinical Cases* by Hal Blumenfeld, MD. Blumenfeld H. *Neuroanatomy through Clinical Cases*. Oxford University Press; 2022.



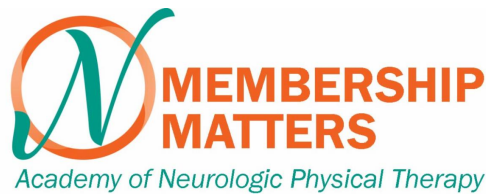
NEW Evidence Elevates Podcast!

In this episode, **Dorian Rose** is interviewed. He one of the authors of the recently published article on essential competencies in entry-level neurologic physical therapist education. To view a video synopsis from Dr. Rose, click [here](#).

Dr. Rose discusses the benefits of competency-based education for accountability, flexibility, and learner-centeredness, and summarizes how the seven essential competency domains can guide academic and clinical educators to support clinician success in neurologic practice. Click [here](#) for the podcast.



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