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5-2017

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INSTRUMENTED MEASURES OF GAIT AND MOBILITY ARE NOT CORRELATED WITH A HISTORY OF FALLS OR BALANCE CONFIDENCE IN INDIVIDUALS WITH MULTIPLE SCLEROSIS

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Introduction

Individuals diagnosed with Multiple Sclerosis (MS) often have an increased risk of falling. Additionally, many also have a fear of falling that all can affect balance confidence. Recent advancements in wearable sensor technology have made it possible to assess certain aspects of gait and balance in the clinical setting that were not possible previously. The information collected by sensors may be useful for identifying specific factors that contribute to falls and balance confidence in those with MS which in turn could help enhance treatment approaches.

Purpose

The purpose of this study was to identify possible relationships between fall history, balance confidence and instrumented measures of gait and mobility in individuals with MS.

Hypothesis

We hypothesized that the results will show a significant correlation with at least one of the instrumented gait measures or mobility measures.

Subjects

For subject information, please refer to Table 1 to see descriptions.

Materials

- Opal sensors (Figure 1)
- Mobility Lab System and software (Figure 2)
- Gait Belt
- Chair for iTUG test

Table 1. Participant Characteristics

Subject	Age	EDSS	#Falls	ABC	FSS
1	51	2.5	2	96	2.5
2	35	4.5	6	57	4.5
3	62	6	1	62	6
4	68	6.5	8	82	6.5
5	62	3.5	3	82	3.5
6	53	6.5	3	59	6.5
Mean (SD)	55.17(10.70)	4.92(1.54)	3.83(2.41)	73.00(19.81)	4.92(1.54)

EDSS = Expanded Disability Status Scale, ABC = Activities Specific Balance Confidence Scale, FSS = Fatigue Severity Scale

Figure 1. Opal sensor



Figure 2.

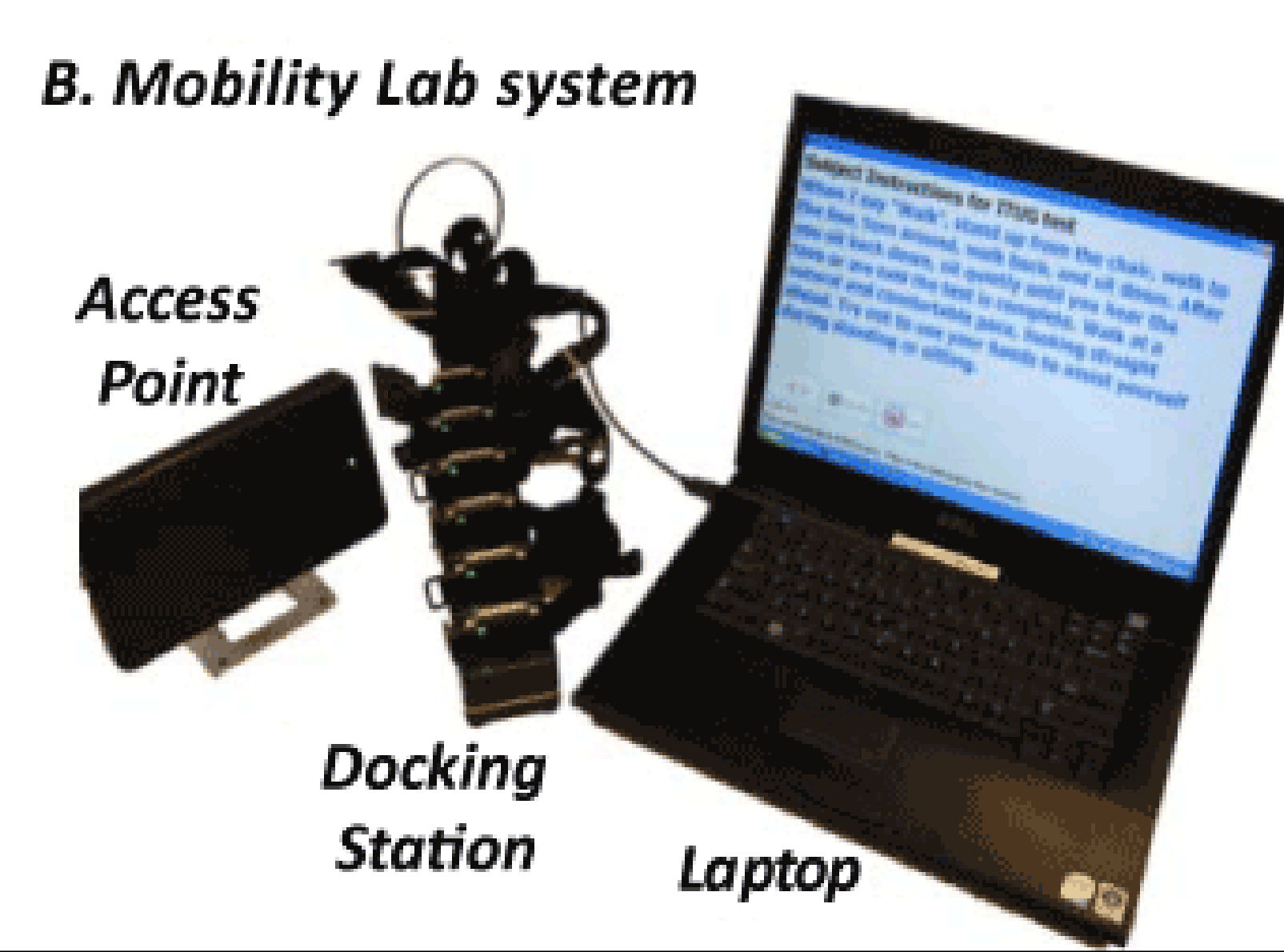
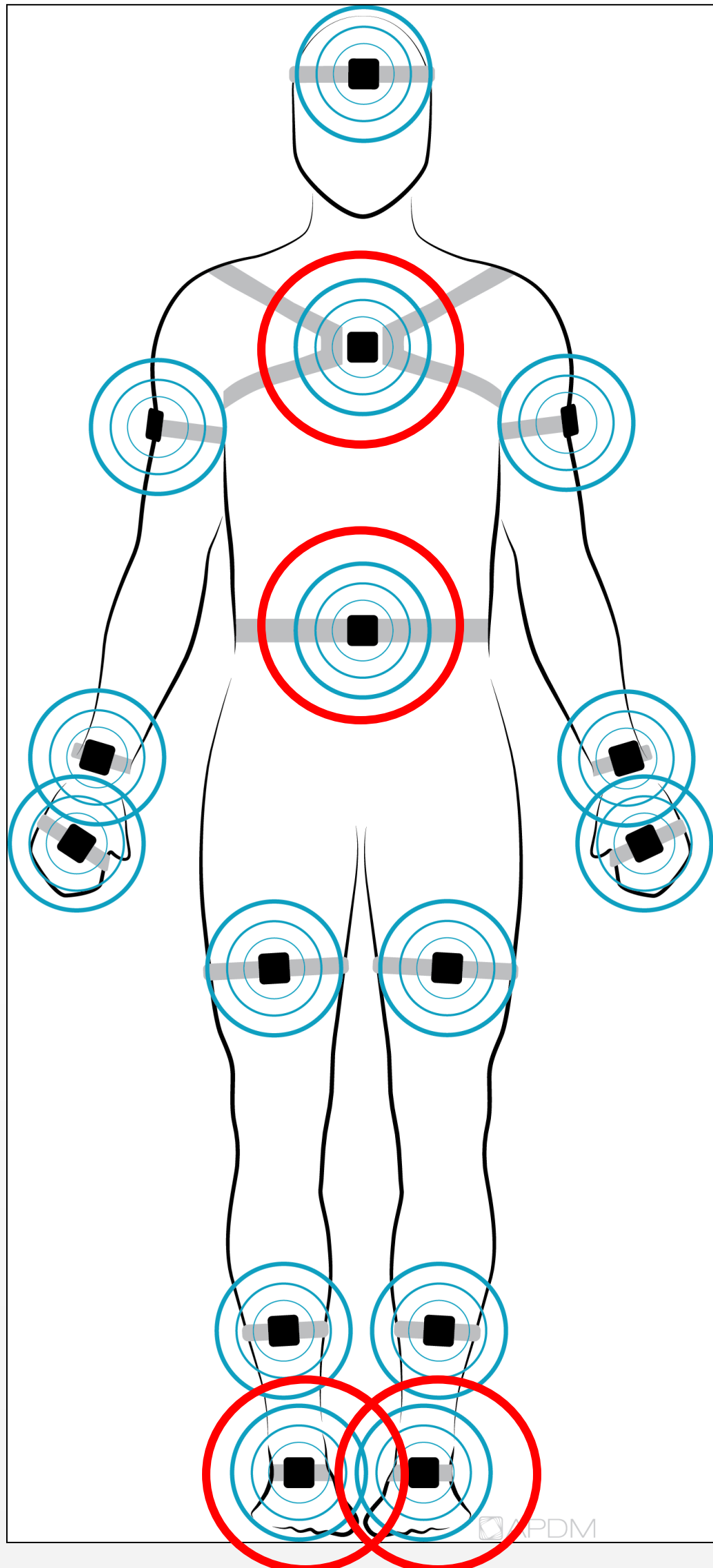


Figure 3. Placement for this study in red



Methods

Subject participated in a single testing session that involved completion of questionnaires, including the Activities-specific Balance Confidence (ABC) scale and Fatigue Severity Scale (FSS). Then, each subject completed three trials of the instrumented Timed Up and Go (iTUG) and three trials of the 10 Meter Walk Test while wearing four inertial sensors.

Results

Correlations (Spearman's rho) were calculated between the instrumented measures and the number of falls in the past 12 months and the ABC. No significant correlations identified between any of the instrumented measures and the number of falls experienced in the past 12 months or balance confidence (ABC). Measures of disability (EDSS) and fatigue (FSS) were also not correlated with falls and balance

Discussion

Balance and falls in individuals with MS are known to be complex and multifactorial in nature. Therefore, individual measures of impairment, including instrumented measures of gait and mobility may be of limited value for identifying fall risk in this population. However, due to the small number of participants in this study, these results should be interpreted cautiously.

References

- Gunn H, Newell P, Haas B, Marsden J, Freeman J. Identification of Risk Factors for Falls in Multiple Sclerosis: A Systematic Review and Meta-Analysis. *Physical Therapy*. April 2013;93(4):504-513.
- Matsuda P, Shumway-Cook A, Ciol M, Bombardier C, Kartin D. Understanding Falls in Multiple Sclerosis: Association of Mobility Status, Concerns About Falling, and Accumulated Impairments. *Physical Therapy* . March 2012;92(3):407-415.

Table 2. Instrumented Measures of Gait and Mobility

10 Meter Walk Measures	iTUG Measures
<ul style="list-style-type: none">CadenceGait Cycle DurationGait SpeedDouble Support %Foot ClearanceCircumductionStride LengthStance and Swing %	<ul style="list-style-type: none">DurationTurn velocityTurn durationSit to stand duration