Background: The ability to maintain joint stability and motion control of the extremities is important in injury prevention/recovery. Quantitative measurement of proprioception, especially the upper extremity, is difficult.

Objective: We investigated the reliability of a custom iPhone app to compile accelerometer data and calculate a path length of movement over 20 seconds.

Design: This study used a prospective test-retest design. Subjects completed three trials on each upper extremity (RA and LA) 48 hours apart (MWF). A convenience sample of subjects was used.

Subjects: Subjects were students associated with exercise science or athletic training programs. The activity level ranged from recreational athlete to NCAA Division II athletes. Twenty-three subjects started with 15 completing all upper extremity trials. Exclusion criterion was an upper extremity injury the last month.

Intervention: An iPhone 6 app was developed to utilize accelerometer data in a Cartesian grid. Data was obtained at 20 Hz to calculate a path length of motion for each 20 second trial. Each subject stood, holding the iPhone in the palm of the hand directly in front of the shoulder with palm up, attempting to minimize motion for 20 seconds.

Main Outcome Measurements: Reliability measures were calculated between trials using the path length.

Results: The mean path length for RA was 2669 with a standard error of 149, with LA being 2774 and 124. The intraclass correlation coefficient was 0.86 for the right arm and 0.74 for the left arm across three trials.

Conclusions: The accelerometer in an iPhone 6 is a moderately reliable instrument for assessing motion control stability in the upper extremity.

We plan to add additional data filtering to the app and repeat.

**Path Length of one 20 second trial**

**Absolute Reliability**

<table>
<thead>
<tr>
<th>Arm</th>
<th>Mean</th>
<th>Std. Error</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAL Arm</td>
<td>2744</td>
<td>124 000</td>
<td>2479 000</td>
<td>3010 000</td>
</tr>
<tr>
<td>Right Arm</td>
<td>2669</td>
<td>148 000</td>
<td>2348 000</td>
<td>2990 000</td>
</tr>
</tbody>
</table>

**Standard Error of the Estimate**

**Relative Reliability**

**Systematic Bias**

**Paired Samples Test**

**ANOVA**

**Bland Altman plots of mean difference**

IBM SPSS Statistics version 24.0


