Exploration of a Novel Approach to Measure Brain Smudging in Dancers

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**Exploration of a Novel Approach to Measure Brain Smudging in Dancers**

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**Introduction**

The specific physical, mental, and emotional demands of dancers’ careers put constant strain on their bodies to perform at the level required and can lead to injury or a higher risk for re-injury. Traditional interventions often do not address central consequences of injury on the body, such as motor cortex reorganization, also known as brain smudging.5,6 These brain changes may lead to longer rehabilitation times and greater chance for future injury. By recognizing brain changes earlier, intervention can be tailored to address these deficits as part of a comprehensive rehabilitation program. The degree of brain smudging that occurs in injured dancers is currently unknown. Ability to discriminate between right and left sides of the body has been proposed as a means of measuring this smudging.7,9,10

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**Methods**

**Data Collection:**
- 22 dancers from 2 local professional dance organizations (rehearsing >20hrs/wk, actively performing without performance-inhibiting injuries)
- 2 short laterality tests were administered via iPad applications to test discrimination between right and left hands and (Recog Line) and between right and left feet in (Recog Foot).10
- 20 images in each game with 2 seconds/image
- iPad games were completed within dancers’ respective facilities before dance rehearsals and accuracy scores recorded

**Figure 2.** Recognise Hand™ (left) and Recog Foot™ (right) applications.10

**Data Analysis:** Means and standard deviations calculated with IBM® SPSS Version 25

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**Results**

**Mean Accuracies of Right/Left Hand Discrimination**

<table>
<thead>
<tr>
<th></th>
<th>Accuracy (%)</th>
<th>Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Hand</td>
<td>87.3</td>
<td>56.94</td>
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<tr>
<td>Right Hand</td>
<td>72.73</td>
<td>52.53</td>
</tr>
</tbody>
</table>

**Mean Accuracies of Right/Left Foot Discrimination**

<table>
<thead>
<tr>
<th></th>
<th>Accuracy (%)</th>
<th>Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Foot</td>
<td>84.96</td>
<td>45.99</td>
</tr>
<tr>
<td>Right Foot</td>
<td>75.02</td>
<td>68.91</td>
</tr>
</tbody>
</table>

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**Discussion**

**Accuracy values are higher for right/left discrimination of feet than of hands (Figure 3)**
- Heavier workload is typically placed on the lower extremities in dancers.1,2
- Increased dexterity of hands may add a level of complexity to the hand images
- Scores may be predictive of brain smudging and increased risk of future injury

Figure 4. The majority of dance emphasizes strength and articulation of feet, such as in pointe dancing. Photo of an American Ballet Theatre principal dancer by NYC Dance Project.

Further research is needed to establish scores for dancers with current performance-inhibiting injuries

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**Clinical Relevance**

Currently, there are few noninvasive ways to measure cortical reorganization. The Recognise™ applications may provide a quick, noninvasive mechanism for measuring these neuroplastic changes. The baseline data gathered in this study may be used to support future research studying brain smudging in dancers to allow for earlier intervention, shorter rehabilitation duration, and decreased risk of re-injury.

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**References**


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