Comparison of the sprint paddling performance between competitive male and female surfers

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COMPARISON OF THE SPRINT PADDLING PERFORMANCE BETWEEN COMPETITIVE MALE AND FEMALE SURFERS

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INTRODUCTION

Surfboard riding (surfing) is a popular sport that is performed competitively at both recreational and elite levels (8). Successful surfing requires a high level of both technical proficiency and physiological fitness, of which the latter is utilised to provide propulsion through the water, in order to be correctly positioned to catch the most appropriate waves. This propulsion occurs prior to the surfer standing up from a prone position and riding the wave, through paddling. Whilst riding the wave, the surfing athlete uses dynamic balance and lower-body power to remain on the board and perform manoeuvres (4, 9).

The current judging criteria, as noted in the “Association of Surfing Professionals Rule Book”, states that “surfers must perform a variety of innovative and progressive manoeuvres, with a high degree of difficulty and commitment” (1, 7). To be successful, surfers must perform major manoeuvres whilst maintaining speed, power, and flow of the surfboard (1). Competitive surfing is scored solely on technical ability and skills on a wave, however, the peak velocity that can be attained during a sprint paddling effort to catch a wave will likely determine the speed and power of the surfer’s initial manoeuvre. This is the result of a surfer that possesses a greater sprint paddling peak velocity, demonstrating the associated capability to take-off closer to the curl of a wave, and therefore, perform a scoring manoeuvre with greater speed and power sooner after entering the wave, which increasingly adheres to the scoring criteria. Further, during surfing training female surfers have to compete with males for waves in the line-up. Any deficit in a female surfers sprint paddling ability, compared to males, will limit their ability to sit as close as possible to the curl of the wave, and therefore, their opportunity to catch a high number of waves during a training session will be limited. If a female surfer does not have the opportunity to catch a sufficient number of waves in a training session, there will be an associated reduction in their ability to acquire new skills and refine their technique of already learnt manoeuvres.

Sheppard et al. (11) identified a significant association between relative upper-body pulling strength and peak paddling velocity \((r = 0.66)\). As it has previously been reported that significant differences exist between the upper-body strength of males and females (2, 6, 10), it may be proposed that competitive female surfers possess lower sprint paddling peak velocities when compared to males, and hence, entry speed in to caught waves will be reduced. A surfer’s maximal sprint paddling velocity likely underpins scoring potential in competitive events, as well as their opportunity to catch a higher frequency of waves during surfing practice. However, no research to date has investigated the differences between competitive male and female surfers’ sprint paddling performance. As such, this study aims to establish if any differences - exist in the sprint paddling capabilities between male and female competitive surfers.

METHODS

Experimental Approach

The current study involved a comparative analysis of differences between the sprint paddling performance of competitive male and female surfers, with subjects matched for age and competitive level.

Subjects

Thirty-six competitive male \((n=18, 18.2 \pm 4.6\text{ years})\) and female \((n=18, 17.6 \pm 3.6\text{ years})\) surfers’ 15m sprint paddling data were analysed for this study. All subjects were matched for age and competitive level, with no significant difference identified between the mean male and female age \((p=0.70)\).

Procedures

All sprint paddle trials for this study were performed in the same outdoor 25 m swimming pool. The benefits of this location, as previously outlined by Sheppard et al. (11), being that it allows for ease of marking out set distances, provides control against potential effects of tides and currents experienced by most other waterways, allows for professional supervision by lifeguards, and eliminates potential hazards from marine creatures. Prior to performing the 15 m sprint paddle tests, each subject was required to perform a progressive warm-up, consisting of 200 m low-intensity paddling, followed by a sprint specific warm-up of 4x15 m sprint paddling efforts at 60, 70, 80, and 90% volitional effort on ~2 minute intervals (3, 11).

All sprint paddle trials were performed with the use of a purpose-built horizontal position transducer (iRex, Southport, Australia) attached to the top of each subject’s board shorts or bikini (3, 5, 11). Subjects performed...
three trials of the 15 m sprint paddle, with the trial that was the fastest to 15 m used for analysis. The kinematic data was obtained and stored for analysis on a personal computer, with the transducer recording a time-stamp at every 0.01 m of displacement. This allowed for determination of the time taken to complete each split (5 m, 10 m, 15 m) from the start (0 m), as well as, the maximum achieved velocity, through differentiation (3, 11). The ICC for time to; 5 m, 10 m, and 15 m, and maximum velocity has previously been reported as; 0.82, 0.91, 0.95, and 0.99, respectively (3).

Statistical Analysis
All statistical analyses were performed using SPSS (Version 21.0; Chicago, IL). One-way analysis of variance was performed to compare the means of the time taken from 0 m to; 5 m, 10 m, 15 m, as well as the maximum recorded velocity of the 15 m sprint paddle test between males and females. Cohen’s d was used to calculate effect size (ES) using the following criteria; <0.2 (trivial), 0.2-0.5 (small), 0.5-0.8 (moderate), and >0.8 (large). Statistical significance was set at p≤0.05.

RESULTS
Large significant differences were identified between males and females for time to; 5m (p<0.001, ES=-1.4), 10m (p<0.001, ES=-1.3), and 15m (p<0.001, ES=-1.3), as well as for the maximum recorded velocity (p<0.001, ES=1.3) (Table 1).

Table 1 - Comparison of the mean (±SD) time to 5m, 10m, and 15m, and maximum recorded velocity for males and females.

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
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</thead>
<tbody>
<tr>
<td>Time to 5m (s)</td>
<td>3.74 ± 0.35</td>
<td>4.34 ± 0.31</td>
</tr>
<tr>
<td>Time to 10m (s)</td>
<td>6.65 ± 0.56</td>
<td>7.65 ± 0.56</td>
</tr>
<tr>
<td>Time to 15m (s)</td>
<td>9.59 ± 0.78</td>
<td>11.01 ± 0.81</td>
</tr>
<tr>
<td>Maximum Velocity (m·s⁻¹)</td>
<td>1.77 ± 0.13</td>
<td>1.55 ± 0.12</td>
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</table>

*p<0.001,  a = Large ES

DISCUSSION
The purpose of this study was to provide the first comparison between competitive male and female surfers sprint paddling performance. Any deficit in sprint paddling ability will reduce the athlete’s ability to take-off close to the curl of the wave, and perform a major manoeuvre with speed and power, sooner after entering the wave. If the athlete cannot enter the wave with sufficient velocity, their scoring potential in competitive events will be limited, and their opportunity for technical practice during training sessions will be reduced. The results of this study indicate that when performing a 15m sprint paddle, females are significantly slower to 5m, 10m, and 15m, as well as demonstrating a significantly reduced maximal sprint paddling velocity. This indicates that when compared to their male counterparts, female surfers have a competitive disadvantage as their ability to adhere to the scoring criteria may be limited by their sprint paddling performance. In addition, their opportunity to catch waves during surfing training will be limited.

Sheppard et al. (11) previously reported a strong association between relative upper-body pulling strength and; time to 5 m (r=-0.93), time to 10 m (r=-0.93), and maximum paddling velocity (r=0.66). As a result, it is recommended that training prescription for competitive female surfers focuses on increasing upper-body pulling strength, as this physical quality likely limits their sprint paddling ability. Provided that increases are made in a female surfer’s upper-body pulling strength, there will likely be an associated improvement in maximal sprint paddling velocity. Improvement of a competitive female surfer’s sprint paddling performance will likely ensure that when competing against fellow female surfers, they will enter the wave with greater entry speed. This may allow them to perform a major manoeuvre sooner after entering the wave, which will provide a significant competitive scoring advantage. Additionally, by reducing the sprint paddling performance gap between males and females, the female surfers will be able to compete with males for the best waves during surfing training sessions, and ensure they catch an increased number of waves, which will greatly benefit skill acquisition and technical practice.

PRACTICAL APPLICATIONS
Strength and conditioning coaches working with female surfing athletes should ensure that there is a strong focus on developing relative upper-body pulling strength. As a result of the reported association between relative upper-body pull-up strength and sprint paddling ability, it is proposed that increases in this strength quality should lead to associated improvements in sprint paddling performance (11). Provided that gains are made in a competitive female surfer’s sprint paddling performance they should also possess the ability to take-off closer to the curl of the wave, and
perform a major manoeuvre sooner after entering the wave, which will likely improve their scoring potential during competitive events, and skill acquisition and technical practice during training sessions.

REFERENCES