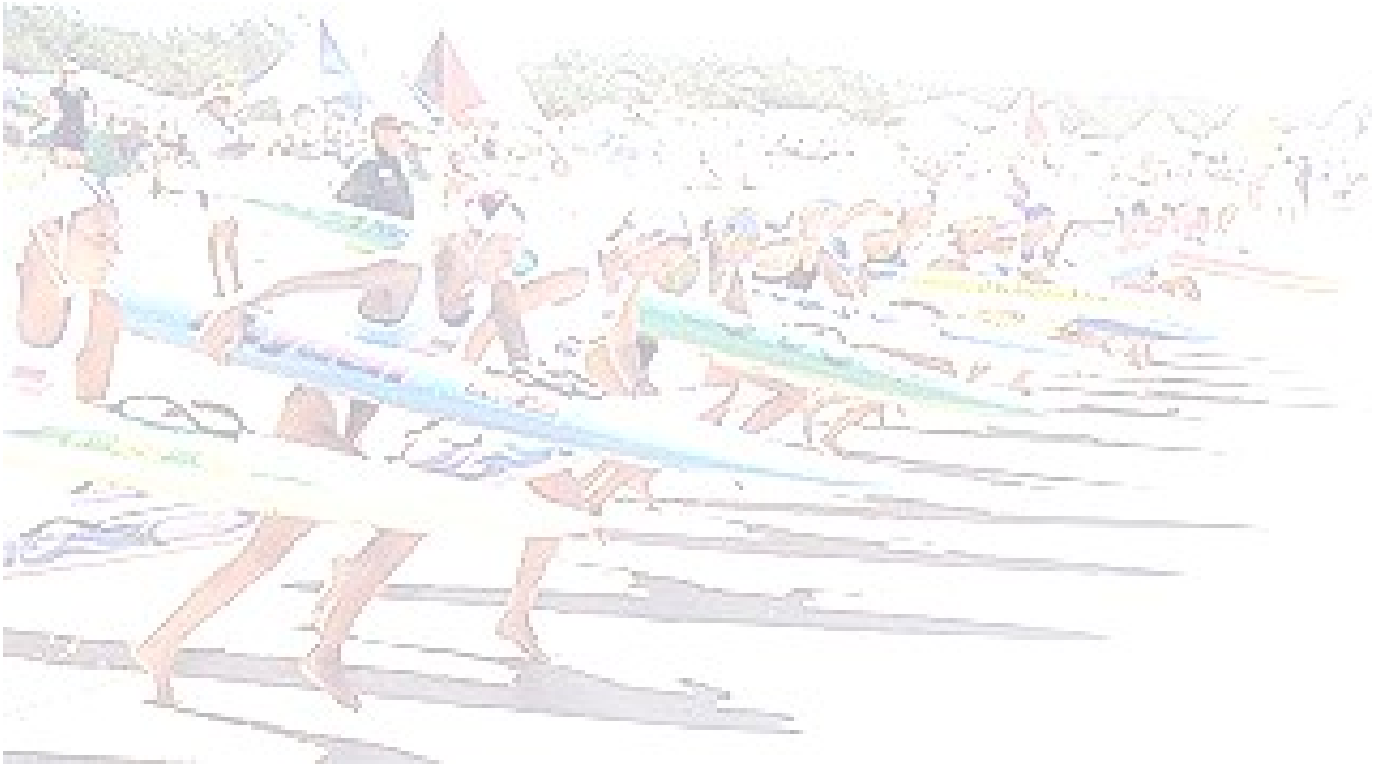


SLSA LEVEL 3 SURF COACHES

RESEARCH PROJECT

INVESTIGATING THE USE OF ERGOMETERS FOR BOARD TRAINING



Wade Sinclair
SLSA LEVEL 3 SURF COACH CANDIDATE
PICNIC BAY SLSC
QUEENSLAND

INTRODUCTION

Dry-land training is a popular coaching tool employed by surf coaches. Coaches are introducing dry-land training sessions ranging from body-weight resistance training such as sit ups and push ups to structured strength training programs conducted in a local gym. Many coaches are taking dry-land training that bit further by introducing training sessions on discipline specific ergometers. Discipline specific ergometers currently available for surf lifesaving include those for surfboat rowing (e.g. Concept 2™, Rowperfect™, Rowing Simulator VR100™), ski paddling (e.g. K1 Ergo™, Dansprint™, SpeedStroke™, PaddleOne K™) and swimming/board paddling ergometers (e.g. kinetic swim benches, VASA Trainer™, VASA Ergometer™) as well as cycle ergometers, wind trainers and treadmills for cross training.

Ergometers, although often expensive, offer an alternative for coaches who wish to isolate an athlete for technique or a more intensive one-on-one session. They offer an alternative for training in bad weather, demonstrating a new skill, time trials for team selections, overloading an athlete with resistance as well as fitness testing. For fitness testing to be effective and comparable between sessions, the testing environment needs to be controlled, valid and reliable. In our natural competitive environment this is extremely difficult due to environmental and surf conditions as well as differences in craft design. Therefore conducting a test on an ergometer in a gear shed presents an attractive solution. Surf coaches often utilise a 1000m time trial for board paddlers as a representation of their aerobic fitness. In sport science, tests of true aerobic fitness such as VO_{2MAX} tests are of 10 to 15 min duration and therefore the 1000m time trial for board paddlers presents a more realistic and suitable alternative to expensive laboratory testing. Additionally, a valid fitness test on an ergometer should encompass specific movements, energy systems and fluidity of the discipline in order to provide the ideal testing environment. This project investigated the legitimacy of using ergometers for assessing board paddling performances in the prone and kneeling positions in comparison to an on-water 1000 m time trial.

METHODS

Sixteen board paddlers (10 male and 6 female) undertook three 1000m time trials. All paddlers were competitive at an inter-regional level having won a Queensland Country championship for iron, swim, board or ski and 2 individual medallists at the 2006 Queensland Championships. Two time trials were performed on a VASA board paddling ergometer (one each in the prone and kneeling paddling position) and one trial on a Malibu competition board on a non-tidal river course. The 2 ergometer time trials were randomly allocated to prevent any potential bias. During the on-water time trial, paddlers altered their position as they preferred in order to replicate typical on-water paddling performances. During the ergometer time trial in the kneeling position, paddlers were required to remain on their knees for the duration of the test with intermittent periods of recovery permitted as required.

Paddlers were given an opportunity to familiarise themselves with the ergometer prior to commencing a 3 min warm up at 40 strokes per minute in their designated position. Paddlers were assigned to their paddling positions in a randomised order so that paddlers didn't experience any learning effects between trials that may influence their results. Paddlers were instructed to complete the time trial in as fast a time as possible and were verbally

encouraged throughout the trial in order to elicit their maximal performance. As each effort was required to be maximal, paddlers were not told their time after the first trial so they did not try to better their time at the next testing session. Additionally, paddlers were asked to quantify their exercise effort into a number ranging from 6 (very very light effort) to 20 (very very heavy effort). Time and stroke rate was recorded for each 100m segment with the final stroke rate recorded during the final 50 m of the 1000 m time trial. Additionally HR was recorded each 15s during the ergometer time trials using a downloadable HR monitor to determine HR_{MAX} at the conclusion of the time trial. For the river time trial, HR was recorded immediately once the paddlers reached the shore after completing the 1000 m.

RESULTS

Table 1: Average (and range) statistics of project participants

	Age (yr)	Height (cm)	Weight (kg)	Malibu* (yr)	Nippers* (yr)
Male (n=10)	18.7 (13 – 32)	179.2 (166.5 – 191.0)	74.6 (56.1 – 95.5)	3.8 (0.6 – 8.0)	5.5 (4.0 – 8.0)
Female (n=6)	16.2 (14 – 22)	164.4 (152.5 – 170.5)	62.5 (57.0 – 70.6)	2.0 (1.0 – 3.0)	6.5 (6.0 – 7.0)
Total (n=16)	17.8 (13 – 32)	173.6 (152.5 – 191.0)	70.0 (56.1 – 95.5)	3.1 (0.6 – 8.0)	6.0 (4.0 – 8.0)

* Malibu and nipper board paddling experience in years.

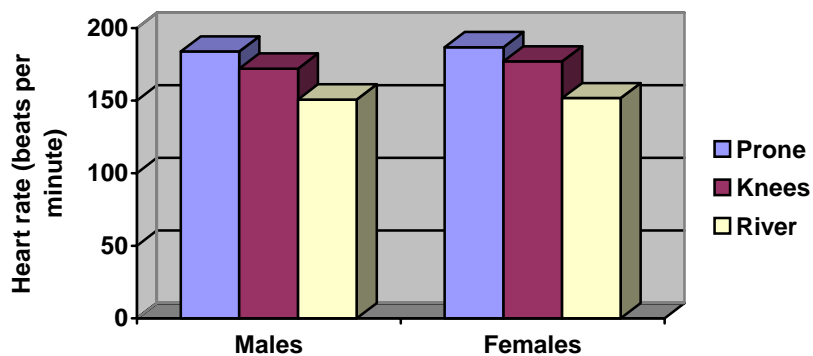


Figure 1: Heart rate responses (beats per minute) to the prone and kneeling position ergometer time trials and the river time trial.

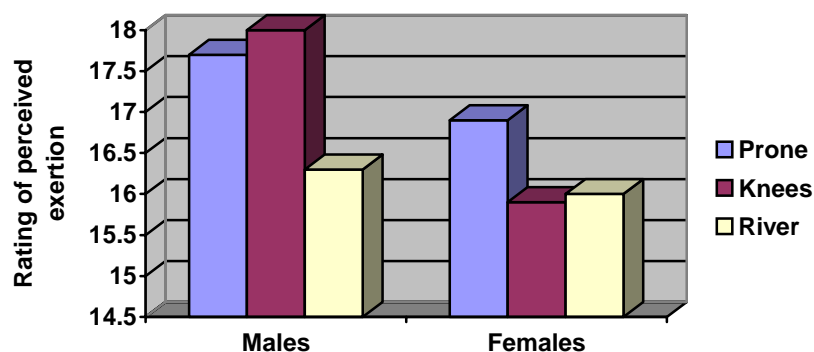


Figure 2: Rating of perceived exertion (RPE) responses to the prone and kneeling position ergometer time trials and the river time trial.

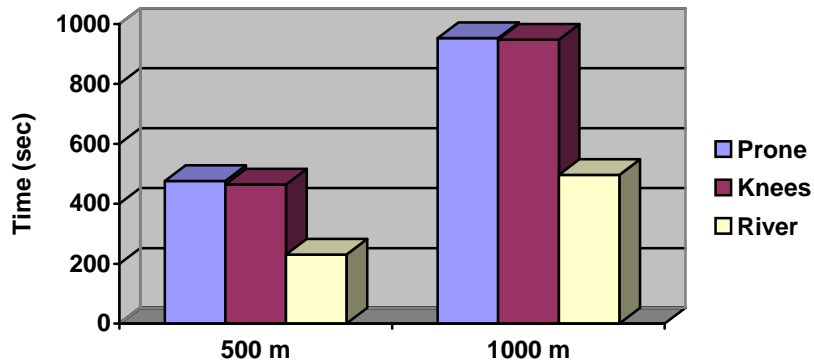


Figure 3: 500 m and 1000 m splits for the prone and kneeling position ergometer time trials and the river time trial.

Of the 16 paddlers who participated in the project, only 10 completed the kneeling time trial on the ergometer. The 6 who did not complete the kneeling time trial ceased paddling due to tightened hamstrings (3 paddlers) or lower back pain (3 paddlers). These paddlers competed between 150m and 500m before withdrawing from the time trial. In total only 6 paddlers completed all 3 time trials.

Table 2: Paddling velocities (m/sec) for the prone and kneeling position ergometer time trials and the river time trial

	Prone time trial		Kneeling time trial		River time trial	
	500 m	1000 m	500 m	1000 m	500 m	1000 m
Male	1.05	1.05	1.00	1.23	2.17	2.02
Female	0.85	0.85	0.85	0.85	2.02	1.92
Total	0.97	0.97	0.97	0.96	2.09	1.97

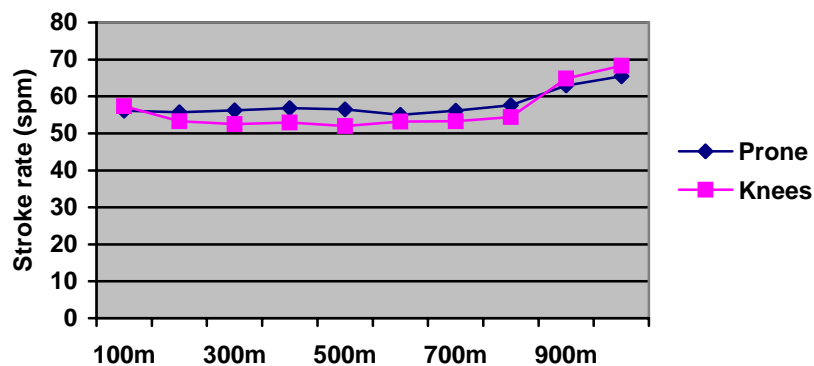


Figure 4: Stroke rate (strokes per minute) splits for the prone and kneeling position ergometer time trials.

DISCUSSION

From the results of this project, it would appear that there is very little difference between the kneeling and prone board paddling positions on a 1000m ergometer time trial performance. However the 500m and 1000m splits are almost double that of the river time trial indicating that the ergometer used in this project, which is specifically designed for surfboard paddling, is relatively poor at mimicking the on-water performance of paddling a Malibu racing board. The velocity of the paddlers at the 500m split for the river time trial (Table 2) is comparable to those reported in the SLSA High Performance Fitness Testing Protocols (2.29+ m/sec for males and 2.24+ m/sec for females). Therefore the ergometer time trial results are not indicative of poor paddling performances but could possibly be the result of the paddlers being unfamiliar with the ergometer to paddle at maximal speed or simply a heavier resistance compared to the resistance experienced on-water. The heavier resistance could be the absence of the 'run' typically associated with paddling surfcraft or simply an inferior design of the ergometer.

Further comparison between the SLSA HP and the participants of the present project also identifies similar HR but lower stroke rates. The lower stroke rates in the ergometer time trials (Fig 4) than those reported for the SLSA High Performance squad (73 for males and 74 for females) indicate that the paddlers may have had difficulty generating their rating. The greater workload on the ergometer is supported by paddler HR indicating that they were working harder during both the ergometer time trials than during the on-water river time trial as supported by paddler RPE. Interestingly, the female paddlers found the kneeling position similar to their on-water time trial while the males found kneeling harder than their prone position (Fig 2). Additionally, HR and RPE responses indicate the on-water performances during the river time trial were not a maximal effort possibly due to the unfamiliarity of these paddlers completing a maximal effort over 1000m and therefore experiencing difficulties in pacing strategies.

One criticism often directed at ergometers is an apparent lack of proprioception or 'feel' of the craft the ergometer is designed to mimic. Although generally the paddling felt 'heavier', all paddlers commented that the ergometer felt like paddling a board in the flat especially with the rolling capacity of the 'board' on the ergometer. Based on the results of this project, the ergometer represents a quality training tool for coaches to elicit a controlled, technique specific resistance session similar to the traditional drill of tying a rope around the board. Although the orders of paddlers' performances were similar between all trials (Appendix 1), caution should be extended to the use of an ergometer for team selection or comparisons to individual on-water performances. An ergometer does not account for surf skills, lateral balance ability or on-water technique characteristics such as trim and 'fluidity' of the stroke.

Using an ergometer for conditioning sessions, prone and knee paddling positions present no differences except for strengthening specific musculature employed in the various positions. Six of the paddlers in this project failed to complete the 1000m and interestingly the distances at which they withdrew are typical of those within a board race in which paddlers often lay down on their boards to round the turning buoys. When using the ergometer in the kneeling position, this is one limiting factor on the performance of a paddler that would need to be addressed.

Conclusion

In conclusion, despite the ergometer used in this project being a relatively poor substitute for on-water performance, it represents a practical coaching tool for technique and resistance workloads for annual training programs in an environment controlled by the surfcoach. Caution should be extended to situations in which a coach wishes to use the ergometer performance to represent an athlete’s on-water performance.

	ERGOMETER	ON-WATER
Stroke Rate	Lower	Higher
Heart Rate	Higher	Lower
Resistance	Bigger	Smaller
Perceived Exertion Rate	Higher	Lower
Position in Group	Similar	Similar

REFERENCES

SLSA High Performance Fitness Testing Protocols