

LASER SAILING: STRENGTH AND CONDITIONING CONSIDERATIONS

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Sailing is a sport that requires tactical ability and strategy with different energy and movement requirements across the different boat classes. The laser class is a single-handed dinghy in which the sailor is required to perform a series of actions to counter heeling forces from the sails in moderate to strong winds while maximizing the dinghy's sailing speed (8,10). One of the main movements is called hiking (Figure 1) and it requires the sailor to hook their feet under straps on the boat and lean their body outwards, over the water. As such, the sailor's knee extensors and hip flexors are required to maintain the sailor's body position, with the quadriceps held in a near-isometric position. This is just one unique position required of sailors for the sport.

STRENGTH REQUIREMENTS

Due to the unique demands of sailing, elite sailors are required to possess high levels of strength and strength endurance (3). The quadriceps, hamstrings, paraspinal muscles, and abdominals are the main muscles that work synergistically during hiking, enabling a sailor to stabilize his body while producing the right movement (5). On top of lower body strength, other strength components needed by a laser sailor include upper body strength and agility. Upper body strength endurance (pulling) is required by the sailor to trim the sails and hold the mainsheet during periods of strong winds. Agility training is also useful to improve change of direction movements seen on the boat. The laser sailor also does frequent tacking, which involves moving from one side of the dinghy to the other, usually from a hiking position on one side to a hiking position on the other.

INJURY PREVENTION

Common sites of injury obtained by elite sailors include the low back (45%), knee, and shoulder (22%) (2,4,6). The prevalence of low back injuries are due to overuse, inadequate physical preparation, genetic predisposition, and poor hiking technique (high mechanical loading due to non-neutral posture) (9).

The most common factor leading to low back injuries is the lack of strength and endurance of the muscles involved in hiking. The lack of muscular strength and endurance results in greater iliopsoas loading and promotes lumbar lordosis, which increases compressive forces on the intervertebral discs of the lumbar and sacral vertebrae (1). This is pronounced in long hiking, where the preferred posture is a flexed spine, rather than hyperextension (7).

SAMPLE TRAINING PROGRAM

The training program (Table 1) should focus on strength endurance training of the muscles involved in hiking, mainly the quadriceps, hip flexors, and anterior core musculature. The exercises are performed at a low loads (< 67% 1RM), high repetitions (> 12 repetitions), and with low rest periods (30 s to 1 min) between sets. Upper body strength endurance (pulling) and agility focused drills can be added to supplement the training program. Core stability exercises can also be implemented to increase strength endurance and dynamic stabilization for maintaining a good hiking movement pattern. The aim of the core stability program (Table 2) is to provide stabilization of the trunk while simultaneously moving the extremities during functional activities. Thus, exercises focusing on anti-rotation, anti-lateral flexion, anti-extension, and anti-flexion movement patterns should be implemented.

CONCLUSION

For a well-rounded strength and conditioning program, strength training, hiking endurance, agility, and coordination components should be targeted in a laser sailor's training plan. Specific hiking training should focus on sustained quadriceps stress, while also emphasizing core strength to prevent long-term injuries of the low back. ■

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ABOUT THE AUTHOR

Julian Lim is a strength and conditioning coach at the Singapore Sports Institute, where he implements sport-specific training programs for national and elite level athletes. His current portfolio includes athletes competing in sailing, badminton, basketball, bowling, and shooting. Lim endeavours to research and utilize evidence-based strength training principles to enhance athletes' sporting performance. Lim received his Master's degree in Research from the National Institute of Education, Nanyang Technological University. His research focused on the application of post-activation potentiation in enhancing the performance of sprinters.

FIGURE 1. HIKING POSITION

Hiking position as demonstrated on a laser boat class.



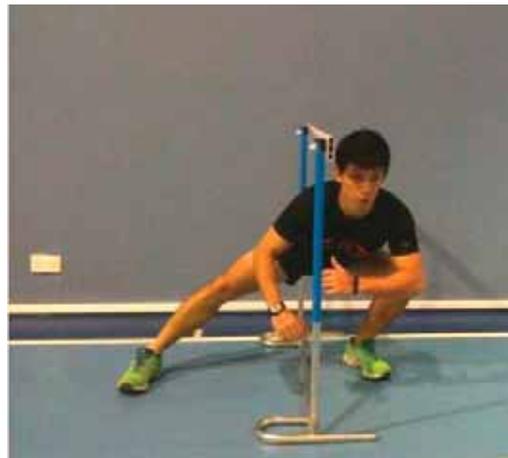
FIGURES 2A AND 2B. SINGLE-ARM CABLE UPRIGHT ROW

The athlete adopts a half squat position with one arm fully extended and holding onto a handle attached to a cable. The exercise begins with an explosive squat extension, while simultaneously performing a single-arm upright row.



FIGURES 3A AND 3B. AGILITY HURDLES

Hurdles or a rope at a fixed height can be used to set as a referenced target to duck under. The athlete lunges under and across a set height to simulate the tacking action.



FIGURES 4A AND 4B. HIKING EXTENSIONS

The athlete sits on an exercise ball, with the anterior portion of the ankles hooked onto a fixed anchor. The knees are slightly bent and the torso is upright, simulating a short hiking position. The exercise begins with a quick extension of the knees and leaning back until the torso is almost parallel to the ground, simulating a long hiking position.

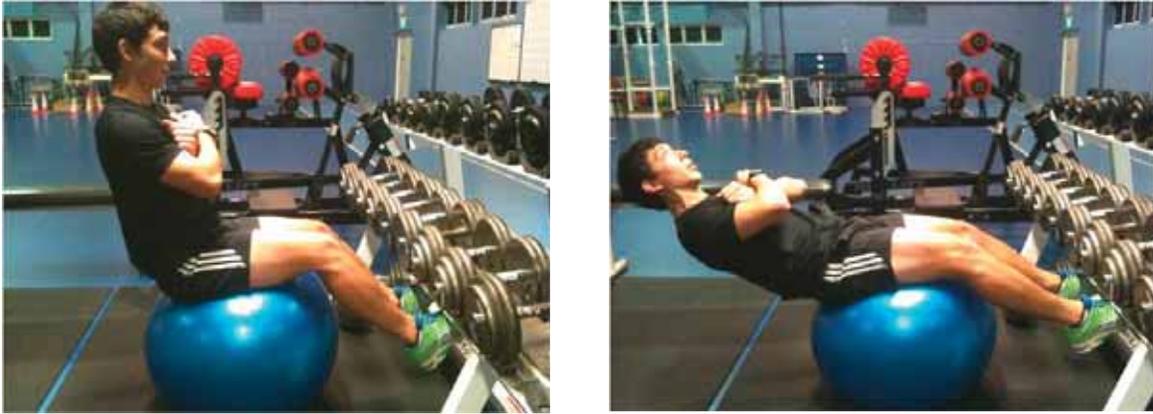


FIGURE 5. HIKING HOLDS

The athlete sits on the edge of a bench, with the anterior portion of the ankles hooked onto a fixed anchor and hips slightly off the bench. The torso is leaned as far out as a neutral spine can be maintained. This position is held for a set amount of time and weight can be added to increase the exercise intensity.



FIGURES 6A AND 6B. ANCHORED GROUND-BASED APPARATUS ROTATIONS

One end of a barbell is secured to a swivel on the ground, while the free end is held to the chest. The barbell is then rotated with the arms from chest level to one side of the hip. This action is repeated to the other side and alternated for repetitions. The lower body is pivoted slightly but the hips and torso are held isometrically to emphasize anti-rotation.



FIGURES 7A AND 7B. KNEELING CABLE OVERHEAD PALLOF PRESS

The athlete adopts a tall kneeling position, with knees on the ground and hips fully extended, while holding the handle at chest height. The athlete holds the handle extended overhead and with an isometric contraction. The hips and torso remain erected to emphasize anti-lateral flexion.

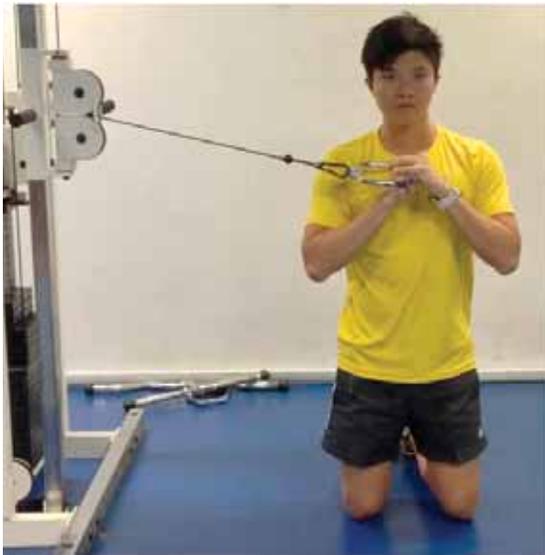


TABLE 1. LASER SAILING: SAMPLE STRENGTH ENDURANCE TRAINING PROGRAM

EXERCISES	TEMPO	SETS X REPETITIONS	LOAD	REST	NOTES
Single-arm cable upright row (with squat extension) (Figures 2a and 2b)	20X	4 x 6	5-6RM	2-3 min	Explosive hip extension and pulling action
Agility hurdles (Figures 3a and 3b)	X	3 x 5	Body mass	2-3 min	Bending from the hips, instead of the lower back
Barbell front squat	201	4 x 15-18	< 67%	-	Loading of anterior chain (quadriceps and abdominals)
Hiking leg extensions (Figures 4a and 4b)	-	4 x 15-18	Lean back to add resistance	30 s - 1 min	Sitting in a hiking position on an exercise ball, extend the legs through the last few degrees and release
Single-arm seated cable row	201	3 x 15-18	< 67 %	-	Anti-rotation emphasis
Hiking holds (Figure 5)	-	3 x 2-3 min	5-10 kg	30 sec - 1 min	Weight plate held at chest to overload hiking musculature

TABLE 2. LASER SAILING: SAMPLE CORE STABILITY PROGRAM

EXERCISES	SETS X REPETITIONS	NOTES
Anchored, ground-based apparatus rotations (Figures 6a and 6b)	2 x 20	Anti-rotation exercise
Kneeling cable overhead Pallof-press (Figures 7a and 7b)	2 x 15 (each side)	Anti-lateral flexion exercise
Barbell/exercise ball rollouts	2 x 15	Anti-extension exercise
Back extension/reverse hyperextensions	2 x 15	Anti-flexion exercise