

Long term strenght development pathway & key principles for SST youth sailors.

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Physical strength is a important factor as a physical requirement for Olympic yacht sailing (Bojsen-Moller, Larsson, Aagaard 2014). Requirement to acquire specific strength skills is a regular differentiated strength training with weights. Main goal is to improve physical strength to a level making sailors physically able to sail their boat as fast as possible. This is a process taking years in learning exact exercise techniques and training methodologies. With the entry to elite level this process should be finished. Then sailors should be able to train specific interventions without learning anymore basic exercise techniques and methodologies. Finally new exercises and adapting methodologies will occur to work on specific individual needs or problems for a whole athlete career. But the main frame of exercises and methodologies should be built with reaching elite level.

This is the job of a physical coach to teach this pathway to our SST youth sailors. If you work with a physical coach, use this pathway as information for your physical coach what you should learn in which age. The exercise lists and methodologies mentioned in this pathway are not finally closed. Of course there are a lot of other training possibilities and if your needs require other exercises additionally your physical coach is free to add – but with the entry to elite level all exercises and methodologies of this pathway should be known by you and you must be able to perform them without questions.

The following numerations and tables give you a basic overview about goals, effects, guidelines and periodization of strength training for youth athletes. The exercise selection for the age groups are made on base of the quoted literature, needs for sailing and the experience of last years work with SST elite sailors.

Common goals of a strength training for youth athletes according to Fleck & Kraemer (2005):

1. Increased strength of specific muscle groups
2. Increased power of specific muscle groups
3. Increased local muscular endurance and specific muscle groups
4. Increased motor performance (ability to jump, run or throw)
5. Increased total body mass (age dependent)
6. Increased muscle hypertrophy
7. Decreased body fat
8. Increased self confidence
9. Improved sport performance

Many other positive effects are gained with a differentiated strength.

Effects and adaptations on differentiated strength training – adapted to Gottlob (2001):

1. Strength increase
2. Increase of muscle cross sectional area – hypertrophy
3. Efficiently movability
4. Improvement of quickness
5. Enhancement of bone density
6. Reinforcement of tendons, ligaments, aponeurosis and joint structures
7. Higher joint stability
8. Improved posture
9. Improved protection
10. better supply of joint structures
11. more effective rehabilitation after injuries and illnesses
12. improvement of metabolism and energy supply
13. improved physical performance
14. better body evolution and
15. good effects on brain metabolism and psyche

Most important to avoid injury or overload in strength training is a perfect exercise technique. Training weight is always limited by exercise technique. Never use a training weight that worsens your exercise technique. Learn and understand the following basics of exercise technique.

Basics of proper exercise technique according to Fleck and Kraemer (2005)

1. understanding the exercise movement
2. spotting techniques
3. use of collars with free weights
4. proper grips
5. properly adjusting machines to fit a lifter
6. knowing how and when to make changes in resistance used
7. correct breathing techniques
8. giving lifters feedback concerning their technique
9. choosing exercises that promote symmetrical muscular development

Another important factor to minimize injury and overload risk is proper spotting.

Spotting is important to assist a lifter if needed. Spotters can help to complete a repetition, correct improper technique or in a dangerous situation.

Checklist for spotters according to Fleck and Kraemer:

1. know proper exercise technique
2. know proper spotting technique
3. be sure you are strong enough to assist the lifter with the resistance he is using
4. know how many repetitions the lifter intends to do
5. be attentive to the lifter all times
6. stop the exercise if incorrect technique is used
7. if incorrect exercise technique is used, correct it
8. know the plan of action if a serious injury occurs

For resistance exercise progression and training methodology use the following tables in combination with the exercise description for age groups.

Training methodology for age groups:

12-14: use table "periodization model for a prepubescent child" –next page

15-18: depending on development and biological maturation use methodologies of "periodization model for a prepubescent child" and traditional periodization for an adult strength / power athlete

19-21: use table "traditional periodization for an adult strength / power athlete"

Basic guidelines for resistance exercise progression adapted to Fleck and Kraemer (2005)

age	program design
12-14	introduce and teach basic exercises in all variations of lifts and machine exercises using little or no weight, develop the concept of a training session, additionally use body weight, partner and lightly resisted exercises, keep volume low, monitor tolerance of the exercise stress
15-18	train basic exercise techniques and do a progressive loading of each exercise, emphasize exercise techniques, introduce more advanced exercises with little or no resistance. Progress to more advanced youth programs in resistance exercise. Increase volume of strength training
18-21	move to entry level adult programs after all background knowledge has been mastered and basic level of training experience has been gained. Develop athlete to a strength training level to enable him/her to do a elite training program with specific work for boat and position in boat

periodization model for a prepubescent child			
training phase	sets	repetitions	
base	3	10-15	
strenght	3	6-10	
power	2-3	6-8	
peaking	1-2	6-8	
Active rest	physical activity – not necessarily resistance training		

traditional periodization for an adult strenght / power athlete			
training phase	sets	repetitions	intensity
base	3-5	8-15	Low
strenght	3-5	2-6	High
power	3-5	1-3	High
peaking	1-3	1-3	Very high
Active rest	physical activity – not necessarily resistance training		

Exercise selection for long term development to elite level age group 12 to 14 years:

-when exercises are clear, go on with practicing clear methodology and teach exercises of next age group only in technique without intensity

Leg exercises

Nr	exercise	tool	variation
1	squat	body weight	deep
2	lunges	bodyweight	front/back
3	overhead squat	stick	
4	step up	box/bench	
5	nordic hamstrings	bodyweight	easy to hard variation

Arm / shoulder exercises

Nr	exercise	tool	variation
1	push up	bodyweight	wide/narrow
2	dips	bodyweight	wide/narrow
3	pullup below bar	bodyweight	horizontal
4	pulling over bench	bench	
5	internal/external rotation	rubber band	standing/sitting
6	shoulder shrug	little dumbbell/free	

Core exercises

Nr	exercise	tool	variation
1	arm raising lying	bodyweight	for deep abdominals
2	leg raising lying	bodyweight	for deep abdominals
3	diamond	bodyweight	for deep abdominals
4	sit up	bodyweight	for abdominals
5	pull over	medicine ball	for deep abdominals
6	leg raising hanging	bodyweight	for deep abdominals
7	belly jumper	bodyweight	for back
8	belly superman	bodyweight	for back
9	bridging	bodyweight	for back/hip
10	extensor	bodyweight	for back/hip/shoulders
11	heel to ceiling	bodyweight	for back/hip
12	physioball T W Y	bodyweight on PB	for upper back
13	diamond lateral flexion	bodyweight	for abdominal side
14	hip cross over 45/90 degrees	bodyweight	for abdominals side
15	pillar bridge side	bodyweight	for abdominals side
16	quadruped arm extension	bodyweight	combined stability
17	quadruped leg extension	bodyweight	combined stability
18	quadruped arm-leg extension	bodyweight	combined stability
19	ball wandering	bodyweight	combined stability
20	wood chop	bodyweight and med ball	combined stability

Exercise selection for long term development to elite level age group 15 to 18 years:

-when exercises are clear, go on with practicing clear methodology and teach exercises of next age group only in technique without intensity

Leg exercises

Nr	exercise	tool	variation
1	leg press	machine	sitting/lying, one foot
2	leg extension	machine	
3	overheadsquat	dumbbell/disk	
4	lunges	dumbbell	front/back
5	hamstings	machine	sitting/lying

Arm / shoulder exercises

Nr	exercise	tool	variation
1	chest press	machine	wide/narrow grip
2	rowing	machine	wide/narrow grip
3	lat pull down	cable	to chest / to upper back
4	upright row	cable	
5	overhead press	machine	
6	shoulder raise	machine	
7	triceps push down	cable	
8	biceps	machine/cable	

Core exercises

Nr	exercise	tool	variation
1	rotary torso	machine	
2	seated cable row	cable	narrow/wide grip
3	abdominal flexion	machine	
4	back extension/back45	machine	

Exercise selection for long term development to elite level age group 19 to 21 years:

-when exercises are clear, go on with practicing and using clear methodology

Leg exercises

Nr	exercise	tool	variation
1	dead lift	barbell	
2	squat	barbell	front/back
3	overheadsquat	barbell/dumbbell	
4	lunges	barbell/dumbbell	front/back
5	romainian deadlift	barbell	stiffleg

Arm / shoulder exercises

Nr	exercise	tool	variation
1	bench pull	barbell	wide / narrow grip
2	bench press	barbell	wide / narrow grip
3	pullup with weight		grip variations
4	standing upright row	barbell/dumbbell	
5	overhead press	barbell/dumbbell	
6	shoulder raise lateral	dumbbell	
7	bicepscurls	dumbbell	
8	triceps kicks	dumbbell	

Core exercises

Nr	exercise	tool	variation
1	cable rotation	cable	standing, kneeling
2	standing rowing	barbell	
3	good morning	barbell/dumbbell	
4	physioball crunch weight	PB and weight	

Teach stretching exercises from begin on to make athletes able to improve or maintain flexibility and to reduce tension after hard sailing / physical trainings.

Stretching exercises

Nr	exercise	tool	variation
1	deep and superficial calfs		
2	quadriceps lying on side		
3	hamstrings lying on back		
4	bum lying on back, kneeling on floor or standing in front of box		
5	hip flexors		
6	adductors sitting		
7	spine extension/flexion		
8	spine lateralflexion		
9	scorpion		
10	chest		
11	upper back		
12	lower back		
13	abdominals		
14	latissimus		
15	triceps		

Boisen-Moller, J; Larsson, B; Aagaard, P. (2014). Physical requirements in olympic sailing. European journal of sports science.

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