

Junior Sports Academy

20 & 26 Jan 2023

Why Strength & Conditioning (S&C)?

Develop Force Capabilities of Athletes



Force Application/Propulsion



Force Absorption/Braking

Why Strength & Conditioning (S&C)?

↑ Performance Improvements

SCANDINAVIAN JOURNAL OF MEDICINE & SCIENCE IN SPORTS

Original Article

Neuromuscular and athletic performance following core strength training in elite youth soccer: Role of instability

O. Prieske^a, T. Muehlbauer, R. Borde, M. Gube, S. Bruhn, D. G. Behm, U. Granacher



Journal of Sport and Health Science

Volume 9, Issue 6, December 2020, Pages 620-627



Original article

Effectiveness and time-course adaptation of resistance training vs. plyometric training in prepubertal soccer players

Yassine Negra^{a, d}, Helmi Chaabene^b, Thomas Stöggl^c, Mehréz Hammami^a, Mohamed Souhaïel Chelly^{a, d}, Younés Hachana^{a, d}

Injury Prevention

Downloaded from <http://bjsm.bmj.com/> on May 12, 2016 - Published by group.bmj.com

Original article

The effectiveness of a neuromuscular prevention strategy to reduce injuries in youth soccer: a cluster-randomised controlled trial

C A Emery, W H Meeuwisse

Original article

Effectiveness of an injury prevention programme for adult male amateur soccer players: a cluster-randomised controlled trial

Anna M C van Beijsterveldt,¹ Ingrid G L van de Port,¹ Mark R Krist,¹ Sandor L Schmikli,¹ Janine H Stubbe,² Janet E Frederiks,³ Frank J G Backx¹

WARM-UP

R

A

M

P

	Raise	Activate	Mobilise	Potentiate
Purpose	Raising heart rate and core body temperature	Activating key muscle groups	Mobilise joints to increase range of motion	To improve the effectiveness of subsequent performance
Exercises	Jog / cycle / skip Multi-directional movement Crawling	Pillar preparation Low intensity exercises Low intensity jumps / hops	Hip, thoracic spine and surrounding areas	Speed work Change of direction Contact preparation

RECOMMENDED WARM-UP

Choose any 2 of the following activities
Perform for 2 sets of 30 seconds each, with rest in between

Rope skipping

Jumping jacks

Burpees

Walk on the spot

Jog on the spot

Next, perform **all** dynamic stretches in order

Arm rotation
(x10)

Alternate arm
swing (x10)

Torso Windmills
(x5 each)

Forward leg swing
(x10)

Side leg Swing
(x10)



STRENGTH 101

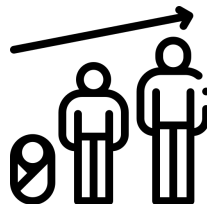
A well-planned resistance training programme prepares the athlete for the demands of the sport and reduces injury risks through an understanding of sport-specific movements and its corresponding injury profile

The resistance training programme should be age-appropriate and follow a sensible progression pathway

Stage of maturation



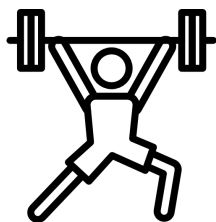
Training age



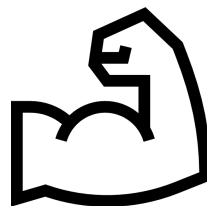
Fundamental movement skills (FMS) competency



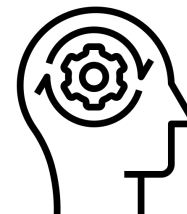
Technical lift proficiency



Existing strength levels



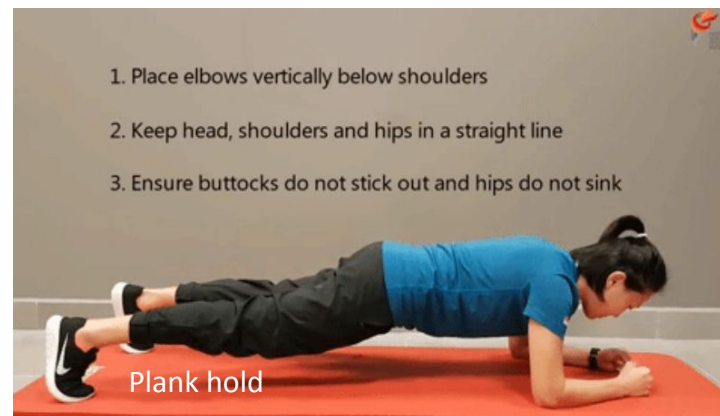
Psychosocial factors



. Technical lift competency through a range of basic exercises should be prioritised before external load progressions are considered

JSA TRAINING PROGRAM (WEEK 1-5)

Week 1	Week 2	Week 3	Week 4	Week 5
1. Push-up (x10)	1. Push-up (x12)	1. Push-up (x15+)	1. Push-up (2x10)	1. Push-up (2x12)
2. Half squat (x10)	2. Half squat (x12)	2. Half squat (x15+)	2. Half squat (2x10)	2. Half squat (2x12)
3. Sit-up (x10)	3. Sit-up (x12)	3. Sit-up (x15+)	3. Sit-up (2x10)	3. Sit-up (2x12)
4. Skydiver Darts (x10)	4. Skydiver Darts (x12)	4. Skydiver Darts (x15+)	4. Skydiver Darts (2x10)	4. Skydiver Darts (2x12)
5. Stationary lunge (x10ea)	5. Stationary lunge (x12ea)	5. Stationary lunge (x15ea)	5. Stationary lunge (2x10ea)	5. Stationary lunge (2x12ea)
6. Plank hold (30s)	6. Plank hold (35s)	6. Plank hold (>40s)	6. Plank hold (2x30s)	6. Plank hold (2x40s)



JSA TRAINING PROGRAM (WEEK 6-10)

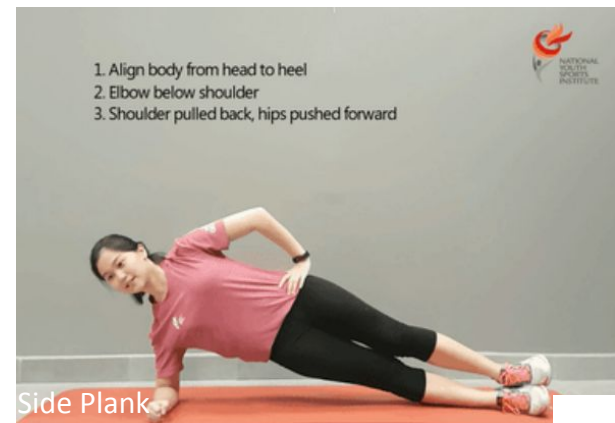
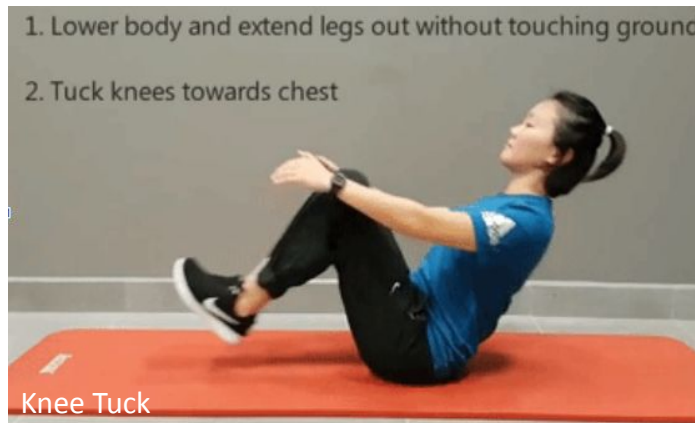
Week 6	Week 7	Week 8	Week 9	Week 10
1. Decline push-up (x10) 2. 90° Squat (x10) 3. Sit-up w/ double twist (x10) 4. Prone W to I (x10) 5. Forward lunge (x10) 6. Plank w/ alt. Arm Raises (30s)	1. Decline push-up (x12) 2. 90° Squat (x12) 3. Sit-up w/ double twist (x12) 4. Prone W to I (x12) 5. Forward lunge (x12) 6. Plank w/ alt. Arm Raises (40s)	1. Decline push-up (x15) 2. 90° Squat (x15) 3. Sit-up w/ double twist (x15) 4. Prone W to I (x15) 5. Forward lunge (x15) 6. Plank w/ alt. Arm Raises (45s)	1. Decline push-up (2x10) 2. 90° Squat (2x10) 3. Sit-up w/ double twist (2x10) 4. Prone W to I (2x10) 5. Forward lunge (2x10) 6. Plank w/ alt. Arm Raises (2x30s)	1. Decline push-up (2x12) 2. 90° Squat (2x12) 3. Sit-up w/ double twist (2x12) 4. Prone W to I (2x12) 5. Forward lunge (2x12) 6. Plank w/ alt. Arm Raises (2x40s)



JSA TRAINING PROGRAM (WEEK 11-15)

MAIN EXERCISES

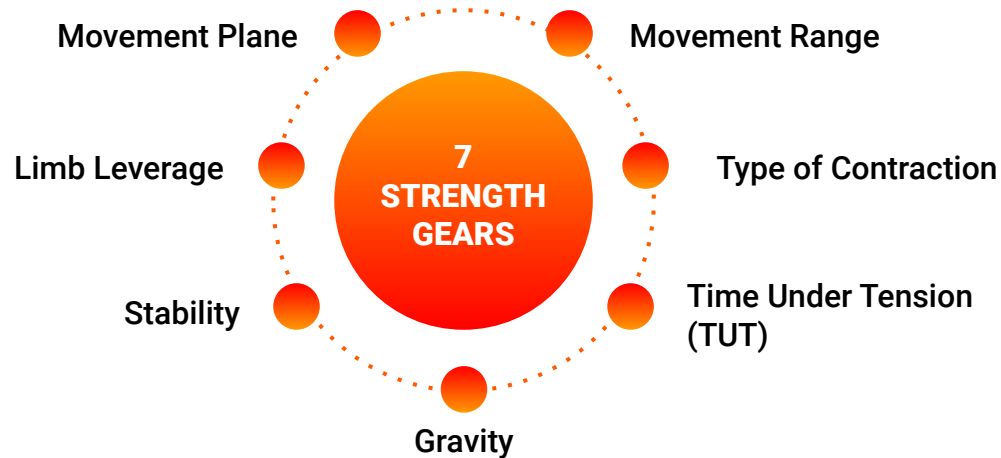
Week 11	Week 12	Week 13	Week 14	Week 15
1. Decline push-up w/ alt. leg raise 2. Overhead Squat 3. Alt. Knee Tuck 4. Partner Pulls 5. Reverse Lunge 6. Side Plank to Front Plank to Side Plank Hold				
Ex. 1-5: 1 set of 6 Ex. 6: 1 set of 5s each	Ex. 1-5: 1 set of 8 Ex. 6: 1 set of 10s each	Ex. 1-5: 1 set of 10 Ex. 6: 1 set of 10s each	Ex. 1-5: 2 set of 6 Ex. 6: 2 set of 7s each	Ex. 1-5: 2 set of 8 Ex. 6: 2 set of 10s each



JSA TRAINING PROGRAM (WEEK 11-15) SUPPLEMENTARY EXERCISES

Category	Week 11-12	Week 13-14	Week 15
General	Nordic Curls (1x6) Squats Jumps (1x6) Single Leg Balance w/ heels off (1x20s ea)	Nordic Curls (1x8) Squats Jumps (1x8) Single Leg Balance w/ heels off (1x30s ea)	Nordic Curls (2x6) Squats Jumps (2x6) Single Leg Balance w/ heels off (2x20s ea)
Team	Nordic Curls (1x6) Lunge Jump (1x5 ea)	Nordic Curls (1x8) Lunge Jump (1x6 ea)	Nordic Curls (2x6) Lunge Jump (2x5 ea)
Net-Barrier	Nordic Curls (1x6) Squat Jump (1x6) Single Leg Hop (1x6ea)	Nordic Curls (1x8) Squat Jump w/ 180° Turn (1x6) Single Leg Hop (1x8ea)	Nordic Curls (2x6) Squat Jump w/ 180° Turn (2x6) Single Leg Hop (2x6ea)
Target	Nordic Curls (1x6) Single Leg Balance w/ heels off (1x20s ea)	Nordic Curls (1x8) Single Leg Balance w/ heels off (1x30s ea)	Nordic Curls (2x6) Single Leg Balance w/ heels off (2x20s ea)

PROGRESSION AND REGRESSION



Difficulty of the bodyweight exercises can be progressed by alternating any of these variables:

Movement Plane	Angle of motion: Sagittal, Frontal and Transverse Plane
Movement Range	Range of motion: Capability of a joint to go through its complete spectrum of movements
Type of Contraction	Concentric, isometric and eccentric
Time Under Tension (TUT)	Speed of contraction (i.e., 3-0-3)
Gravity	Amount of systematic load / additional soft resistance
Stability	Balance demands / unilateral variations
Limb leverage	Moment of resistance: shorter the moment arm, the lesser the mechanical advantage, i.e. more difficult to lift a weight.

3-Step Approach to Providing Effective Feedback

To reinforce good behavior (good technique), the following 3-step procedure has been recommended

1. Provide **POSITIVE PRAISE**

(good job, well done, excellent etc.)

2. **POSITIVE REINFORCER**

(good knee lift, good posture and back position etc.)

3. **CORRECTIVE REINFORCER**

(Higher knee lift required, squeeze shoulder blades etc.)


RESISTANCE TRAINING GUIDELINES

Development level	Exercise Selection	Intensity (%1RM)	Sets	Reps	Rest intervals	Training frequency	Recovery (btw sessions)
Beginner	Modified bodyweight exercise with light resistance	Bodyweight, 50 – 70%	1-2	8-15	1min	2-3	72-48h
Intermediate	Introduction to simple free weights exercises	60 - 80%	2-4	6-10	1-2min	2-3	72-48h
Experienced	Progression of free weights exercise with the introduction of complex lifts	70 - 85%	2-4	5-8	2-3min	2-4	48h
Advanced	Introduction of complex multi-joint movement and programme routines	85 - 100%	2-5	2-5	2-5min	2-5	48-36h

Note:

- The number of repetitions prescribed should be exercise dependent and objectively driven to suit the training requirements.
- One to three repetitions of an exercise may be performed when teaching technique to allow for real-time feedback.
- Youth athletes do not have to train to muscular failure during resistance training as similar gains in strength and hypertrophy can still be elicited by other means,
- To track strength progressions, predictive equations to estimate 1RM values from submaximal loads (3-5RM strength test protocols) may be utilised.
- However, strength tests should always be carried out under qualified supervision, and only prescribed after technical competency with external loading has been established.

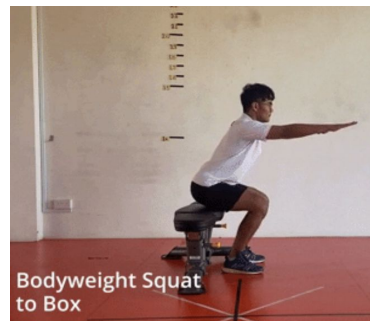
STRENGTH MATRIX

Levels  	Movement category	Upper body Push	Upper body Pull	Lower body Push		Lower body Pull
	Foundation	Incline push up (Bench, TRX, rack)	Modified inverted row	Bodyweight squat to box	Split squat	Glute bridge
	+	<i>Stability push up</i> (Swissball / BOSU)	<i>Stability ineverted row</i> (Swissball / BOSU)	<i>Swiss ball bodyweight wall squat</i>	<i>Cossack squat</i>	<i>Hip thrust</i>
	Development	Push up	Inverted row	Squats (Bodyweight / light load)	Lunges (Reverse / forward)	Deadlift (Kettlebell / dumbbell)
	+	<i>Decline push up</i> (Box, TRX)	<i>Inverted Row</i> (Feet elevated)	<i>single leg bodyweight squat</i>	<i>Side lunges</i>	<i>Barbell / Hex bar deadlift</i>
	Performance	Weighted push up	Pull up	Goblet squat (dumbbell, kettlebell)	Walking Lunge	Romanian deadlift
	+	<i>Handstand push up</i>	<i>Weighted pull up</i>	<i>Overhead squat</i>	<i>Rear foot elevated split squat</i>	<i>Single leg romanian deadlift</i>

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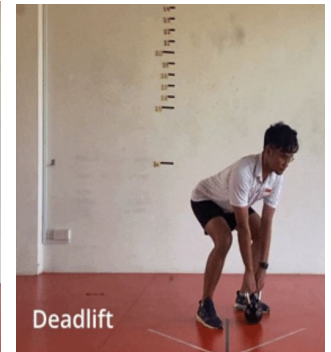


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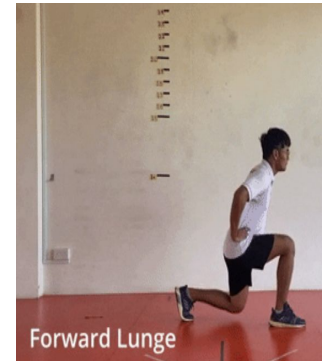
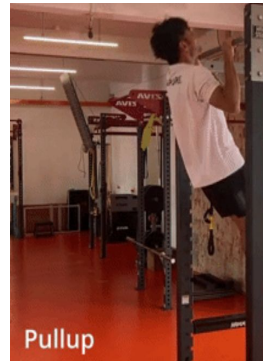


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MOVEMENT COMPETENCY CHECKLIST

PUSH UP



- ☐ Feet hip width apart and wrists vertically below shoulder
- ☐ Body is in a straight line from ankles to head
- ☐ In the downward phase, maintain neutral alignment of the torso and head
- ☐ Elbows form a 45° angle with the body at the bottom position

INVERTED ROW



- ☐ Grip the bar shoulder width apart and place feet hip width apart
- ☐ Body is in a straight line from ankles to head
- ☐ Pull the chest up towards the bar
- ☐ Maintain neutral alignment of the torso and head

BODYWEIGHT SQUAT



- ☐ Place feet between shoulder and hip-width apart
- ☐ Bend at the hips and knees, and squat down till the thighs are parallel to the floor
- ☐ Ensure that the knees track in the same direction as the second toe
- ☐ Maintain a neutral spine throughout the movement

BODYWEIGHT LUNGES



- ☐ Place feet hip-width apart
- ☐ Lunge forward/back till the front thigh is parallel to the floor
- ☐ The back knee should be slightly off the floor at the bottom position
- ☐ Maintain neutral alignment of the torso

KETTLEBELL DEADLIFT



- ☐ Place feet hip-width apart and bend over to grip the kettlebell
- ☐ At the starting position, ensure that the back and arms are straight
- ☐ Extend the knees and raise hips at the same time
- ☐ Push the hips through once the kettlebell pass the knees

Levels	Lower Body				Upper Body			
	Squat (BL)	Squat (UL)	Split Leg	Hinge	Push (HORIZONTAL)	Push (VERTICAL)	Pull (HORIZONTAL)	Pull (VERTICAL)
1A	BW Squat	Front, low box step-up	Floor-to-stand lunge/split squat	Glute bridge	Incline (medium box)	Wall angels (seated)	TRX Pull (High)	Low Bar Hang
	(arm, front)				Push-up			
1B	BW Squat	-	Floor-to-stand lunge/split squat (FR foot elevated)	-	Incline (medium box) alt. s/leg	Wall angels (standing)	TRX Pull	Low Bar Hang (Scapular depression)
	(arm, up)				Push-up		High, Archer	
2A	Bosu Squat,	Front, med box step-up	Forward lunge	Hip thrust	Swiss/Bosu ball hold +	Wall sliders	TRX Pull (Med)	High bar jump and up-hold
					Push-up (Partial to Full)			
2B		-	Reverse lunge	-	Swiss/Bosu ball hold with s/leg raise	Wall walk	TRX Pull	High bar jump and up-hold (ECC) ↓
3A	RB Squat	Side, med box step-up	Side, lunge	Deadlift	Decline (medium box)	Pike push-up	TRX Pull (Low)	High bar jump and hold underhand (ECC + partial CON)
	(arm, front)					on floor		
3B	RB Squat,	-	Lunge comb series	-	Decline alt. s/leg raise	Pike push-up	TRX Pull	High bar jump and underhand hold (ECC + ≥90°CON)
	(arm, up)				Push-up	S/leg on floor	Low, Archer	
4A	Goblet Squat	Side, cross-over step-up (med)	Bulgarian split squat	RDL	Swiss/Bosu ball hold +	Pike push-up	TRX Pull	Leg Supported Pull-up
					Push-up (Feet on ball)			
4B	Overhead Squat	-	-	-	Swiss/Bosu ball hold with s/leg raise	Pike push-up	TRX Pull	Feet Elevated-on-Box Pull-up
						on high box	S/leg, Archer	
5	90° squat (10% BW, 1min)	Box, ECC & CON	Walk lunges	Single leg RDL	Full (standard)	Handstand	Inverted Row	Assisted pull up
		(≥90°)			Push-up	(Heels on wall)		
6	90° squat (20% BW, 1min)	Pistol squat	MB walk lunge with rotation (chest/side/OH)		Weighted	Handstand	Inverted Row (Feet elevated)	Pull up
					Push-up	Push-up		

COOL-DOWN PRACTICAL SUGGESTIONS

	Relaxation	Foam Rolling / Stretching	Off-feet low impact cardiovascular work	Other recovery processes as applicable
Purpose	Early facilitation of recovery	Restore / increase range of motion Reduce neuromuscular excitability and pain perception Reduce anxiety and enhance perception of recovery	Increase aerobic capacity with reduced joint impact Increase blood flow	
Suggestions	Breathing techniques	Static stretching, from top to bottom, 2 sets x 20 seconds each	Swimming, cycling	Hydration and nutrition e.t.c.,

ADDITIONAL RESOURCES

Click the link or scan the QR code to access more resources!



[Athletic Training Competency](#)

REFERENCES

1. Baker, D., Mitchell, J., Boyle, D., Currell, S., & Currell, P. (2007). Resistance training for children and youth: a position stand from the Australian Strength and Conditioning Association (ASCA). *J Aust Strength & Cond*, 16, 58-74.
2. Haff, G. G., & Triplett, N. T. (Eds.). (2015). *Essentials of strength training and conditioning* 4th edition. Human kinetics.
3. Lloyd, R. S., & Oliver, J. L. (Eds.). (2019). *Strength and conditioning for young athletes: science and application*. Routledge.
4. McQuilliam, S. J., Clark, D. R., Erskine, R. M., & Brownlee, T. E. (2020). Free-Weight Resistance Training in Youth Athletes: A Narrative Review. *Sports Medicine*, 1-14.
5. Singapore Sports Institute-National Youth Sports institute. (2021) Consensus statement on strength & conditioning for youth athletes. Singapore