Rozvoj silových schopností v OB

teorie a praxe silového tréninku vhodného pro OB

Mgr. Tomáš Kalina, tomas.kalina@gmail.com, 28. 11. 2020, ČSOS – online

verze pro tisk+web 1.0

Jen v krátkosti

- V OB od 1998 jako závodník
- V OB jako trenér TBM, ZBM + osobní kondiční trenér (Indráková, Adámek)
- V práci (Masarykova univerzita) mj. výuka kondičního tréninku a atletiky
- Trenérské vzdělání
  - Mgr. – Učitelství TV
  - „aktuálně“ Ph.D. student – běžecká ekonomika a silový trénink
  - Certifikovaný trenér DNS, FMS level 2, OB T2, atletika TŽ, …

MUNI SPORT

https://www.facebook.com/watch/?v=1684605494886706

Mýty silového trénink

- Posilování zvětší moje svaly.
- Silový trénink způsobuje zranění.
- Posilování bude způsobovat svalovou bolest.
- Abych běhal rychle, musím všechen čas věnovat jen běhání.
- Vytrvalostní výkon potřebuje svalovou vytrvalost nikoli svalovou sílu.
- Mladí by neměli posilovat. A už vůbec ne s činkami.

Mýty: Posilování zvětší moje svaly.

- Při současném vytrvalostním tréninku ne.
- Preference jiných výstupů než u kulturistiky (metody) při použití stejných cviků.
- Příjem bílkovin, testosteron.

Maximal Strength Training Improves Running Economy in Distance Runners

ØYVIND STØREN[1,2], JAN HELGERUD[1,3], EVA MARIA STØA[2], and JAN HOFF[1,4]

[1]Department of Circulation and Medical Imaging, Faculty of Medicine, Norwegian University of Science and Technology, NORWAY; [2]Department of Sport and Outdoor Life Studies, Telemark University College, NORWAY; [3]Hokksund Rehabilitation Centre, NORWAY; and [4]Department of Physical Medicine and Rehabilitation, St.Olav University Hospital, NORWAY

ABSTRACT

STØREN, Ø., J. HELGERUD, E. M. STØA, and J. HOFF. Maximal Strength Training Improves Running Economy in Distance Runners. *Med. Sci. Sports Exerc.*, Vol. 40, No. 6, pp. 1089–1094, 2008. **Purpose:** The present study investigated the effect of maximal strength training on running economy (RE) at 70% of maximal oxygen consumption ($\dot{V}O_{2max}$) and time to exhaustion at maximal aerobic speed (MAS). Responses in one repetition maximum (1RM) and rate of force development (RFD) in half-squats, maximal oxygen consumption, RE, and time to exhaustion at MAS were examined. **Methods:** Seventeen well-trained (nine male and eight female) runners were randomly assigned into either an intervention or a control group. The intervention group (four males and four females) performed half-squats, four sets of four repetitions maximum, three times per week for 8 wk, as a supplement to their normal endurance training. The control group continued their normal endurance training during the same period. **Results:** The intervention manifested significant improvements in 1RM (33.2%), RFD (26.0%), RE (5.0%), and time to exhaustion at MAS (21.3%). No changes were found in $\dot{V}O_{2max}$ or body weight. The control group exhibited no changes from pre to post values in any of the parameters. **Conclusion:** Maximal strength training for 8 wk improved RE and increased time to exhaustion at MAS among well-trained, long-distance runners, without change in maximal oxygen uptake or body weight. **Key Words:** OXYGEN COST OF RUNNING, HALF-SQUAT, LONG-DISTANCE RUNNING, MAXIMAL AEROBIC SPEED

TABLE 2. Physiological results in the intervention and control groups.

Variables	Intervention Group (I) n = 8		Control Group (C) n = 9		
	Pretraining	Posttraining	Pretraining	Posttraining	Difference (I − C)
Weight (kg)	60.3 ± 9.3	60.9 ± 9.2	71.1 ± 12.0	71.6 ± 12.3	0.1
$\dot{V}O_{2max}$					
$mL \cdot kg^{-1} \cdot min^{-1}$	61.4 ± 5.1	61.0 ± 5.8	56.5 ± 8.2	56.0 ± 7.0	0.1
$mL \cdot kg^{-0.75} \cdot min^{-1}$	170.6 ± 15.3	170.1 ± 19.4	164.0 ± 26.8	163.0 ± 23.9	0.5
LT					
% $\dot{V}O_{2max}$	83 ± 4	83 ± 6	85 ± 4	87 ± 5	3
f_C ($beats \cdot min^{-1}$)	180 ± 10	175 ± 10**	168 ± 10	169 ± 9	6##
MAS					
Time (s)	337 ± 124	409 ± 164*	412 ± 163	371 ± 134	113##
C_R70					
$mL \cdot kg^{-0.75} \cdot min^{-1}$	0.679 ± 0.036	0.645 ± 0.030*	0.675 ± 0.051	0.687 ± 0.047	0.045##
f_c ($beats \cdot min^{-1}$)	159 ± 11	156 ± 11**	145 ± 7	148 ± 6	6#
Strength					
1RM squat 90° (kg)	73.4 ± 20.5	97.8 ± 21.3**	92.5 ± 24.5	94.4 ± 22.2	22.4##
RFD squat 90° (W)	466.7 ± 163.2	588.0 ± 147.9**	717.3 ± 259.6	742.6 ± 251.9	96
Training					
Total time ($min \cdot wk^{-1}$)	414 ± 214	391 ± 169	324 ± 155	274 ± 151	27

Values are mean ± SD. C_R70, C_R measured on treadmill at 70% of $\dot{V}O_{2max}$ with 1.5% inclination.

* $P < 0.05$, significantly different from preintervention value.

** $P < 0.01$, significantly different from preintervention value.

\# $P < 0.05$, significantly different from Δ control value.

\## $P < 0.01$, significantly different from Δ control value.

Mýty: Silový trénink způsobuje zranění.

- Nedodržování správné techniky provádění
- Nedodržování individuálního přístupu a používání nadměrné zátěže
- Vysoký objem zátěže
- Absence odborného dohledu

SYSTEMATIC REVIEW

Sports Med 2012; 42 (10): 891-905
0112-1642/12/0010-0891

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What are the Main Running-Related Musculoskeletal Injuries?

A Systematic Review

Alexandre Dias Lopes,[1,2] *Luiz Carlos Hespanhol Junior,*[1,2] *Simon S. Yeung*[3] and

Published in final edited form as:
Br J Sports Med. 2010 January ; 44(1): 56–63. doi:10.1136/bjsm.2009.068098.

Resistance training among young athletes: safety, efficacy and injury prevention effects

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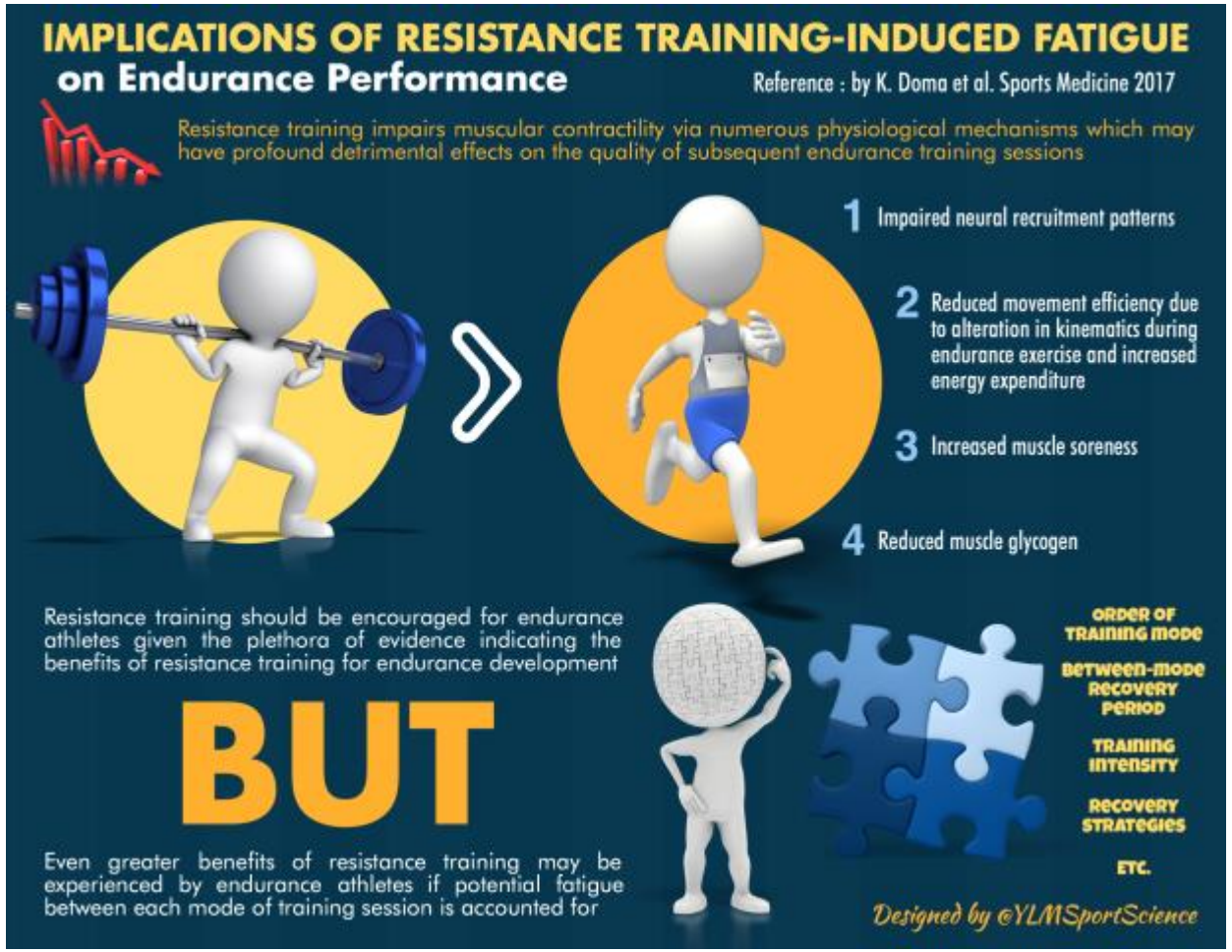
[4]Rocky Mountain University of Health Professions, Provo, Utah, USA

Abstract

A literature review was employed to evaluate the current epidemiology of injury related to the safety and efficacy of youth resistance training. Several case study reports and retrospective questionnaires regarding resistance exercise and the competitive sports of weightlifting and power-lifting reveal that injuries have occurred in young lifters, although a majority can be classified as accidental. Lack of qualified instruction that underlies poor exercise technique and inappropriate training loads could explain, at least partly, some of the reported injuries. Current research indicates that resistance training can be a safe, effective and worthwhile activity for children and adolescents provided that qualified professionals supervise all training sessions and provide age-appropriate instruction on proper lifting procedures and safe training guidelines. Regular participation in a multifaceted resistance training programme that begins during the preseason and includes instruction on movement biomechanics may reduce the risk of sports-related injuries in young athletes. Strategies for enhancing the safety of youth resistance training

Mýty: Posilování bude způsobovat svalovou bolest.

- DOMS.
- Je to o strategii, stejně jako u každého nové činnosti.



Mýty: Vytrvalostní výkon potřebuje svalovou vytrvalost nikoli svalovou sílu.

- Svalová síla
- Kardiorespirační vytrvalost
- Svalová vytrvalost
- Past specifičnosti

BRIEF REVIEW

Effects of Strength Training on Running Economy in Highly Trained Runners: A Systematic Review With Meta-Analysis of Controlled Trials

Balsalobre-Fernández, Carlos[1]; Santos-Concejero, Jordan[2]; Grivas, Gerasimos V.[3]
Author Information

Journal of Strength and Conditioning Research: August 2016 - Volume 30 - Issue 8 - p 2361-2368
doi: 10.1519/JSC.0000000000001316

Sports Med (2018) 48:1117–1149
https://doi.org/10.1007/s40279-017-0835-7

SYSTEMATIC REVIEW

Effects of Strength Training on the Physiological Determinants of Middle- and Long-Distance Running Performance: A Systematic Review

Richard C. Blagrove[1,2] · Glyn Howatson[2,3] · Philip R. Hayes[2]

Mýty: Abych běhal rychle, musím všechen čas věnovat jen běhání.

- BTW: vyhrává nejrychlejší, ne nejvytrvalejší (+ mapa pochopitelně)

Maximal Strength Training Improves Running Economy in Distance Runners

ØYVIND STØREN[1,2], JAN HELGERUD[1,3], EVA MARIA STØA[2], and JAN HOFF[1,4]

[1]*Department of Circulation and Medical Imaging, Faculty of Medicine, Norwegian University of Science and Technology, NORWAY;* [2]*Department of Sport and Outdoor Life Studies, Telemark University College, NORWAY;* [3]*Hokksund Rehabilitation Centre, NORWAY; and* [4]*Department of Physical Medicine and Rehabilitation, St.Olav University Hospital, NORWAY*

ABSTRACT

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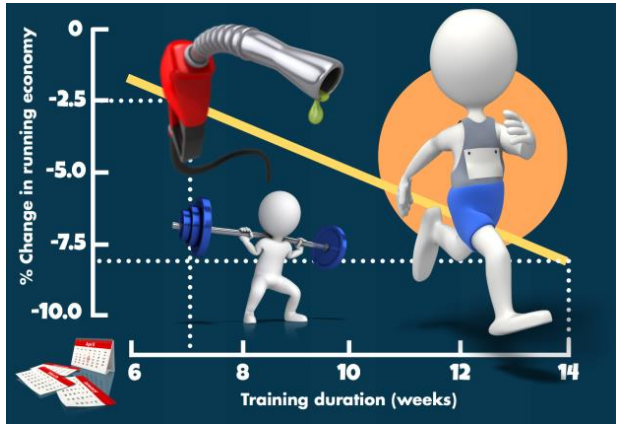
Sports Med (2017) 47:545–554
DOI 10.1007/s40279-016-0604-z

SYSTEMATIC REVIEW

Explosive Training and Heavy Weight Training are Effective for Improving Running Economy in Endurance Athletes: A Systematic Review and Meta-Analysis

Benedito Sérgio Denadai[1] · Rafael Alves de Aguiar[2] · Leonardo Coelho Rabello de Lima[1] · Camila Coelho Greco[1] · Fabrizio Caputo[2]



Eur J Appl Physiol (2003) 89: 1–7
DOI 10.1007/s00421-002-0741-y

ORIGINAL ARTICLE

Robert W. Spurrs · Aron J. Murphy
Mark L. Watsford

The effect of plyometric training on distance running performance

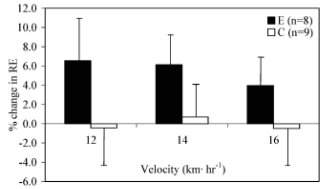


Fig. 2 Percentage (%) changes in running economy (*RE*) before and after 6 weeks for experimental (*E*) and control (*C*) groups

$\dot{V}O_{2max}$ (ml kg^{-1} min^{-1})	57.6 (7.7)	59.5 (8.1)	57.8 (5.4)	61.5 (5.9)
3-km time (min)	10.28 (1.26)	10.12 (1.15)*	9.36 (0.57)	9.31 (0.52)

*Significantly different from pre-training value ($P < 0.05$)

Mýty: Mladí by neměli posilovat. A už vůbec ne s činkami.

- Senzitivní období pro nácvik.
- Růstové chrupavky. A ti malí vzpěrači.

Original Research

Pediatric Exercise Science, 2001, 13, 357-372
© 2001 Human Kinetics Publishers, Inc.

The Effect of Long-Term Resistance Training on Anthropometric Measures, Muscle Strength, and Self Concept in Pre-Pubertal Boys

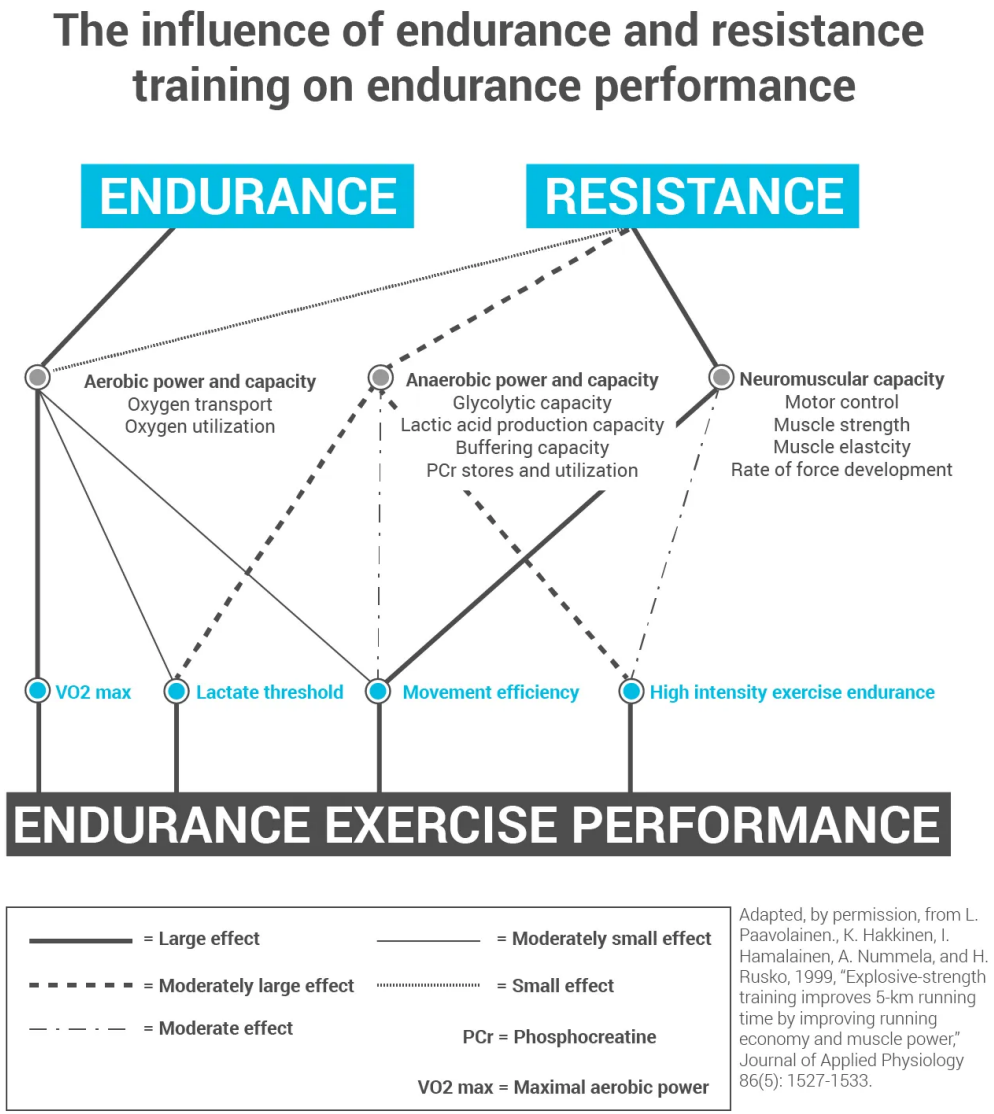
Eliahu Sadres, Alon Eliakim, Naama Constantini, Ronnie Lidor, and Bareket Falk

The purpose of this study was to examine the effect of 2 school years (21 months) of a twice-weekly resistance training program on stature, muscle strength, and self-concept among prepubertal boys. The experimental group (E, $n = 27$) aged 9.2 ± 0.3 yrs, participated in progressive resistance training, while the control group (C, $n = 22$) aged 9.4 ± 0.3 yrs, participated in standard physical education classes (as advised by the Ministry of Education). Training sessions included 1–4 sets of 3–6 exercises, with 5–30 repetitions/set. The load ranged between 30% and 70% 1RM. No differences were observed in the gain in body height between groups. Muscle strength increased significantly more in E (e.g., knee extensors: 0.51 ± 0.13 to 0.77 ± 0.16 kg/kg body mass), compared with C (0.34 ± 0.12 to 0.54 ± 0.11 kg/kg body mass). One minor injury was reported throughout the study. Initial scores of self-concept were high in both groups, with no training effect. The results demonstrate that among prepubertal boys, a twice-weekly low-to-moderate-intensity resistance training program over a period of 2 school years (21 months) can result in enhancement in muscle strength with no detrimental effect on growth.

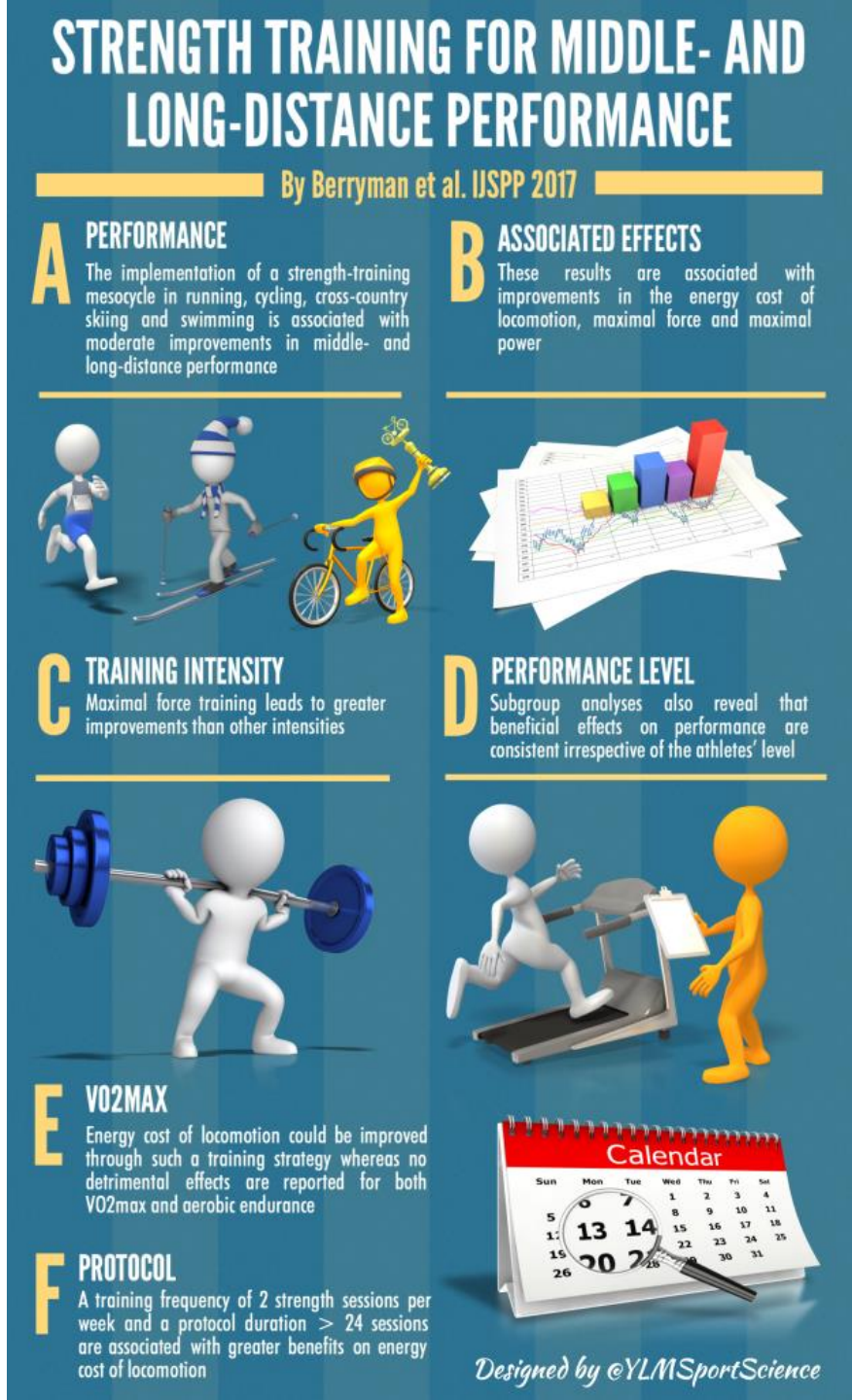
Benefity silového trénink

- Rekrutace motorických jednotek
- Spoušťová frekvence
- Koordinace a motorická kontrola
- Synchronizace motorických jednotek
- Svalovo-šlachová tuhost
- Anaerobní produkce energie
- Hustota kostní tkáně
- *A pak už jenom samá pozitiva a sociální jistoty*

Limitující faktory vytrvalostního výkonu



Adapted, by permission, from L. Paavolainen., K. Hakkinen, I. Hamalainen, A. Nummela, and H. Rusko, 1999, "Explosive-strength training improves 5-km running time by improving running economy and muscle power," Journal of Applied Physiology 86(5): 1527-1533.



Silový trénink

- Odporový silový trénink (vysoká INT, nízké počty opak a sérií, odpočinek)
- Explozivní trénink (vysoká rychlost+střední odpor, nízké počty opak a sérií, odpočinek)
- Plyometrický trénink (jako explozivní trénink + strečinkový reflex)
- ostatní trénink (ENG: conditioning)

Odporový silový trénink

- Svaly VS **pohybové vzorce**
- Odporový trénink není nic jiného než zatížený pohybový vzorec, který bychom měli nejdříve otestovat (pohybová kompetence!)
- Klíčový postup:
  - Technika cvičení
  - Plný rozsah pohybu
    - Eliminace dysbalancí v rozsazích
    - Větší rekrutace motorických jednotek
    - Pojivová tkáň je více zatížena
    - Nutí ke správné technice

Odporový silový trénink – manipulační proměnné

- Cvik (regrese-progrese)
- Opakování
- Série
- Intenzita
- Odpočinek mezi sériemi
- Tempo
  - Excentrické – pomalé, kontrolované
  - Isometrické – stop (SSC není prim cílem)
  - Koncentrická - technické

Outcome	Exercises	Resistance training experience	Repetitions per set	Sets per exercise	Intensity*	Recovery between sets (min)
Learning movement	All	Beginner	8–12	3	5–7 RPE	2-3
Basic strength	All	Intermediate (>3 months)	5–7	3–4	7–8 RPE / 70–85 per cent 1RM	2-3
Maximum strength	Bilateral only	Trained (>1 year)	1–4	3–5	8–10 RPE / 85–100 per cent 1RM	3
Explosive strength		Intermediate (>6 months)	1–5	3–4	7–8 RPE / 70–100 per cent 1RM	3

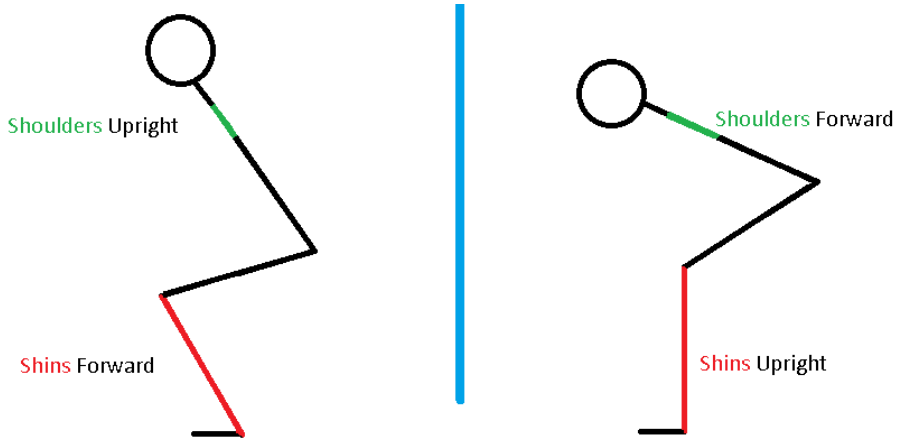
* RPE = Rating of perceived exertion. Scale is 1–10 (1 = set felt very easy; 10 = unable to lift weight on final repetition without marked deviation in technique) RM = Repetition maximum

Dřep

- Pohárový dřep (téměř s čímkoli)
  - https://youtu.be/ZnG3Z7Zgpzs
- Zadní dřep s osou
  - https://youtu.be/ultWZbUMPL8
  - Metodika: https://youtu.be/nhoikoUEI8U

- U OB-běžců
  - Mobilita: kotníky, kyčle
  - Stabilita trupu

Kyčelní ohyb



- Rumunský mrtvý tah
  - Metodika: https://youtu.be/watch?v=k6cUaJasD5U
- Mrtvý tah https://www.strongerbyscience.com/should-you-deadlift-conventional-or-sumo/
  - Tradiční
  - Sumo

Unilaterální cviky

- Bilaterální deficit. (L+P > LP) && [LP >> (L || P)]
- Korekce asymetrie
- Svalová koordinace - jistá míra specificity
- Rovnováha a kontrola

Unilaterní cviky - dřep

- Rozdělený dřep
- bulharský dřep
- výpad vzad

Unilaterální cviky – výstupy na bedýnku – ukázka

- https://www.youtube.com/embed/5qjqDHOUh-A

Unilaterální cviky – kyčelní mosty

- Polomost obounož → hip thrust obounož
- Polomost jednonož → hip thrust jednonož

https://www.youtube.com/watch?v=iO9qZF0rzuE

Unilaterální cviky – mrtvý tah

- holubička

Tlaky

- Axiální tlak, ThExt
- **tlaky** vs tahy
- Horizontální
  - Klik → floor press → bench press
- Vertikální
  - (šikmé tlaky) → striktní tlak (→ push press, push jerk)

Tlaky - ukázky

- Floor press
- Benč press / tlak na lavici
- Tlak nad hlavu
- Push press
- Push jerk

Tahy

- „rovnače postury křivých běžců“
- Horizontální
  - Přítahy na kruzích / TRX
- Vertikální
  - Shyby – progrese: vis, lopatkový shyb, excentrický shyb / stahování kladky, shy

Příklad TJ – Odporový trénink

Exercise	Sets	Repetitions	Load	Recovery
Warm-up: Bodyweight mobilizations and movement skill				
Goblet squat	2	10	10kg dumbbell	2–3min
Romanian deadlift	3	12	20kg barbell	2–3min
Press-up	3	Max.	Bodyweight	2–3min
Split squat	2	8	8kg dumbbells	2–3min
Step-up	2	8	Bodyweight	2–3min

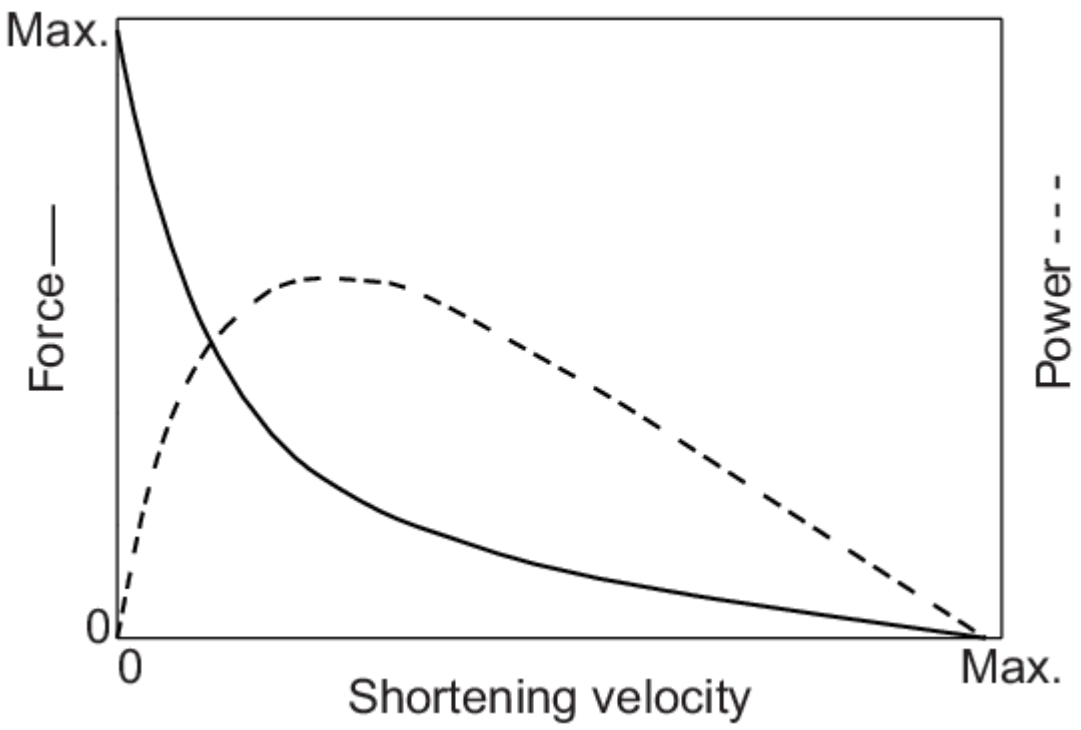
Table 6h: Example of a resistance training session for an endurance runner new to S&C.

Exercise	Sets	Repetitions	Load	Recovery
Warm-up: Body weight and barbell movement preparation				
Hang clean (technique)	3	4	50kg	3min
Back squat	4	6, 4, 4, 4	80kg	3min
Single leg box jump	4	4	Bodyweight	3min
Reverse lunge	3	6	40kg	2–3min
Pull-ups	3	8	Bodyweight	2–3min

Table 6i: Example resistance training session for an endurance runner experienced in strength training.

Explozivní silový trénink

- Primárně se soustředíme na techniku
- Poté na vzájemnou kombinaci rychlost + odpor ➔ nemaximální odpory
- Silový předpoklad, časté jsou kompenzace (kvůli rychlosti provedení se hůř opravuje)
- Nevyužíváme elastické energie



Explozivní silový trénink – osa, míč

- Výskok z přídřepu s osou/trapbarem
- Přemístění od kolen do přídřepu
- Deriváty z vzpírání (přemístění, trh)
- Odhod medicimbálu

Explozivní silový trénink - kettlebell

- Obouruční kettlebell swing
- Jednoruční kettlebell swing/snatch

Explozivní silový trénink – výskoky na bednu

- pozor na mechaniku pohybu, často rychlost přinese chybu a ne odpor
- Obounož
- Jednonož dopad obounož
- Jednonož dopad jednonož

Plyometrický trénink

- Podobný efekt na RE jako odporový a silově explozivní trénink
- při serióznějším zatížení v pokročilých cvicích nutný trénink odporového charakteru (anatomická adaptace především šlach)
- Využití elastické energie
- Chyby
  - Postavení kloubů
  - Dlouhá kontaktní doba
  - Slabé extenzory kyčlí
- Hopping (L→L→L)
- Bounding (L→P→L): … → jeleňáci/odpichy
- Skipping: power skip

Plyometrie - překázky

- Pogo / švihadlo (dvojšvihy)
- 1+mrazík → 1+pogo → 2+mrazík → 3 → …

Plyometrie - seskoky

- https://www.youtube.com/watch?v=dxL1sO8x1HA&feature=emb_title&ab_channel=ChampionPhysicalTherapyandPerformance

Jeleňáci, odpichy, násobné odrazy

- Lp→Pl→…
- L→P→L→
- L→L→P→P→L→… a poté až L→L→L→…

Plyometrie - TJ

Training Variable	Beginner	Intermediate (3–18 months)	Advanced (>18 months)
Sessions per week	2	2–3	3
Number of exercises per session	2–3	3–4	4–5
Total foot contacts per session	30–50	50–100	100+
Sets of each exercise	2–4	3–5	3–5
Repetitions per set	4–6	4–6	6–8
Recovery (minutes)	2–3	2–3	2–3

Table 7c: Guidelines for prescribing and progressing plyometric training.

Exercise	Sets	Repetitions	Foot contacts	Recovery
Warm-up to include skipping and running drills				
Pogo jumps	3	6	18	2min
Hop and stick	2	6	12	2min
Step and stick	2	6	12	2min

Exercise	Sets	Repetitions	Foot contacts	Recovery
Warm-up to include skipping and running drills				
Hurdle jumps (60cm)	5	6	30	3min
Bounding	3	8 (each leg)	24	2–3min
Continuous hopping	3	6 (each leg)	18	2–3min
Depth jumps (45 to 30cm)	5	6	30	3 min

Conditioning

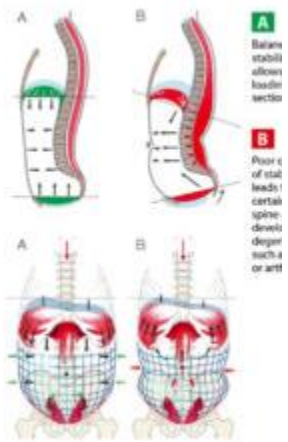
- Oblasti
  - Trup
  - Lýtka a Achillova šlacha, svaly chodidla
  - Hamstringy
  - Stabilizátory v oblasti kyčle
- Kategorie rozvoje
  - Kapacita (důraz na vyšší objem)
  - Síla (důraz na střední objem)
  - Rychlost aktivace
  - Specifické běžecké drily

Trup

Category	Objectives	Exercise	Sets and reps	Recovery
Capacity	• Neutral spine/pelvis • Anti-extension/flexion/rotation with bodyweight • Hip-hingeing/gluteal function	Front plank	3 x 12–15 or 30–60s	Arranged in continuous circuit, or <1min
		Heel taps		
		Superman		
		Side plank		
		Side hold		
		RDL (light)*		
		Glute bridge*		
Strength	• Long lever/loaded isometrics • Rotation and anti-rotation patterns • High load force transfer	Rollout	3 x 8–12 or 30s	2–3min
		Hanging leg raise		
		Landmines		
		Cable hold		
		Cable chops		
		Deadlift, squat*		
Rate of activation	• Unpredictable perturbations • Explosive force transfer	Medicine ball throw-catch	3 x 8–12 or 30s	2–3min
		Partner push/pulls		
		Medicine ball overhead throw*	3 x 6 reps	3min
Specific drills**	• Control of flexion/ rotation during running skills	Overhead drills	2 x 15–20m	Walk back
		Broomstick running	3–5 x 60m	

https://www.skogssport.se/9-2018/english-training-tips-tove-alexandersson-core-strength/

Trup – mýty



- Naposilování jednoho svalu (six-pack) stabilizuje trup.
  - Je to o komplexním zapojení celého hlubokého stabilizačního systému a jeho součástí (dech, bránice, pánevní dno, DNS).
- Core trénink na nestabilních plochách
  - Propriorecepce (zvládnete 30 sekund stoj jednonož se zavřenýma očima na stabilní podložce)
  - Budování stabilizace
  - EBP: těžký dřep naaktivuje core více než běžná cvičení (plank), ale bez fungující trupové stabilizace těžký dřep je troufalost (a co teprve běh v terénu!)
  - EBP: dřep na nestabilní podložce při stejné zátěži sice více zapojí stabilizaci, ale stabilizace bude limitou pro rozvoj síly, kterou můžeme lépe rozvinout na stabilní podložce, http://coretraining.cz/2015/06/pravda-nebo-mytus-drepy-a-sezeni-na-velkem-mici-pro-zlepseni-nasi-stability/

Chodidla a kotníky

Category	Exercise	Sets and reps	Recovery
Capacity	Single-leg calf raise	2–3 x 12–15 reps	Arranged in continuous circuit or <1 min
	Bent-leg calf raise		
	Toe raise		
	Inversions		
	Eversions		
Strength	Loaded single-leg calf raise	2–3 x 8–12 or 30sec cumulative hold each leg	2–3min
	Seated calf raise		
	Calf press hold		
	Eccentric calf lowers		
Rate of activation	Loaded active plant walk	2–3 x 6–8 reps each leg	2–3min
	Drop jumps*		
Specific drills	Hopping and bounding*	2–3 x 6 reps each leg	Walk back
	Double/triple mini hops**	2–3 x 10–12m	

Paired Exercises		Distance/repetitions	Sets	Recovery
Toe scrunch	Heel–toe walk	20 reps/10m	2	None
Toe walk	Heel walk	10m	2	None
Active plant walk	Outside foot walk	10m	2	None
High catch pogo jump	-	20 reps	2	1 min
Pogo jumps	-	20 reps	1	1 min
Zig-zag pogo jumps	-	20 reps	1	1 min

Hamstringy

Category	Exercise	Sets and reps	Recovery
Capacity	Hamstring bridge holds	3 x 12–15 or 30sec total hold duration	1 min
	Swiss ball bridge and curl		
	Single-leg back extension		
	Arabesque		
Strength	Nordic curls	3 x 6–8	2–3min
	General strength exercises*		
Rate of activation	Kettlebell swings	3 x 6	2–3min
	Swiss ball kickers	3 x 10sec	
	Heavy single-leg back extension	3 x 6 holds	
	Explosive strength exercises*	3–5 x 4-6	
Specific drills**	Marching	2 x 5–20m	Walk back
	B-walks and skips		
	Straight leg skips and running		
	Strides and sprints	3–5 x 60m	

Stabilizátory kyčle

Category	Exercise	Progression/Alternative	Sets and reps/duration	Recovery
Capacity	Side-lying raise*	Crab walk*	2–3 x 12–15/ 30sec	Arranged in continuous circuit or <1min
	Clam shells*	Wall push		
	Reverse clams	Reverse wall touch		
	Reverse kicks*	Reverse extensions		
	Glute bridge	Glute bridge fallout*		
Strength	General strength exercises (Chapter 6)		3–5 x 1–6 reps	3min
Rate of activation	Explosive strength exercises (Chapter 6)		3 x 1–6 reps	3min
	Unilateral plyometrics (Chapter 7)			
Specific drills (Chapter 12)	Hurdle walkovers	Running drills	2 x 6–10 hurdles or 15–20m	Walk back

* Initially progress by adding a theraband

Běžecké drily

Category	Purpose	Drills
Ground contact	Low-level plyometric activities that develop stiffness at the ankle and knee, and therefore shorten contact times. Will also provide a strong conditioning stimulus for the foot and ankle	• Pogos* • Sotos • Foot tack • Ankling • Double/ triple mini hops
Early leg recovery (A-drills)	Improve action of the trail leg and foot as it leaves the ground to recover into a front side position. These drills also strengthen the hip flexors to some extent	• Leg cycles • A-walk • A-skip • High knee switch • Deadleg run • High knees
Late leg recovery (B-drills)	Encourage foot placement under the hips so minimizing heel strike and braking forces. Also places high degree of stress on the hamstring muscles so can be used as a useful conditioning tool	• Marching • B-walk • Straight leg skip • B-skip • Straight leg running
Hurdle walkovers	Enhance dynamic hip mobility, gluteal control and posture of the trunk. These drills can be manipulated to provide a greater stimulus for hip mobility, the gluteal stabilizers or the trunk musculature. Skipping versions of each drill develop rhythm and plyometric qualities	• Forward walkover • Backward walkover • Lateral stepover • Scissor walkover • Straight leg kick • One foot stepover
High intensity activities	Aid in the transfer of strength gains from weight-training activities to the running stride. A form of explosive strength training, and can be classified as moderate-high intensity plyometric exercises	• Hopping and bounding* • (Broomstick) strides/sprints • Steep hill sprints

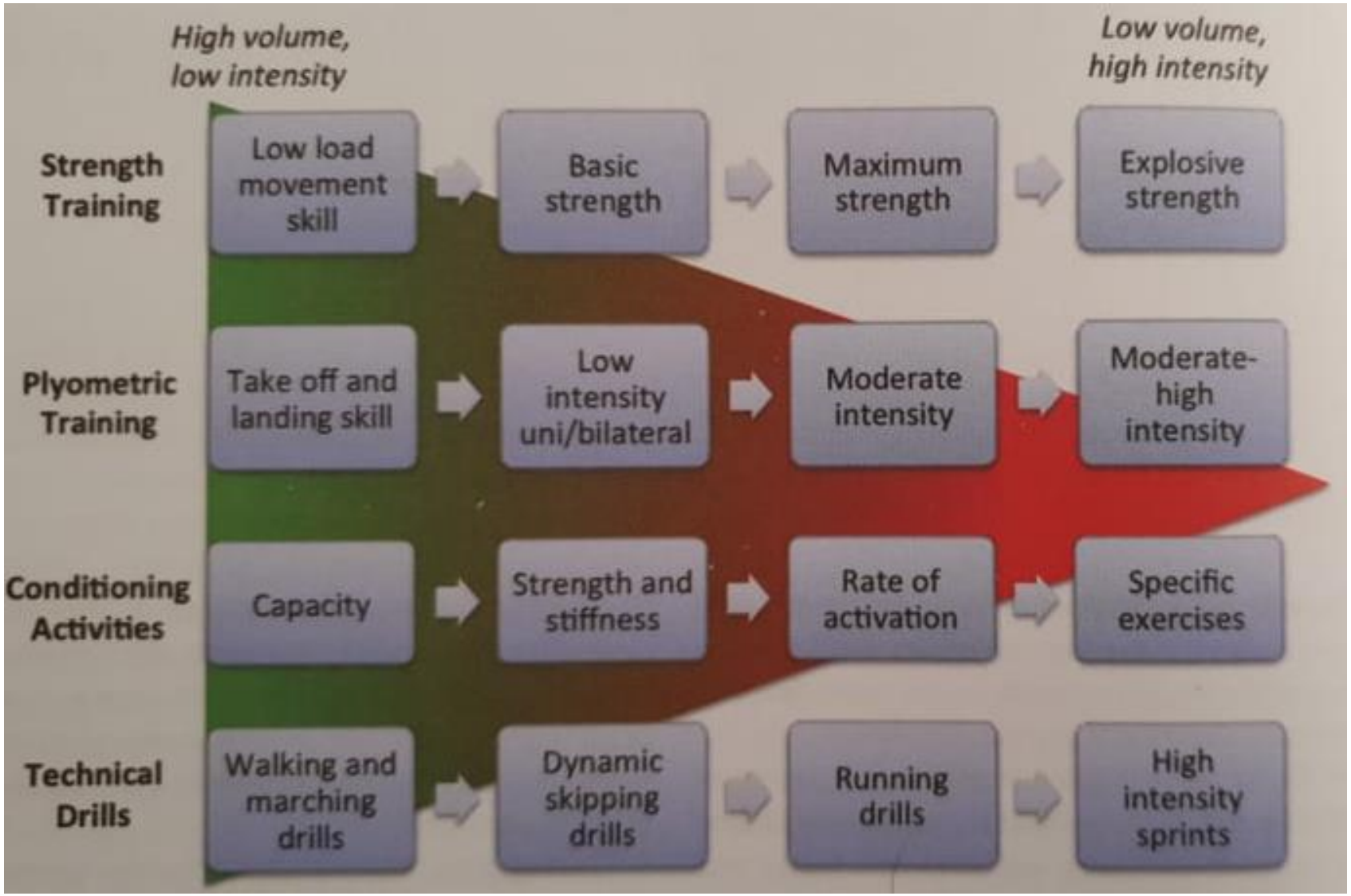
* Refer to Chapter 7 on Plyometric Training

https://www.youtube.com/watch?v=OIXVDdH3o6g

Mobilita

- Extenze a rotace v hrudní části páteře
- Kyčelní flexory
- Obojí obsahuje „preclík“
- Foam rolling
- Mobilita + stabilita = TGU

Plánování


High volume, low intensity
Low volume, high intensity
Strength Training
Low load movement skill
Basic strength
Maximum strength
Explosive strength
Plyometric Training
Take off and landing skill
Low intensity uni/bilateral
Moderate intensity
Moderate-high intensity
Conditioning Activities
Capacity
Strength and stiffness
Rate of activation
Specific exercises
Technical Drills
Walking and marching drills
Dynamic skipping drills
Running drills
High intensity sprints

Sekvence v TJ

- Rozcvička vč. pohybových dovedností
- Plyometrický / silově explozivní trénink
- Bilaterální odporový trénink
- Unilaterální odporový trénink
- Ostatní cvičení

Kam s tím?

Recreational masters runner, no S&C experience or access to gym							
Day	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Pre-run S&C	-	-	*Running drills and mobilizations*	-	-	*Running drills and mobilizations*	-
Running	**Steady 8km**	-	**Work run: Hard 8km**	-	**Steady 6km**	**Parkrun: Hard 5km (10km total)**	-
Post-run S&C	*Home-based S&C*	-	*Conditioning and stretching*	-	*Home-based strength training*	*Stretching*	-
Competitive club runner, intermediate S&C experience							
Day	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Pre-run S&C	-	*Running drills and mobilizations*	-	*Running drills and mobilizations*	-	*Running drills and mobilizations*	-
Running	**Steady 12km**	**Club session: Long intervals (12km)**	**Steady 12km**	**Club session: Tempo run (12km)**	-	**Club session: Hills or track intervals (10km)**	Easy 16-20km
S&C session or post-run S&C training unit	*Plyometrics and strength training*	*Stride/sprints*	*Conditioning and stretching*	*Plyometrics and strength training*	*Stretching*	*Conditioning (20 min)*	*Stretching*

Můj přístup

- Dostatečný odpočinek mezi sériemi, silovka není kardio – trénujeme jinou kvalitu
- Začít obnovou mobility, dýchání (DNS)
- Postupně rozšiřovat komfortní zónu (min. 2-3 RIR), jsme vytrvalci ne siloví sportovci
- V začátcích nutné větší počty opak., ale pozor na DOMS
- U pokročilých raději více sérií s dostatečnou RIR než 2 série do selhání (na běžecké tréninky, aspoň ty rozvojové, musím být ready)
- ABC je nízkointenzivní vysokoobjemové plyo
- Nebát se! Technika nikdy u začátečníku není 100 %, ale někde se začít musí.
- Silovou vytrvalost (kruháče komplexních cviků) dělat specificky během v terénu/kopcema
- Zařazování krátkých úseků/kopečků do klusů
- Silový trénink by měl být efektivní (u pokročilých kvůli pauzám dlouhý)
- Slabý běžec je běžec, který je náchylnější ke zranění
- Nudná postupná progrese je lepší než zábavná stagnace
- Nedá se to udělat jednoduše? TGU a swing.

Ukázka, kde lze sílu propašovat – F.A.

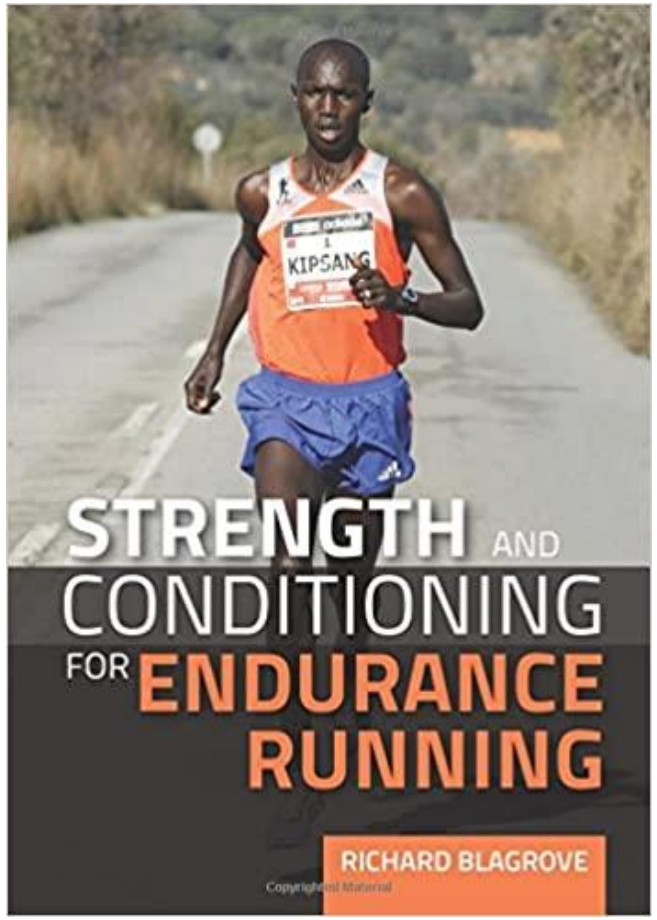
- Doma! K dispozici jen 2 kettlebelly (16 a 24), TRX a hrazda. Proto jede relativně velký objem na dřepu před přechodem k těžší váze.
- Odporový
  - Mob-prep
  - goblet 5x8 16 (4 sekundy negativ)
  - bulhar 4x(6+6) 16
  - TRX 56666 (4 sekundy negativ)
  - lopatkové přítahy 56666
- Silově explozivní
  - Obouruční swing – balistický cvik, má své specifikum
  - 10x 4 24 kg
- Běh
  - Klusy
    - FRM, pogo
    - Rovinky, kopečky
  - Dráha
    - ABC / plyo
    - Rovinky
  - Intervaly mimo dráhu
    - Odpichy do kopce + úsek
- Kompenzační
  - 90/90
  - Polomost obounož s brzděním (kontrolovaná brzdivá fáze na cca 5 vteřin) 5x4
  - mušle s gumou střední intenzity 3x15 na každou stranu
  - reverse nordic curls 444
  - Úkroky stranou 3x 15 na každou stranu v kuse, Guma pod koleny, nebo nad kotníky
  - výpony 2:1 obě varianty (proplné a pokrčené koleno) 3x15 na každou
  - Mobility flow 3:00
  - sed na patách, prsty zapřené do podložky, 2 minut kumulovaně
  - sed na patách, nárty na podložce, 2 minut kumulovaně

Nedá se to udělat jednoduše?

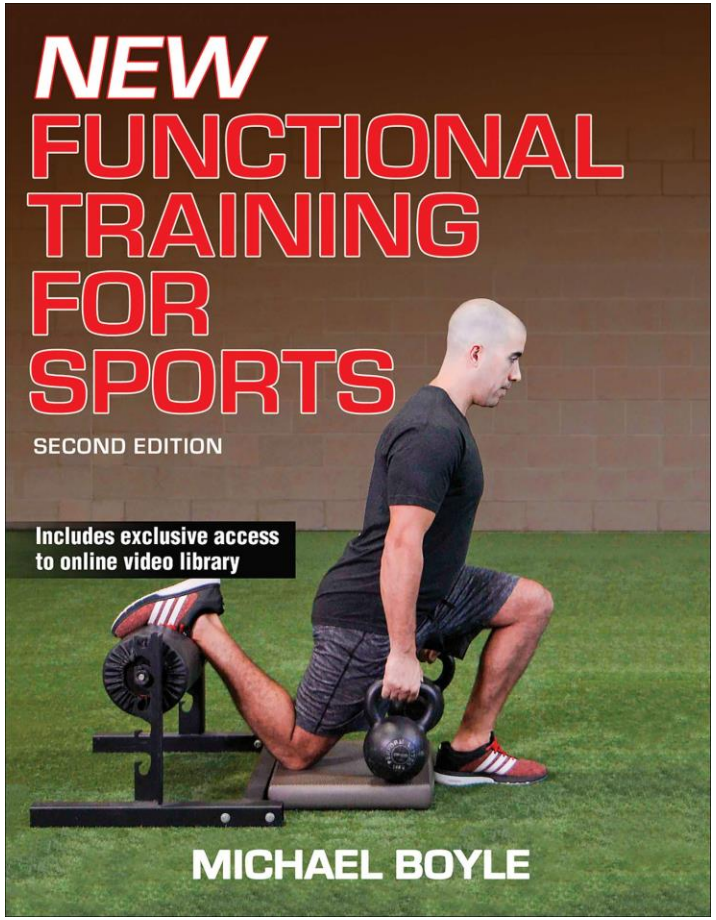
- TGU
- Kettlebell swing

- I v silovém tréninku platí pravidlo 80/20

Literatura



asi nejlepší kniha na trhu pro vytrvalce



výborný žačátek, ale hodně orientováno na sportovní hry

Díky za pozornost!

Q&A

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