ΟΓΚΟΣ ΠΡΟΠΟΝΗΣΗΣ - ΠΡΟΠΟΝΗΤΙΚΟ ΦΟΡΤΙΟ ΚΑΙ Η ΣΗΜΑΣΙΑ ΤΟΥ STRENGTH AND CONDITIONING

Απόστολος Θέος

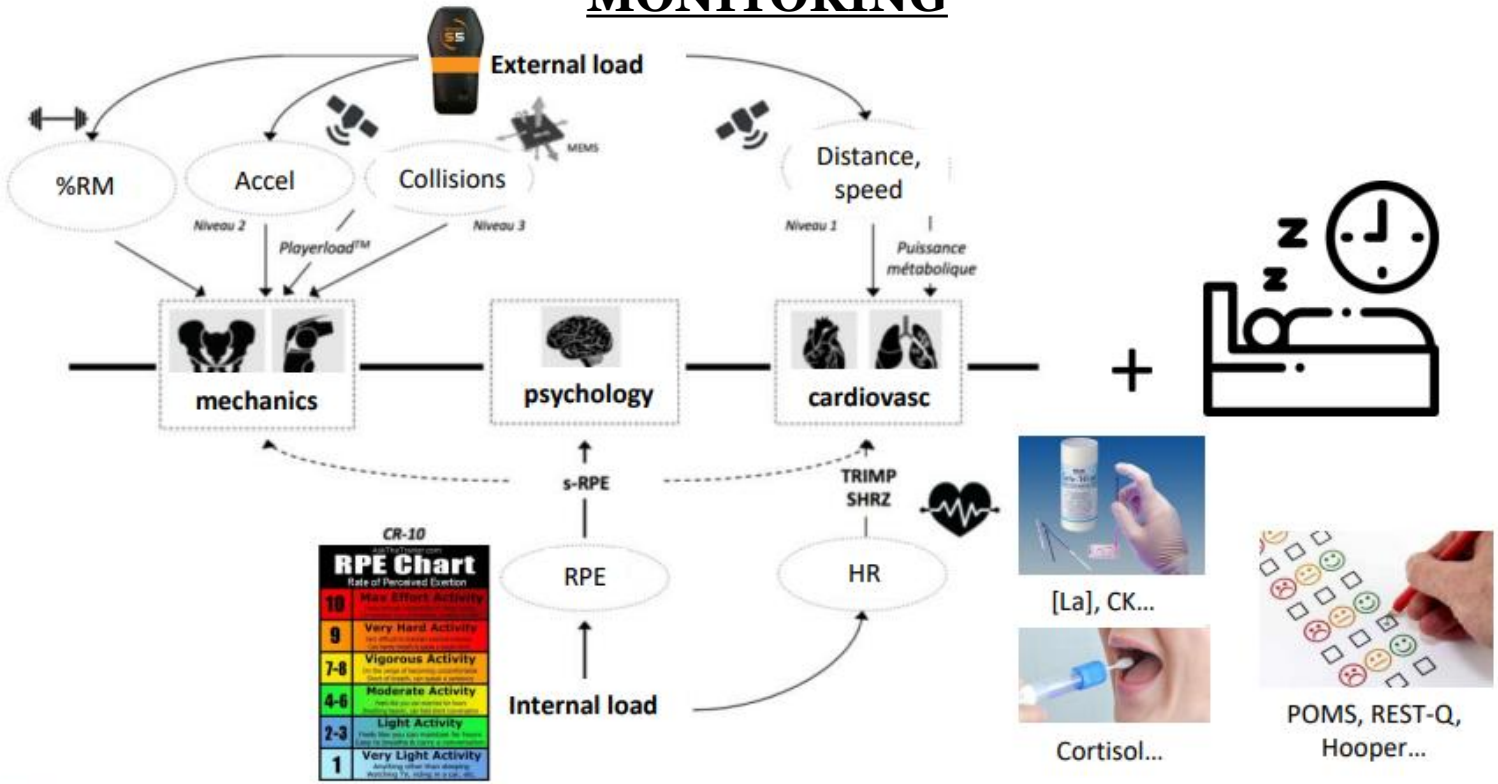
Αν. Καθηγητής Αθλητιατρικής
Διευθυντής Σχολής Αθλητικών Επιστημών
apostolos.theos@umu.se

UMEÅ UNIVERSITET

Περιεχόμενα

- Monitoring
- Ατομικό Προφίλ
- Πως απέδειξα στους Σουηδούς ότι είχα άδικο
- Προπονητικός Όγκος
- Durability
- Προπόνηση Δύναμης
- Πρόληψη Τραυματισμών
- Take Home Message

MONITORING


External load
%RM
Accel
Collisions
MEMS
Distance, speed
Niveau 2
Playerload™
Niveau 3
Niveau 1
Puissance métabolique
mechanics
psychology
cardiovasc
+
s-RPE
TRIMP SHRZ
CR-10
RPE Chart
Rate of Perceived Exertion
10 Max Effort Activity
9 Very Hard Activity
7-8 Vigorous Activity
4-6 Moderate Activity
2-3 Light Activity
1 Very Light Activity
RPE
HR
Internal load
[La], CK...
Cortisol...
POMS, REST-Q, Hooper...

MONITORING

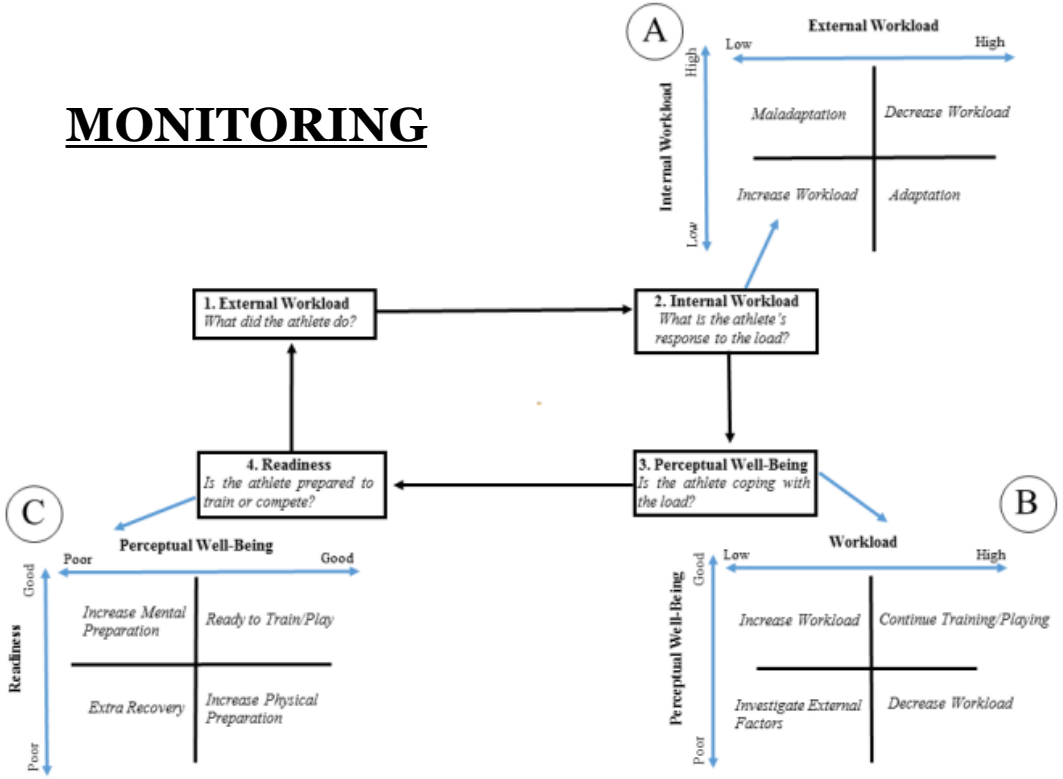
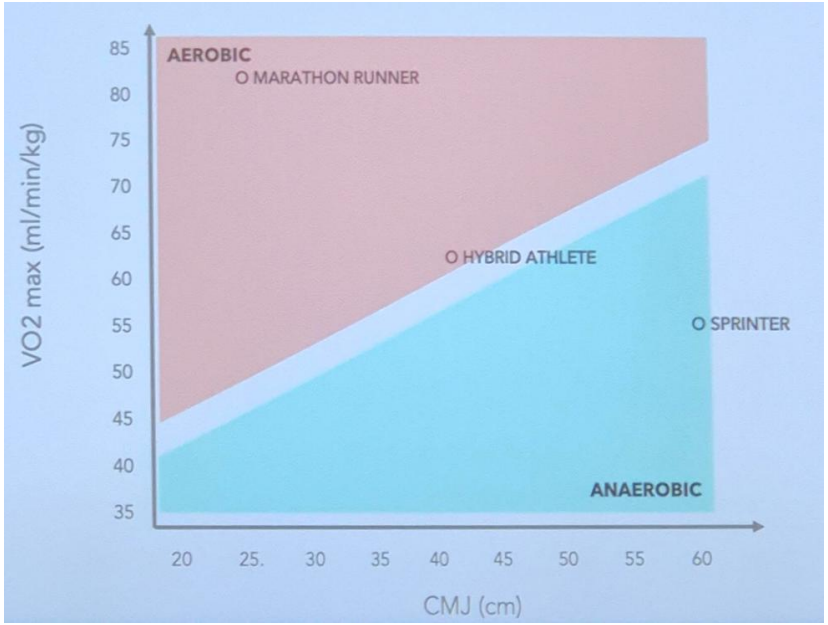


Figure 1 The athlete monitoring cycle.

Gabbett et al., 2017

FROM TRAINING LOAD TO INDIVIDUAL RESPONSES

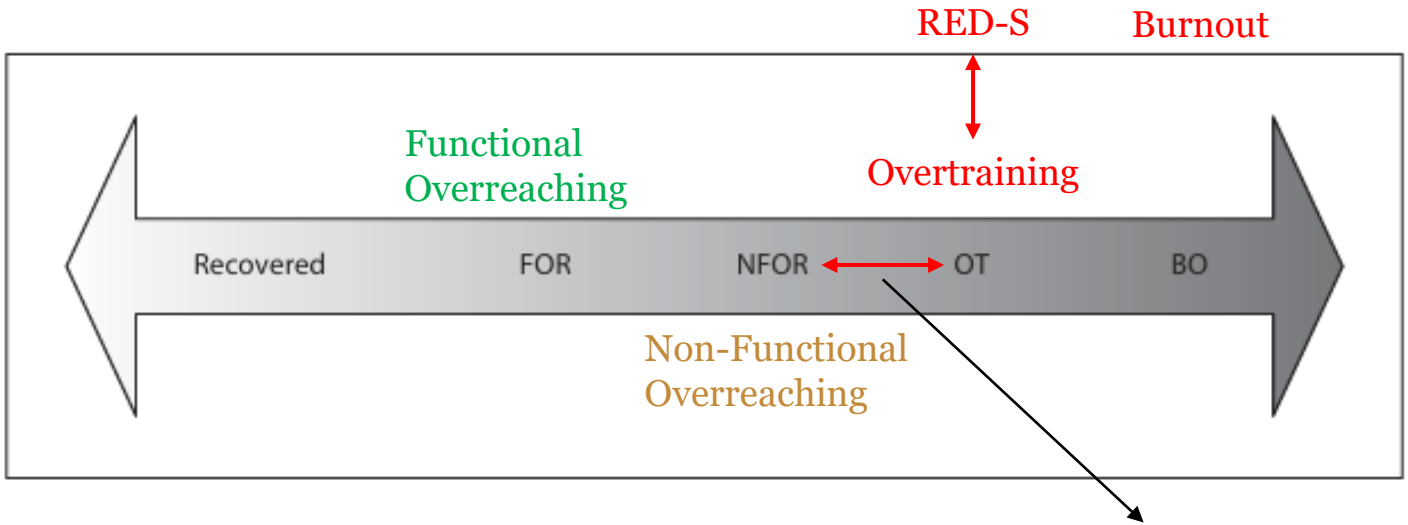
Καθορισμός του Ατομικού Προφίλ του Αθλητή



Overtraining and Elite Young Athletes

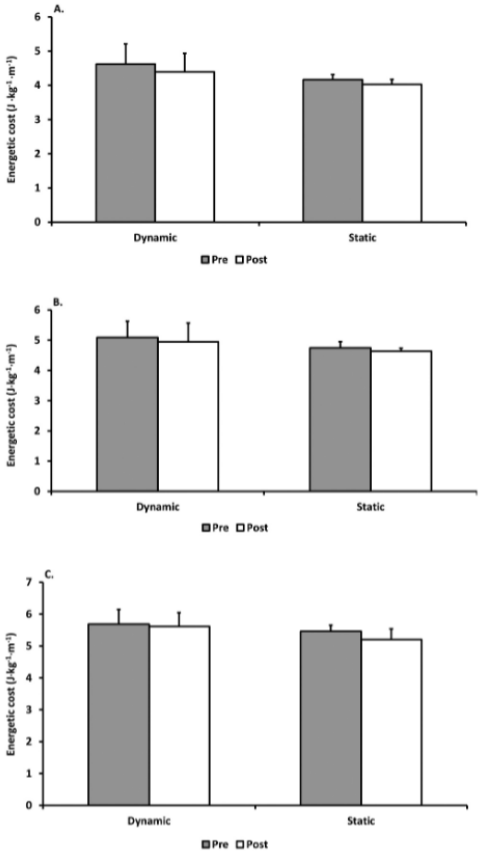
Richard Winsley · Nuno Matos

Children's Health and Exercise Research Centre, University of Exeter, Exeter, UK



Μόνη διαφορά ο χρόνος αποκατάστασης

Winsley & Matos, 2011



Effects of Core Strength Training on Skiing Economy in Elite Junior Cross-Country Skiers

Terese Therell, Daniel Jansson, and Apostolos Theos

Table 3. Results for the physiological variables (mean ± *SD*) during submaximal roller ski testing at three different workloads.

		DT group		ST group		
		Pre	Post	Pre	Post	*p*
First workload	VO_2 (ml·kg^{-1}·min^{-1})	31.6 ± 3.9	30.3 ± 3.4	28.7 ±1.3	27.9 ±2.1	.80
	RER	0.91 ± 0.04	0.87 ± 0.04	0.89 ±0.05	0.87 ±0.02	.39
	HR (b·min^{-1})	150.0 ± 17.8	147.1 ± 22.4	143.0 ± 12.3	140.2 ± 13.8	.95
	Lactate (mmol/L)	1.8 ± 0.5	1.8 ± 0.7	1.8 ± 0.5	1.5 ± 0.5	.94
Second workload	VO_2 (ml·kg^{-1}·min^{-1})	36.3 ± 4.3	35.5 ± 4.3	36.3 ± 4.3	33.3 ± 2.1	.97
	RER	0.94 ± 0.04	0.90 ± 0.04	0.94 ±0.04	0.90 ±0.04	.29
	HR (b·min^{-1})	164.3 ± 15.5	162.2 ± 24.5	164.0 ± 15.5	159.3 ± 12.9	.92
	Lactate (mmol/L)	1.8 ± 0.6	1.5 ± 0.6	1.8 ± 0.6	1.3 ± 0.3	.96
Third workload	VO_2 (ml·kg^{-1}·min^{-1})	43.2 ± 4.6	42.8 ± 4.1	43.2 ± 4.6	39.8 ± 4.1	.60
	RER	0.96 ± 0.04	0.94 ± 0.03	0.96 ± 0.04	0.93 ± 0.04	.68
	HR (b·min^{-1})	179.1 ± 12.9	176.1 ± 19.5	179.3 ± 12.9	176.2 ± 9.2	.87
	Lactate (mmol/L)	2.9 ± 1.2	2.6 ± 1.1	2.9 ± 1.2	2.0 ± 0.6	.98

Note. *p* values refer to the results of interaction (two-way ANOVA).

Old School

Training Session Models in Endurance Sports: A Norwegian Perspective on Best Practice Recommendations

Sport	Hours per year	Sessions per year	Competition days per year	Intensive training days per year	% specific training
Biathlon	800–1000	500–575	30–40	100–120	> 60
Cross-country skiing	900–1100	525–575	30–40	100–120	> 60
Long-distance running	600–700	550–625	20–35	110–140	> 90
Road cycling	1000–1200	300–350	50–80	110–130	> 90
Rowing	850–1000	475–525	25–35	100–125	> 60
Speed skating	900–1100	500–575	25–35	120–140	> 15
Swimming	1150–1350	650–700	20–30	130–150	> 70
Triathlon	1200–1400	700–800	15–25	130–150	100

Swimming, cycling, and running in triathlon account for approximately 20–25, 25–30, and 45–50% of the annual training hours, respectively

80% **20%**

Table 2 Intensity scale for elite endurance athletes

Scale		Heart rate	VO_2	BLa	RPE_{Borg}
6-zone	3-zone	(% max)	(% max)	(mmol/L)	6–20
6	HIT	NA	NA	> 10	18–20
5	HIT	> 93	94–100	6.0–10.0	18–19
4	HIT	88–92	88–93	4.0–6.0	17–18
3	MIT	83–87	81–87	2.5–4.0	15–16
2	LIT	73–82	66–80	1.5–2.5	13–14
1	LIT	60–72	50–65	< 1.5	10–12

BLa typical blood lactate (normative blood lactate concentration ranges based on red-cell lysed blood), *RPE* rating of perceived exertion (based on Borg's 6–20 scale), *HIT* high intensity training, *MIT* moderate intensity training, *LIT* low intensity training

(Tönnessen et al, 2024)

Marit Bjørgen

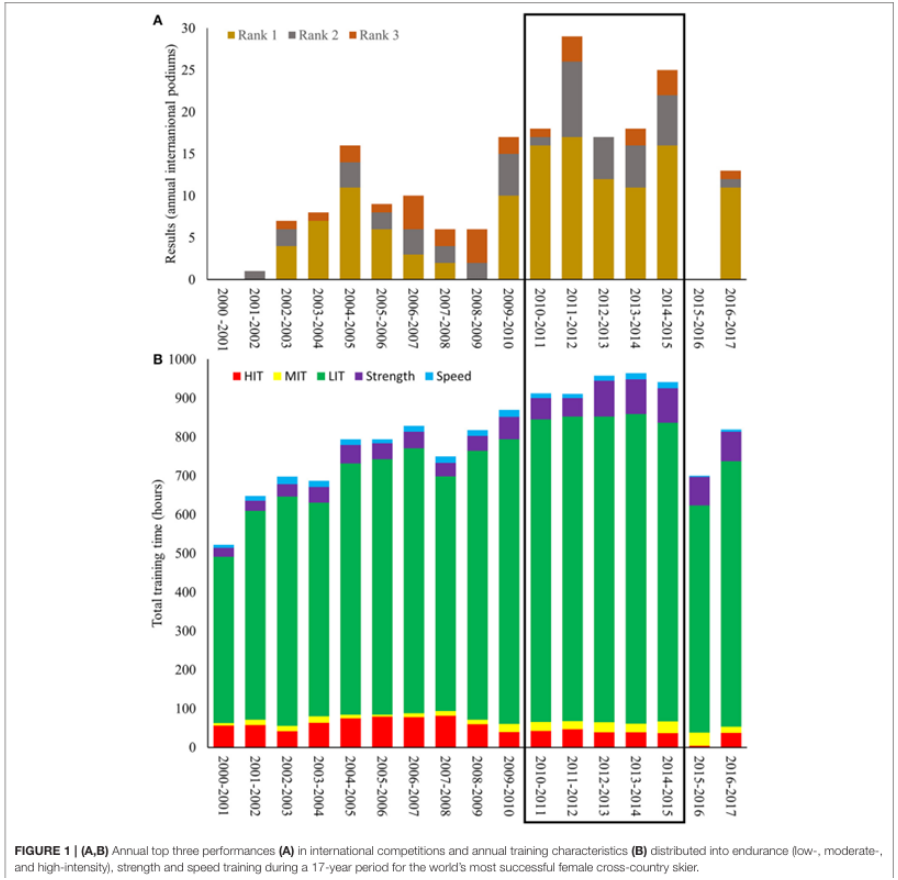


FIGURE 1 | (A,B) Annual top three performances **(A)** in international competitions and annual training characteristics **(B)** distributed into endurance (low-, moderate-, and high-intensity), strength and speed training during a 17-year period for the world's most successful female cross-country skier.

The Training Characteristics of the World's Most Successful Female Cross-Country Skier

(Solli et al, 2017)

Marit Bjørgen

The Training Characteristics of the World's Most Successful Female Cross-Country Skier

(Solli et al, 2017)

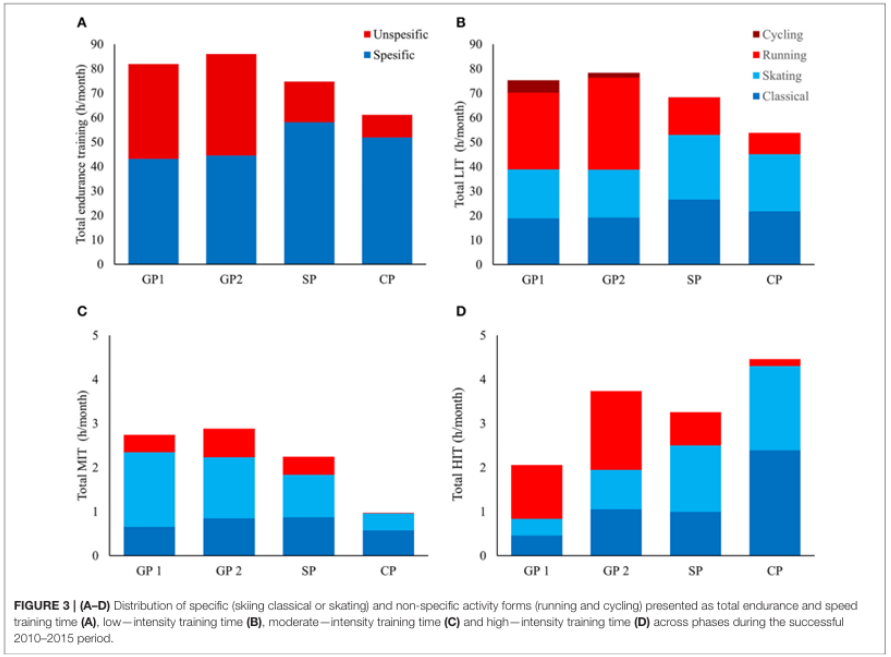


FIGURE 3 | (A–D) Distribution of specific (skiing classical or skating) and non-specific activity forms (running and cycling) presented as total endurance and speed training time **(A)**, low—intensity training time **(B)**, moderate—intensity training time **(C)** and high—intensity training time **(D)** across phases during the successful 2010–2015 period.

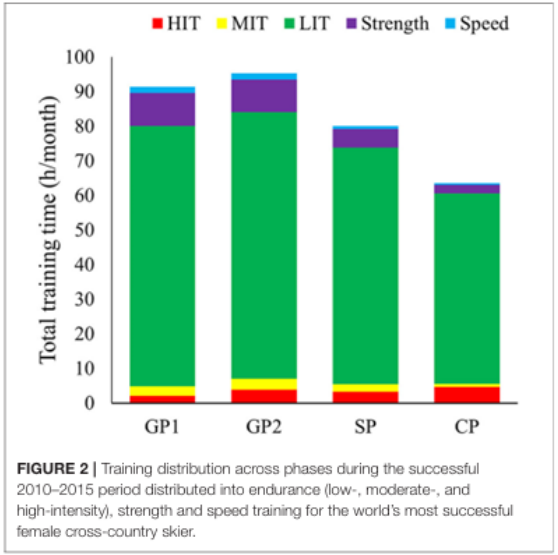
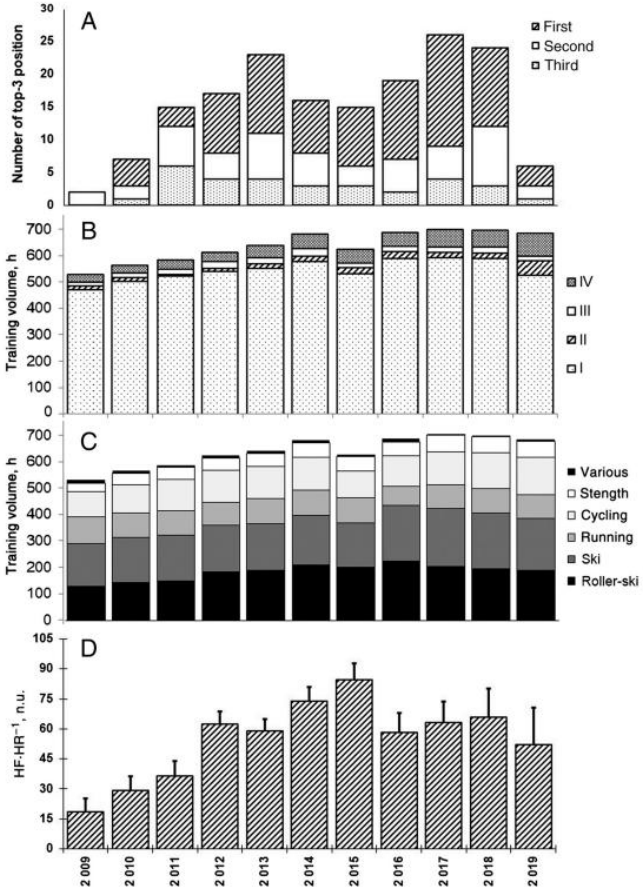


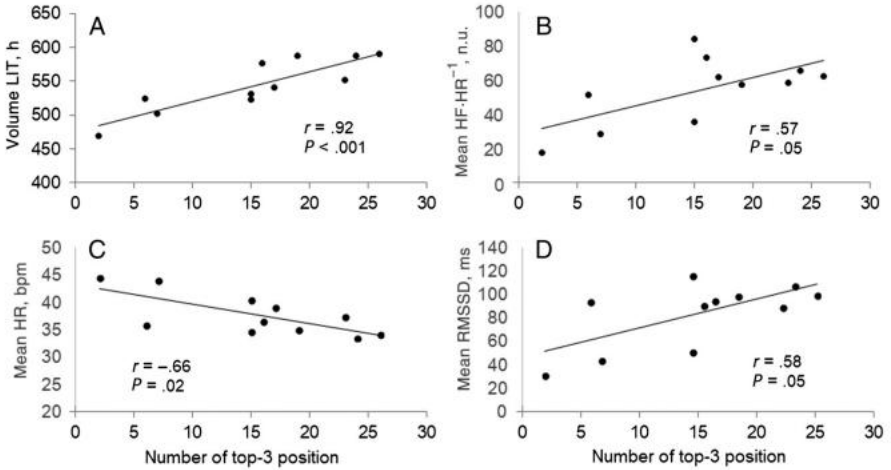
FIGURE 2 | Training distribution across phases during the successful 2010–2015 period distributed into endurance (low-, moderate-, and high-intensity), strength and speed training for the world's most successful female cross-country skier.

Martin Fourcade

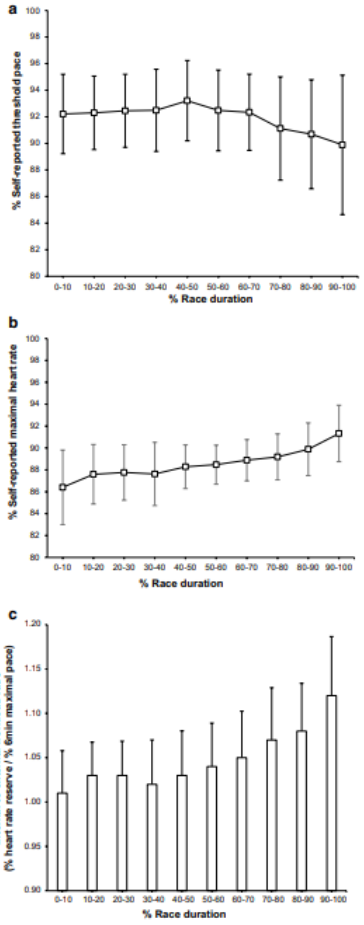
Eleven Years' Monitoring of the World's Most Successful Male Biathlete of the Last Decade

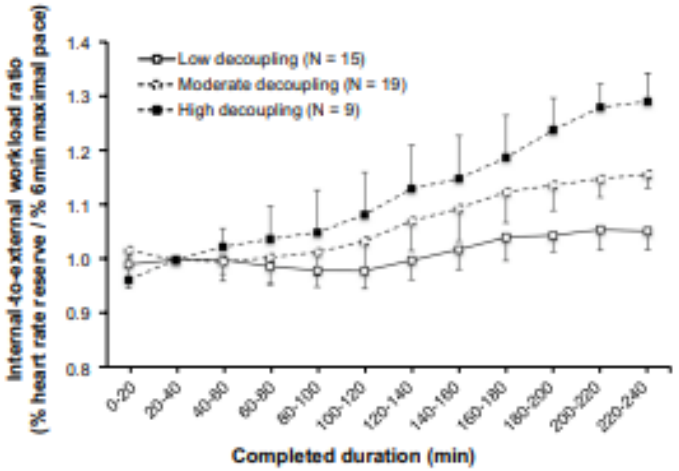
(Schmitt et al, 2021)





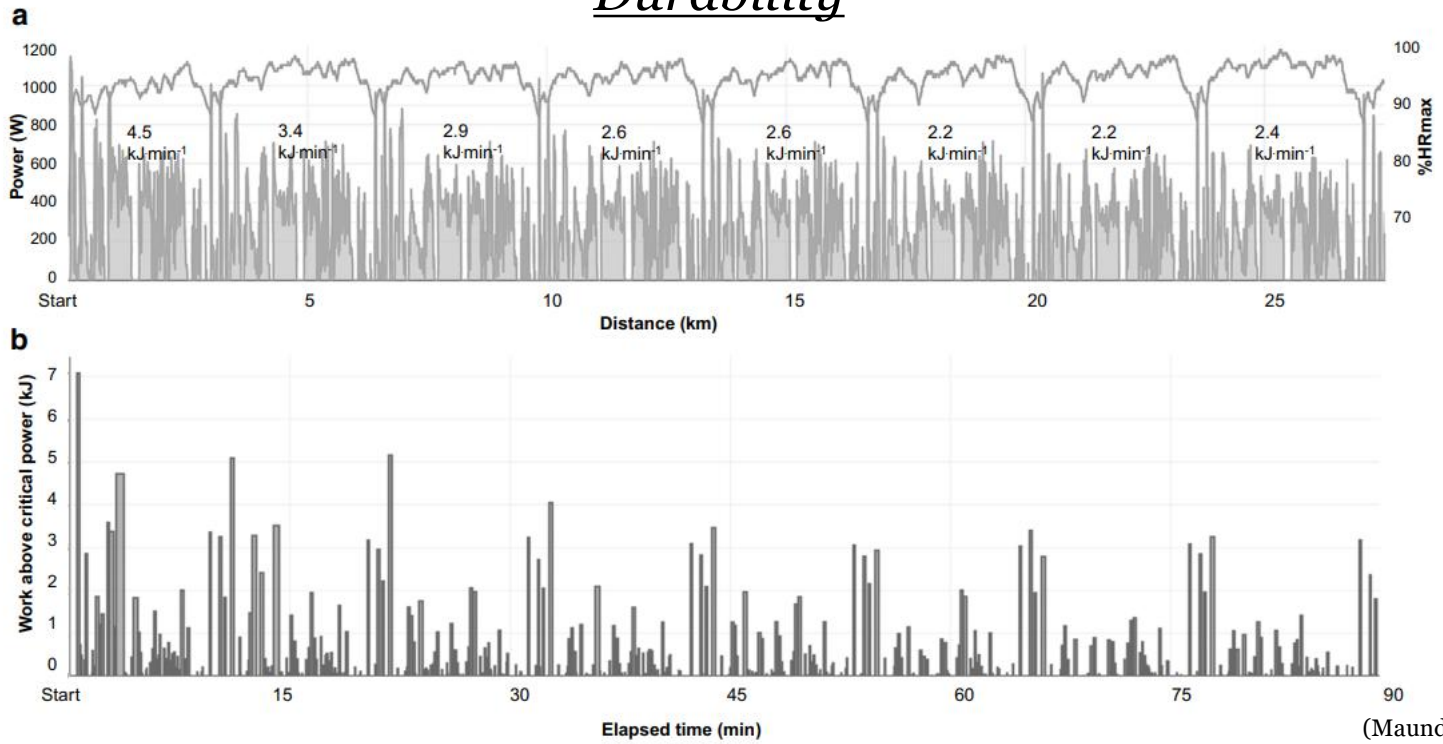
Durability





(Maunder et al., 2021)

Durability



(Maunder et al., 2021)

Interference Model Between Aerobic and Strength Training

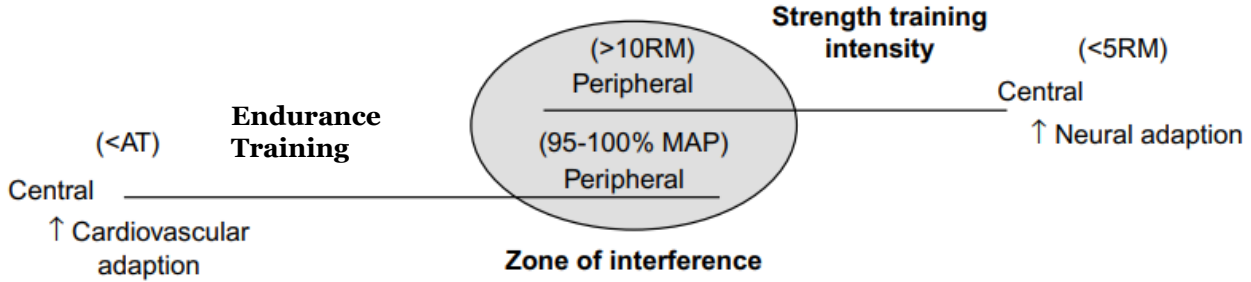


Fig. 3. Intensity continuums and primary location of adaptations for both maximal aerobic power (MAP) and strength training, and the possible overlap when the 2 modes of training are combined. **AT** = anaerobic threshold; **RM** = repetition maximum; ↑ = increased.

(Docherty & Sporer, 2000)

Interference Model Between Aerobic and Strength Training

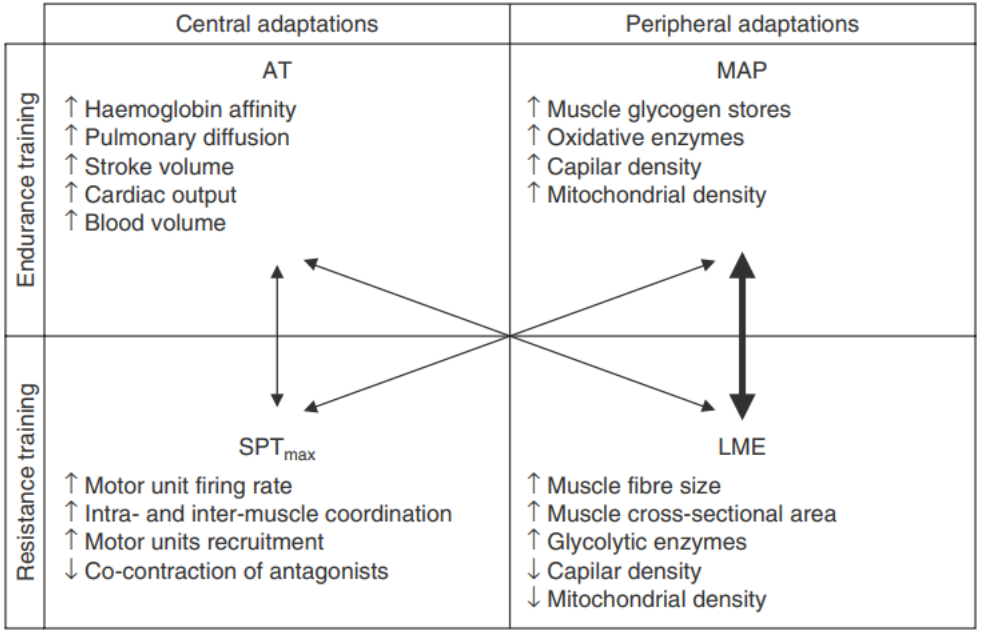
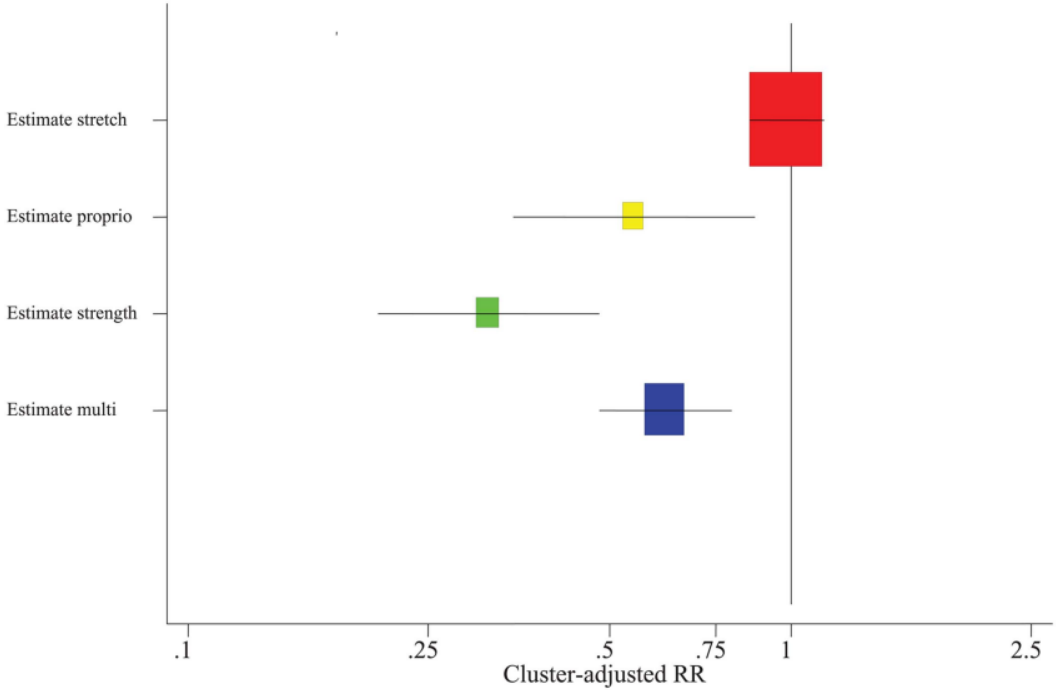


Fig. 4. Optimal combination between resistance and endurance training intensities. **AT** = anaerobic threshold or lower endurance training intensities; **LME** = local muscle endurance training; **MAP** = maximal aerobic power; **SPT$_{max}$** = maximum strength and power training; ↑ indicates increase; ↓ indicates decrease.

(Garcia-Pallares & Izquierdo, 2011)

Πρόληψη Τραυματισμών



(Lauersen et al, 2014)

Πρόληψη Τραυματισμών

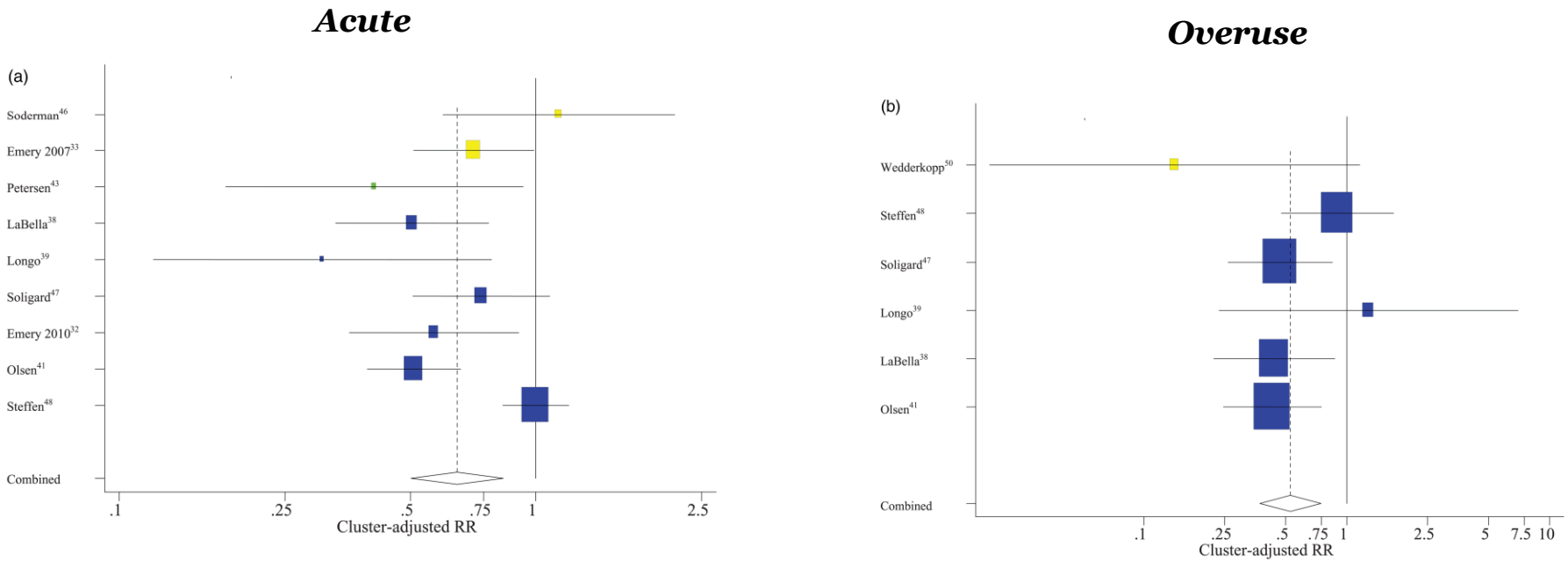


Figure 3 (A) Acute outcomes estimate Forest plot. Proprioception studies are denoted by yellow, strength training green, and multiple component studies blue. (B) Overuse outcomes estimate Forest plot. Proprioception studies are denoted by yellow and multiple component studies blue.

(Lauersen et al, 2014)

UMEÅ SCHOOL OF SPORT SCIENCES
UMEÅ UNIVERSITY

Swedish Sports Confederation
Swedish National Sports University

Take Home Message

- Το monitoring του φορτίου είναι ΑΠΑΡΑΙΤΗΤΟ
- LIT vs. HIT – 80%-20%
- Durability
- Η προπόνηση δύναμης είναι σημαντική
- Το μοντέλο 30-30 πέθανε (?)
- Οι διατάσεις δεν προλαμβάνουν τους τραυματισμούς