



NSCA
COACHES
CONFERENCE 2022

JANUARY 6 – 8, 2022

San Antonio, TX & Online | 2.0 CEUs

#NSCAGoaches22

CONFLICT OF INTEREST STATEMENT

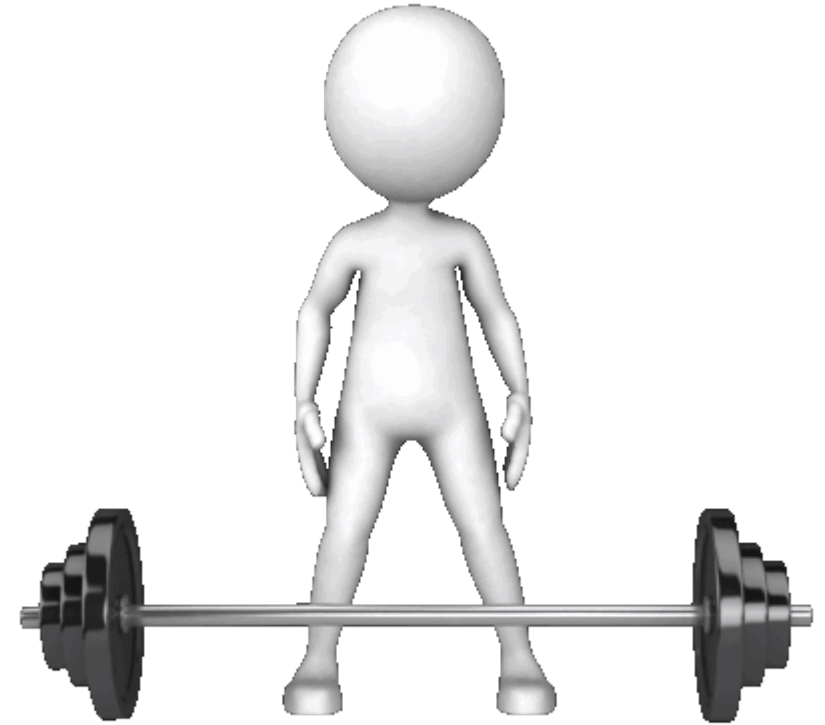
I currently have, or I have had in the past 2 years an affiliation or financial interest with **The Football Association** and **The NSCA Foundation** around this presentation, including:

- Research funding



Micro-Dosing Strength Training

A conceptual framework



Aims

- To define micro-dosing and discuss when it may / may not be an appropriate programming strategy
- To discuss the conceptual framework of micro-dosing strength training
- Provide some preliminary research data comparing micro-dosing strength training to a more traditional approach

“What is micro-dosing?”

INNOVATION

Big physics, small doses: the use of AMS and PET in human microdosing of development drugs

Graham Lappin and R. Colin Garner

(2003) Nature Reviews: Drug Discovery. 2. 233-240



HHS Public Access

Author manuscript

Expert Opin Drug Metab Toxicol. Author manuscript; available in PMC 2015 August 11.

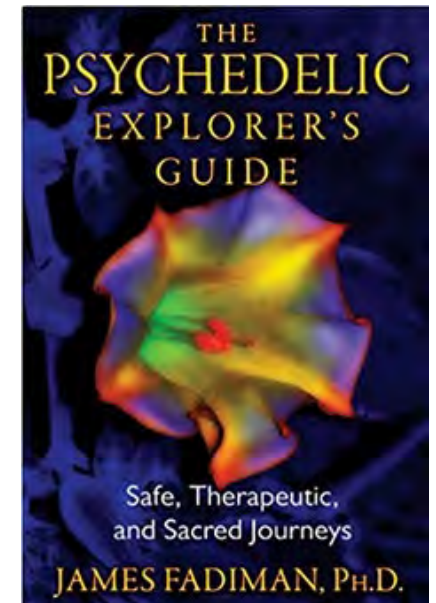
Published in final edited form as:

Expert Opin Drug Metab Toxicol. 2013 July ; 9(7): 817–834. doi:10.1517/17425255.2013.786042.

Microdosing and drug development: past, present and future

Graham Lappin, PhD^{†,1} [Reader in Pharmaceutical Science], Robert Noveck, MD PhD² [Medical Director], and Tal Burt, MD³ [Scientific Director, Assistant Professor]

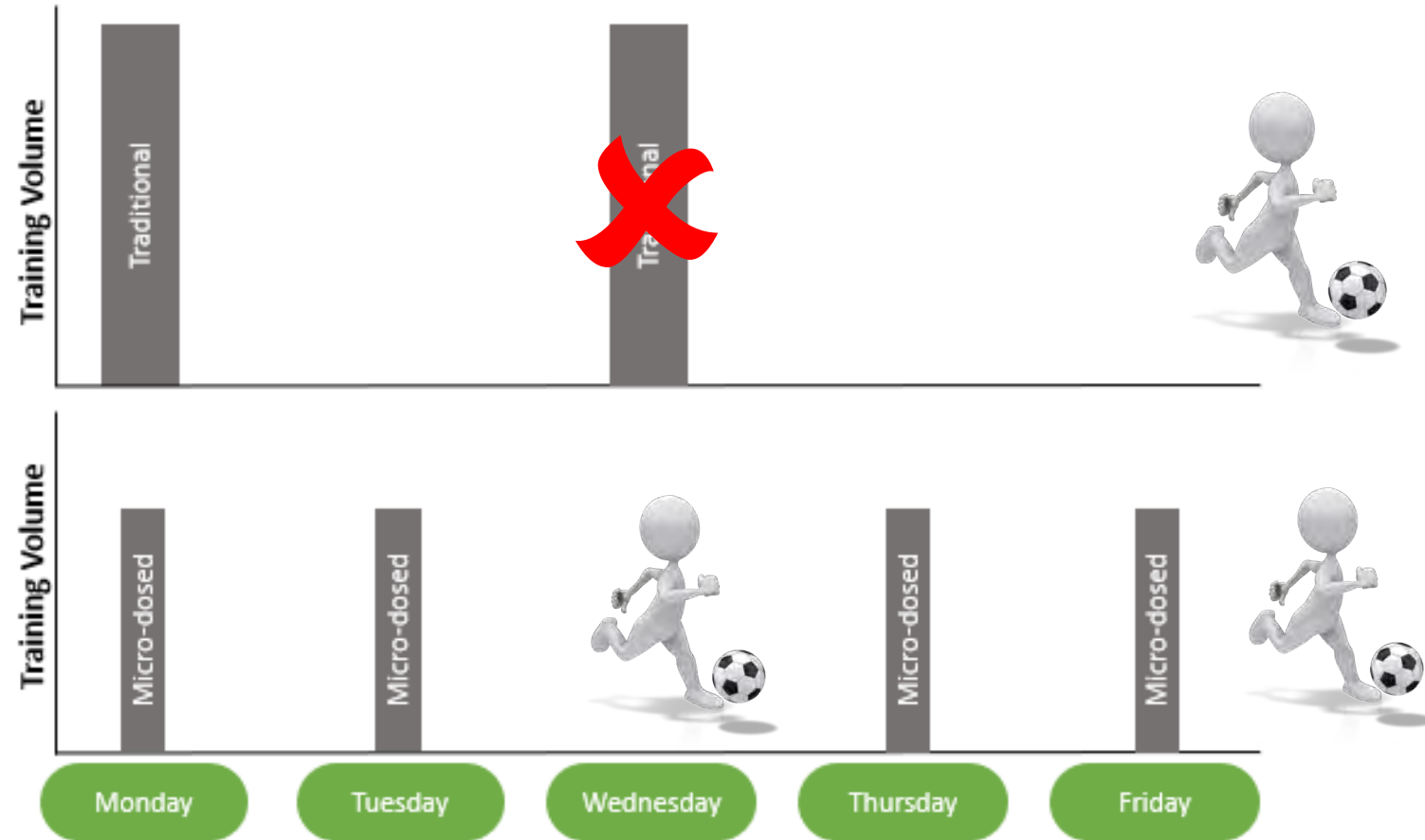
“...a sub-pharmacological / sub-therapeutic dose which the person cannot perceive, but that still causes a metabolic reaction...”



“What is micro-dosing strength training?”

“...the division of total volume within a micro-cycle, across ***frequent, short*** duration, ***repeated*** bouts.”

Cuthbert et al. (2021) Sports Medicine. 51: 1962-1982



Programming

Points to consider

- Volume (Volume Load)
- Intensity (Relative Load)
- Frequency

Sports Med (2014) 44:141–142
DOI 10.1007/s40279-013-0113-2

LETTER TO THE EDITOR

Scientific Rigour: a Heavy or Light Load to Carry?

James Steele • James Fisher

Volume and Relative Load

EFFECTS OF DIFFERENT VOLUME-EQUATED RESISTANCE TRAINING LOADING STRATEGIES ON MUSCULAR ADAPTATIONS IN WELL-TRAINED MEN

**BRAD J. SCHOENFELD,^{1,2} NICHOLAS A. RATAMESS,³ MARK D. PETERSON,⁵ BRET CONTRERAS,⁴
G. T. SONMEZ,¹ AND BRENT A. ALVAR² (2014) JSCR. 28 (10): 2909-2918**

7 sets of 3 rep's vs. 3 sets of 10 rep's, using RM loads

both bodybuilding- and powerlifting-type training promote similar increases in muscular size, but powerlifting-type training is superior for enhancing maximal strength.

TRAINING VOLUME, NOT FREQUENCY, INDICATIVE OF MAXIMAL STRENGTH ADAPTATIONS TO RESISTANCE TRAINING

RYAN J. COLQUHOUN,¹ CHRISTOPHER M. GAI,² DANIELLE AGUILAR,² DANIEL BOVE,²
JEFFREY DOLAN,² ANDRES VARGAS,² KAYLEE COUVILLION,² NATHANIEL D.M. JENKINS,¹ AND
BILL I. CAMPBELL² (2018) JSCR. 32(5): 1207-1213

TABLE 2. Maximal strength and body composition data from pretesting to posttesting in both groups.*

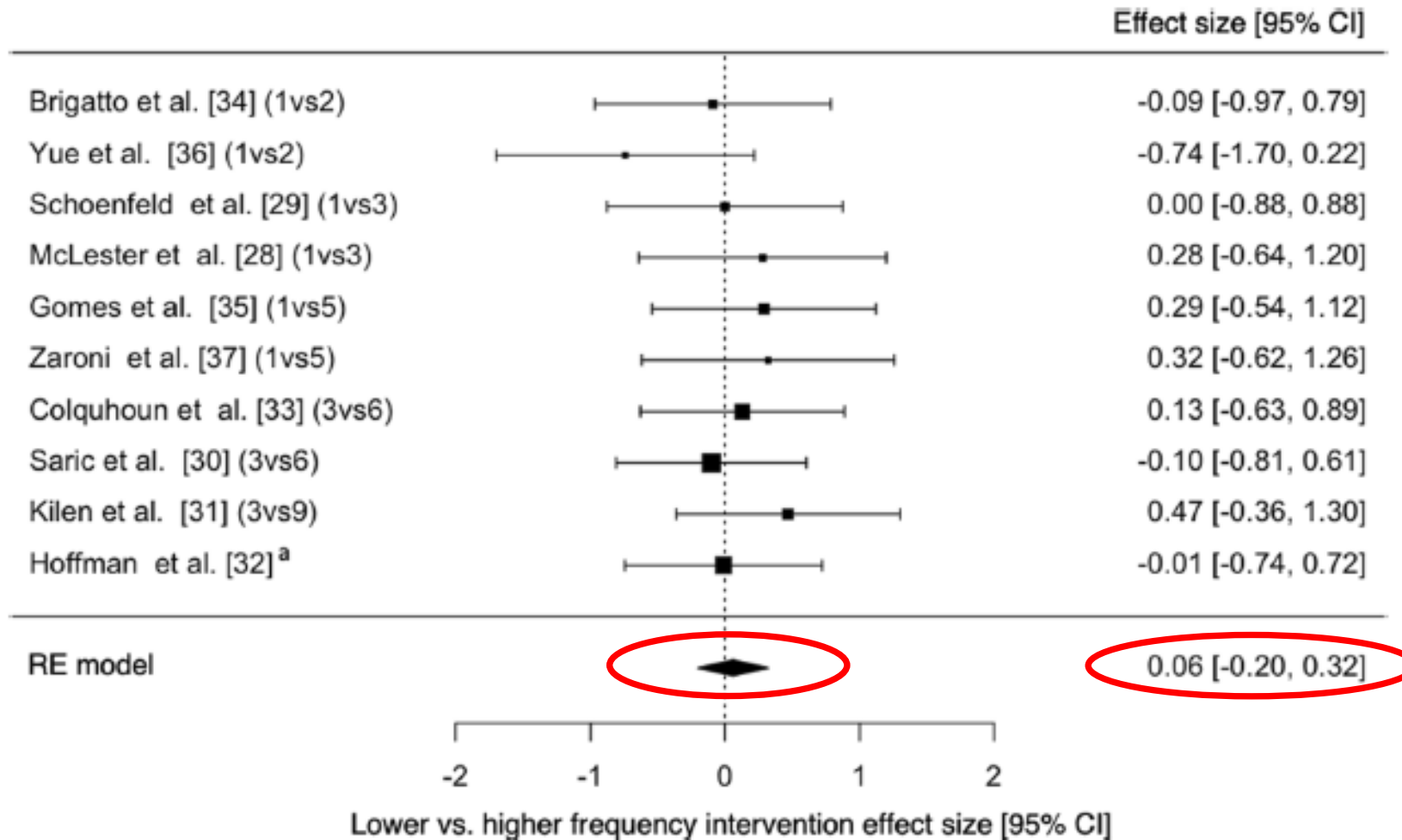
	3× per wk			6× per wk		
	Pretesting	Posttesting	% Change†	Pretesting	Posttesting	% Change
Squat 1RM (kg)	136.8 ± 33.3	153.6 ± 33.7‡	12.2	139.1 ± 28.3	155.8 ± 23.5‡	12.0
Bench press 1RM (kg)	101.4 ± 18.9	109.2 ± 20.0‡	7.7	102.3 ± 28.1	111.1 ± 29.6‡	8.6
Deadlift 1RM (kg)	160.5 ± 37.1	179.5 ± 36.3‡	11.8	166.2 ± 33.2	187.2 ± 29.2‡	12.6
Powerlifting total (kg)	398.7 ± 84.4	442.3 ± 85.3‡	10.9	407.6 ± 86.5	454.1 ± 78.9‡	11.4
Wilk's coefficient	282.3 ± 44.8	309.3 ± 43.0‡	9.6	270.5 ± 44.4	297.6 ± 40.8‡	10.0
Fat-free mass (kg)	69.2 ± 13.5	70.9 ± 13.6‡	2.5	71.8 ± 7.5	74.4 ± 7.7‡	3.6
Fat mass (kg)	10.0 ± 6.6	9.7 ± 6.1	-3.0	12.3 ± 3.8	12.2 ± 3.7	-0.8

*1RM = 1 repetition maximum.

†Percentage change from pretesting to posttesting.

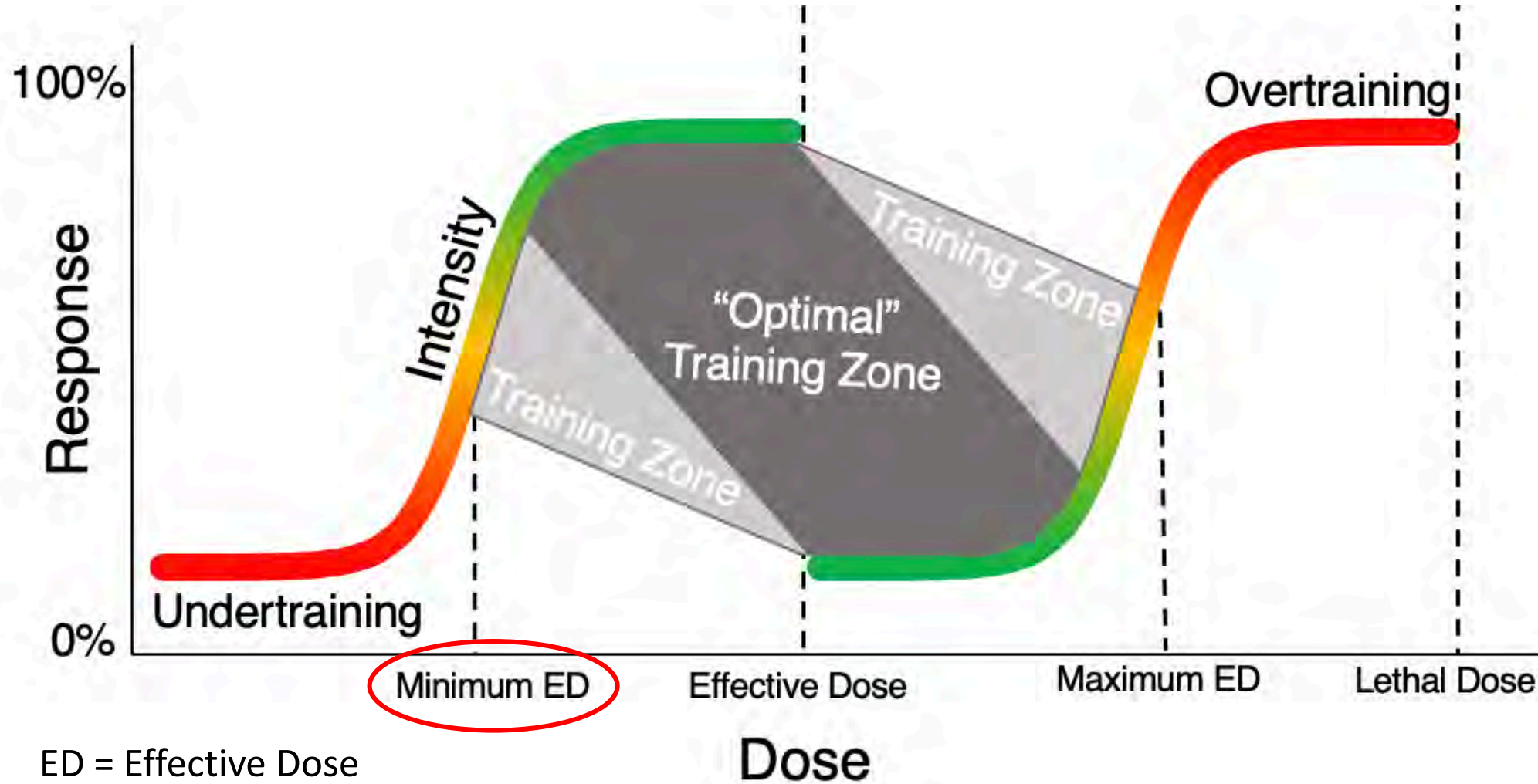
‡Significant difference from baseline testing.

Frequency



Cuthbert et al. (2021) Sports Medicine. 51: 1962-1982

Dose Response



Maintaining Physical Performance: The Minimal Dose of Exercise Needed to Preserve Endurance and Strength Over Time

Barry A. Spiering,¹ Iñigo Mujika,^{2,3} Marilyn A. Sharp,¹ and Stephen A. Foulis¹

2021. 35 (5): 1449-1458.



Do I simply want to
maintain strength /
performance?

“Strength and muscle size (at least in younger populations) can be maintained for up to 32 weeks with as little as **1 session of strength training per week** and **1 set per exercise**, as long as exercise intensity (relative load) is maintained”

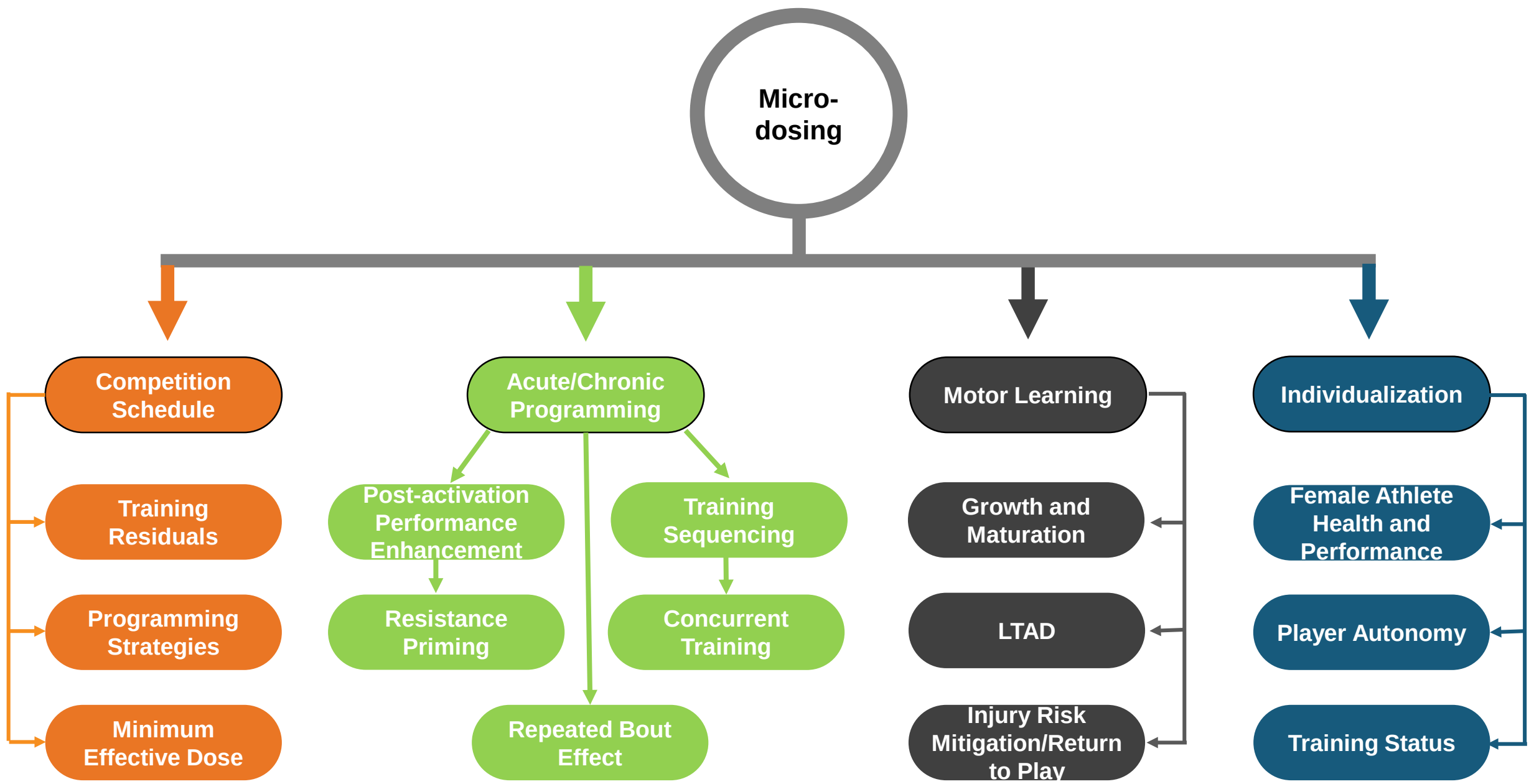
Micro-Dosing

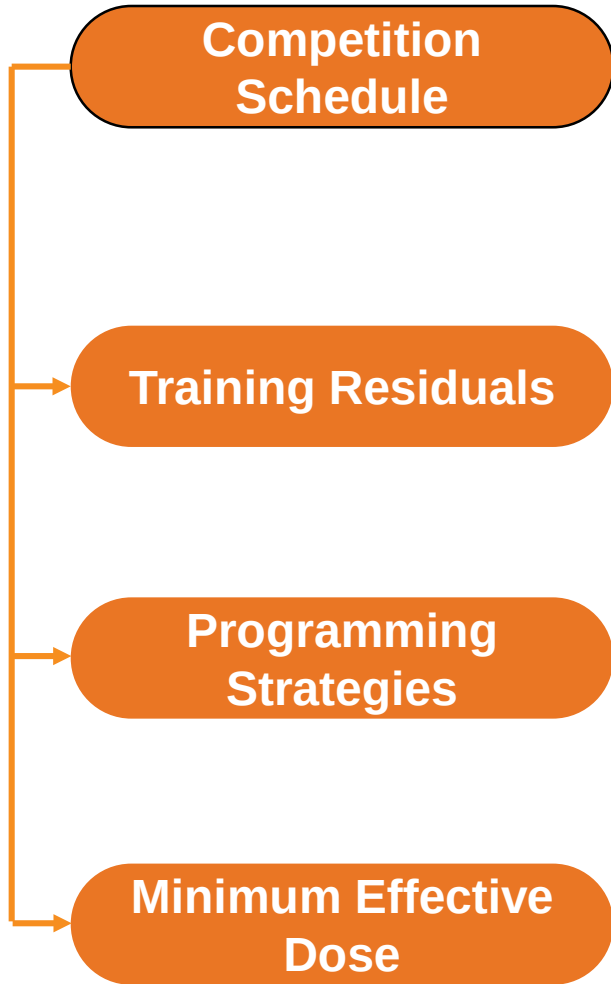
A Conceptual Framework

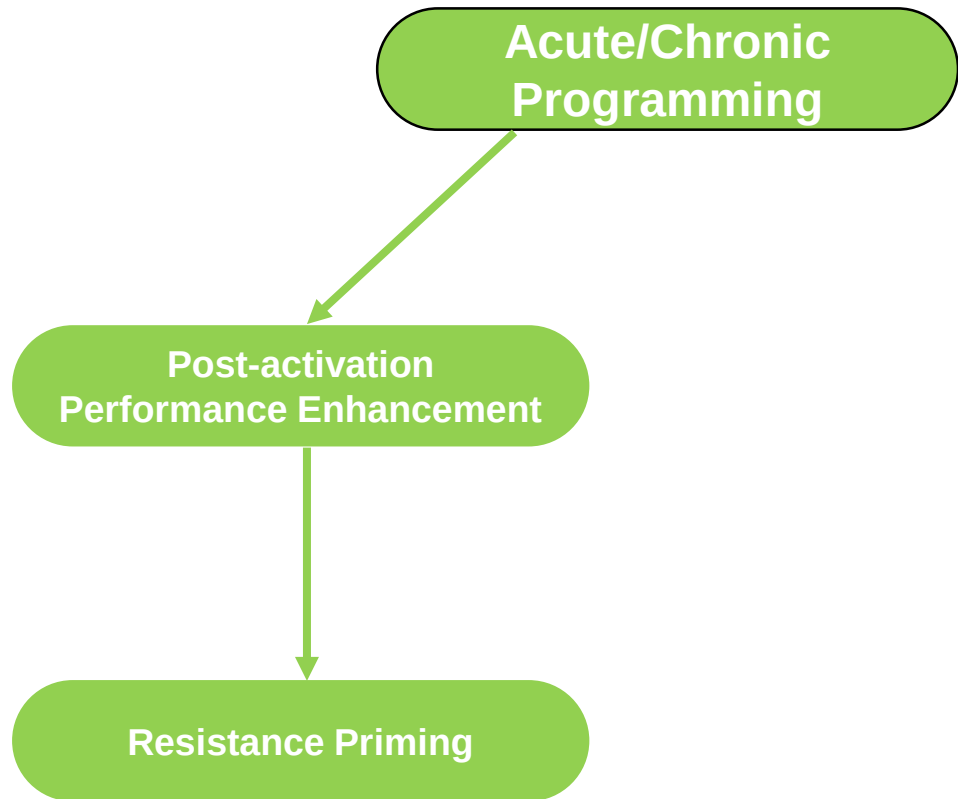
“...the division of total volume within a micro-cycle, across *frequent*, *short* duration, *repeated* bouts.”

Cuthbert et al. (2021) Sports Medicine. 51: 1962-1982

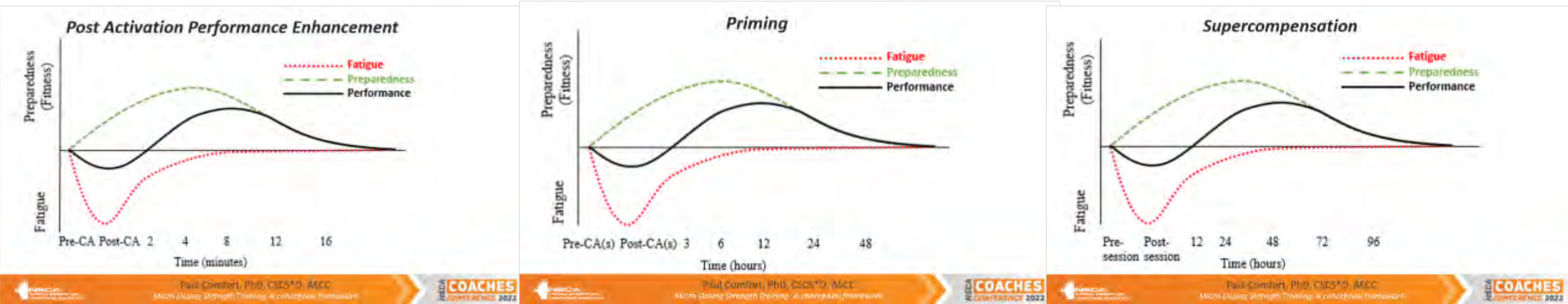
“...not minimum effective dose...”



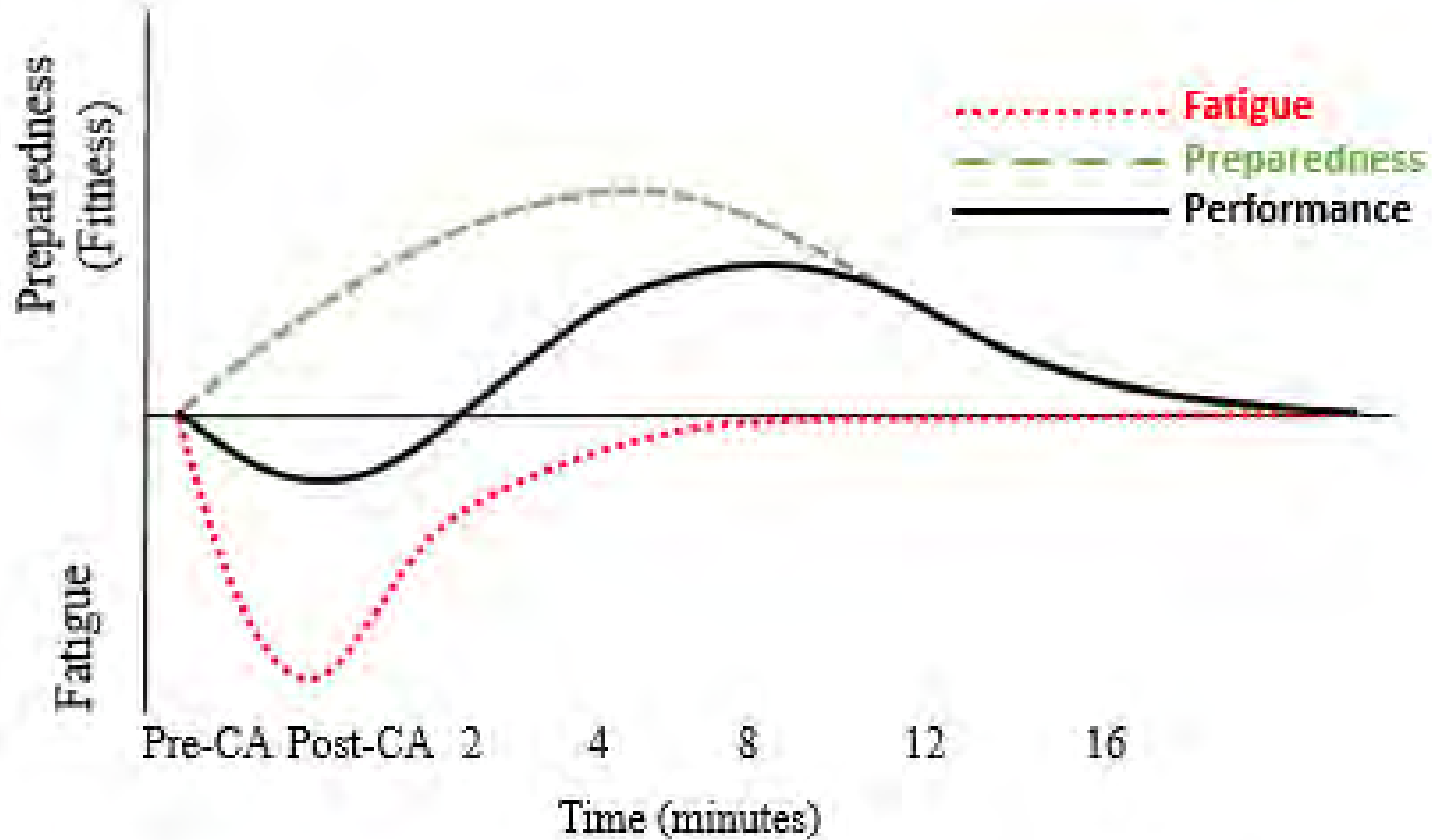




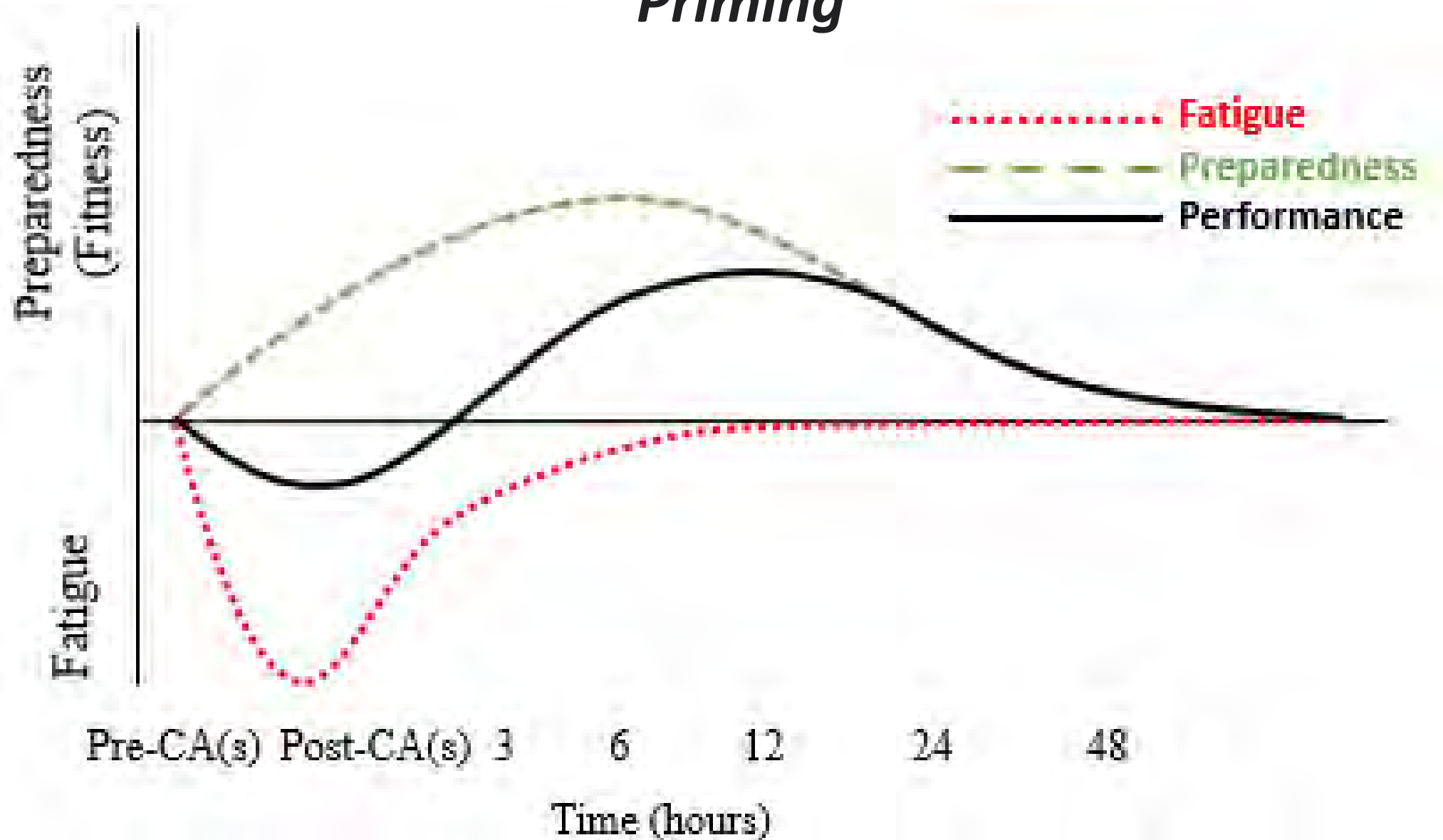
Fitness Fatigue Paradigm



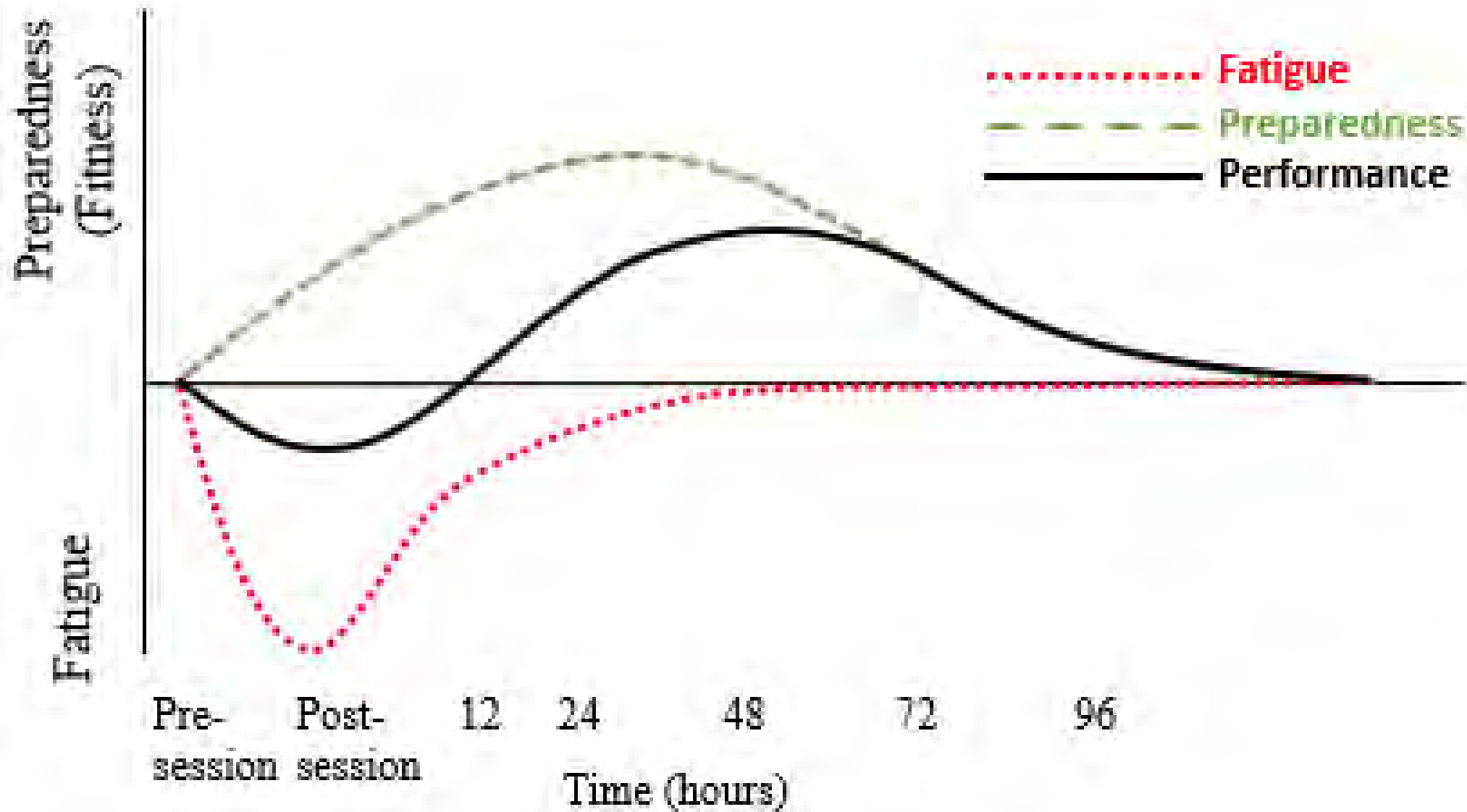
Post Activation Performance Enhancement

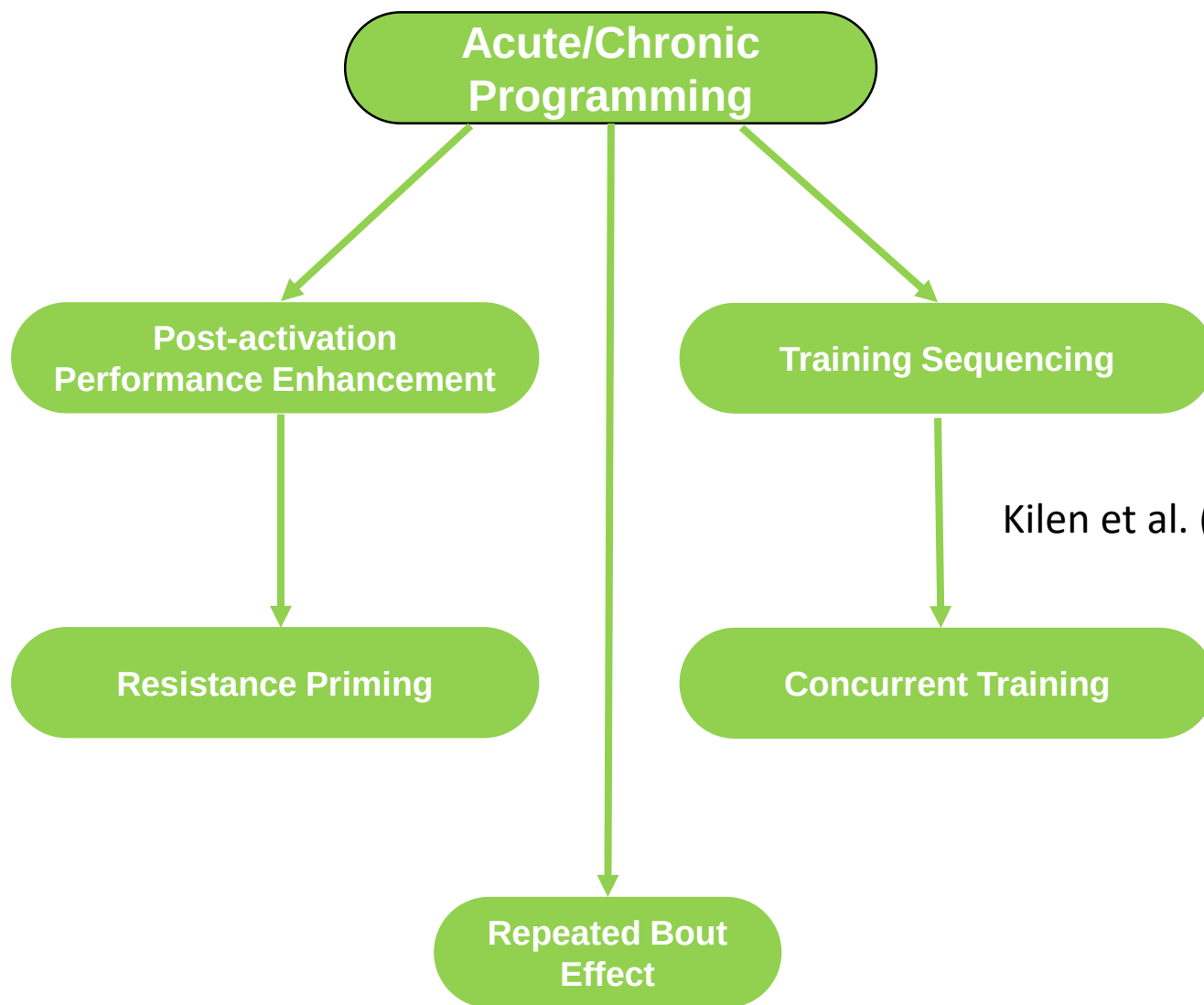


Priming



Supercompensation





Kilen et al. (2020) JSAMS. 23 (10): 999-1004.

Motor Learning

Growth and Maturation

Long Term Athlete
Development

Injury Risk
Mitigation/Return to Play

Individualization

Female Athlete Health
and Performance

Player Autonomy

Training Status

Research Findings

ADAPTATIONS TO SHORT, FREQUENT SESSIONS OF ENDURANCE AND STRENGTH TRAINING ARE SIMILAR TO LONGER, LESS FREQUENT EXERCISE SESSIONS WHEN THE TOTAL VOLUME IS THE SAME

ANDERS KILEN,^{1,2} LINE B. HJELVANG,¹ NIELS DALL,¹ NANNA L. KRUSE,¹ AND NIKOLAI B. NORDSBORG¹

¹Department of Nutrition, Exercise and Sport (NEXS), University of Copenhagen, Copenhagen, Denmark; and ²Center for Physical Training and Education, Danish Armed Forces Health Services, Copenhagen, Denmark

- Generally greater improvements in strength characteristics
- More frequent strength stimuli may decrease mixed signalling effects



Contents lists available at ScienceDirect

Journal of Science and Medicine in Sport

journal homepage: www.elsevier.com/locate/jsams

JSAMS
Journal of Science and Medicine in Sport

Original research

Impact of low-volume concurrent strength training distribution on muscular adaptation

Anders Kilen^{a,b}, Jonathan Bay^a, Jacob Bejder^a, Andreas Breenfeldt Andersen^a, Thomas Christian Bonne^a, Pernille Dyeremose Larsen^a, Andreas Carlsen^a, Jon Egelund^a, Lars Nybo^a, Abigail Louise Mackey^{c,d}, Niels Vidiendal Olsen^e, Niels Jacob Aachmann-Andersen^f, Jesper Løvind Andersen^c, Nikolai Baastrup Nordsborg^{a,*}



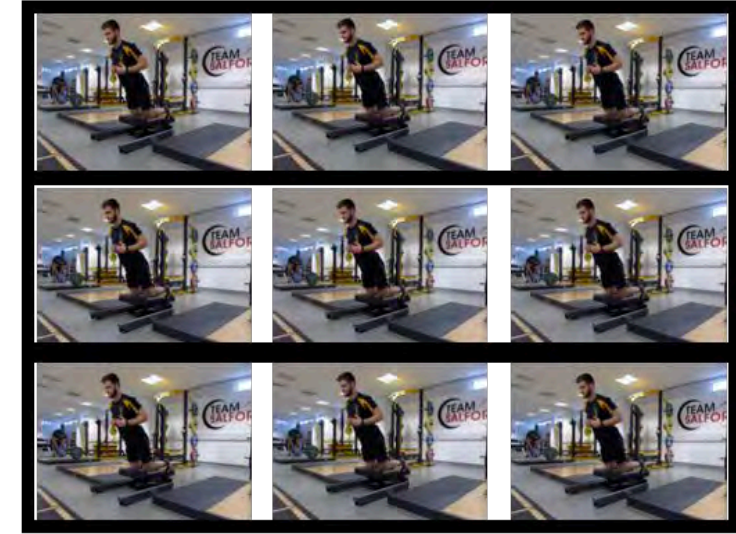
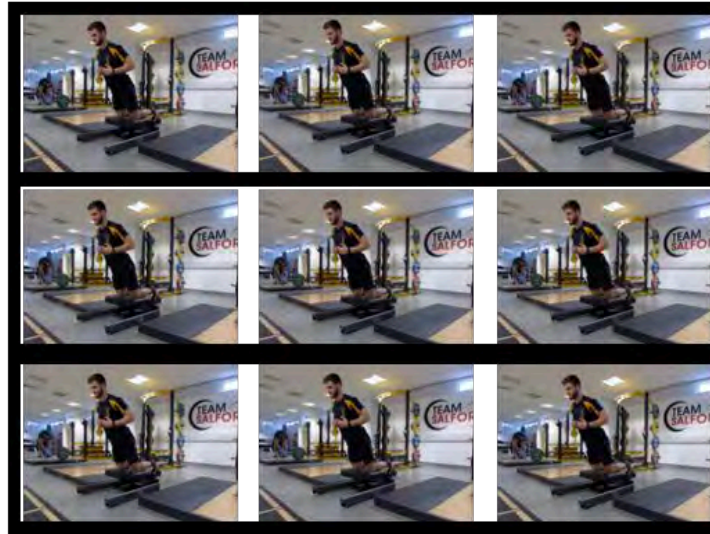
Preliminary Data

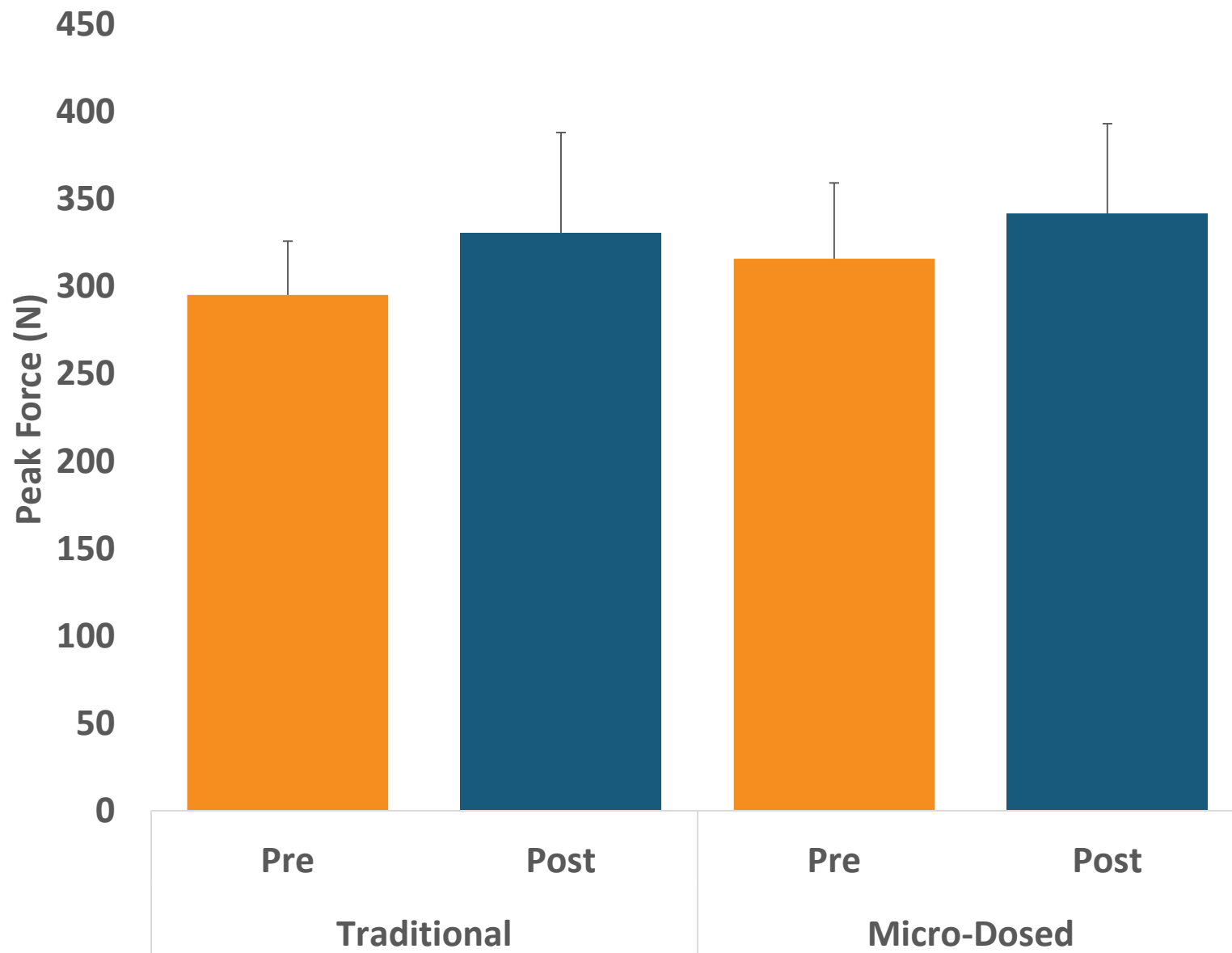
9 Week Intervention - 18 Nordics per week

Group 1 (Traditional)

3 x 3: 2 x Week

Volume 18 rep's





Cuthbert et al. Currently un-published

Micro-Dosing vs. Traditional Strength Training

A Preliminary, In-Season, Investigation in Youth Soccer Players

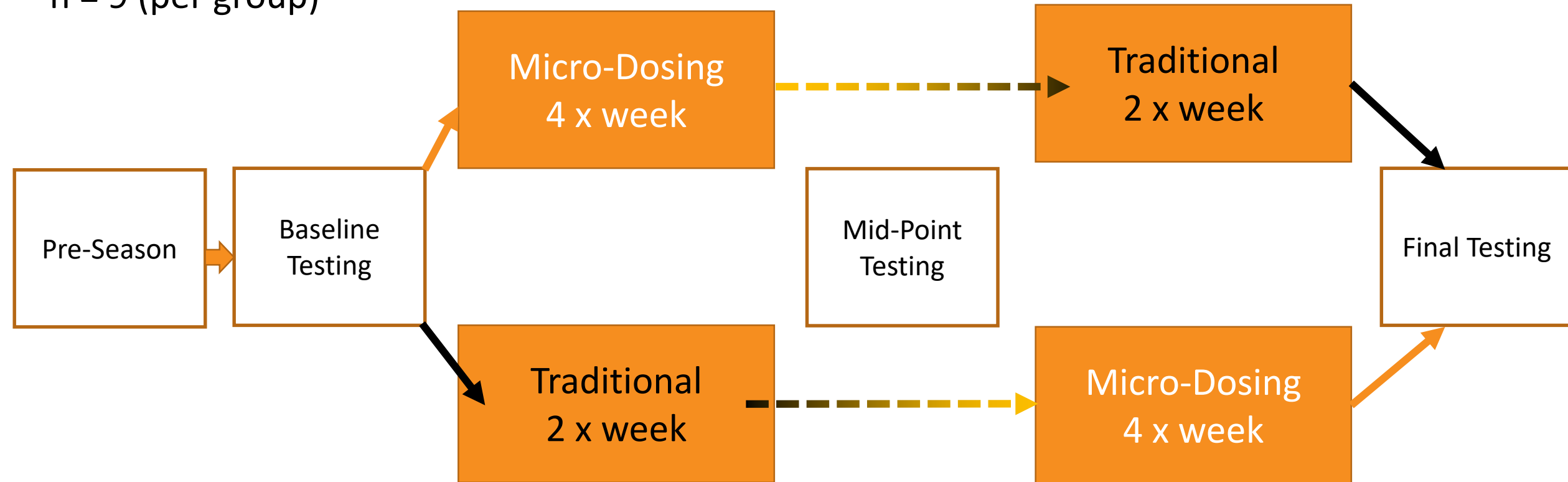


Academy Soccer Team (age 16-18 years)

Cross-Over Trial – 5 weeks per meso-cycle

~~n = 18~~

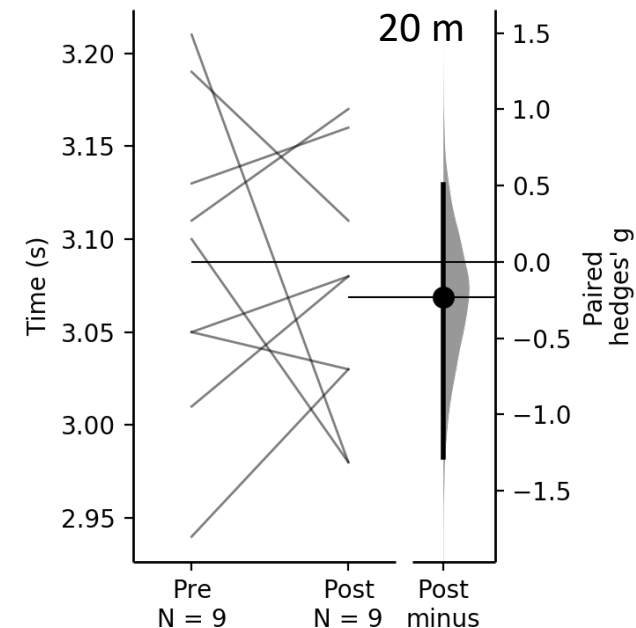
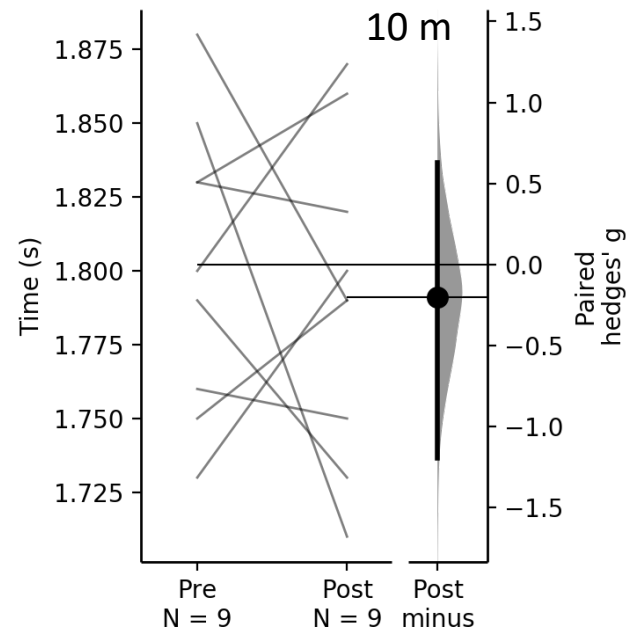
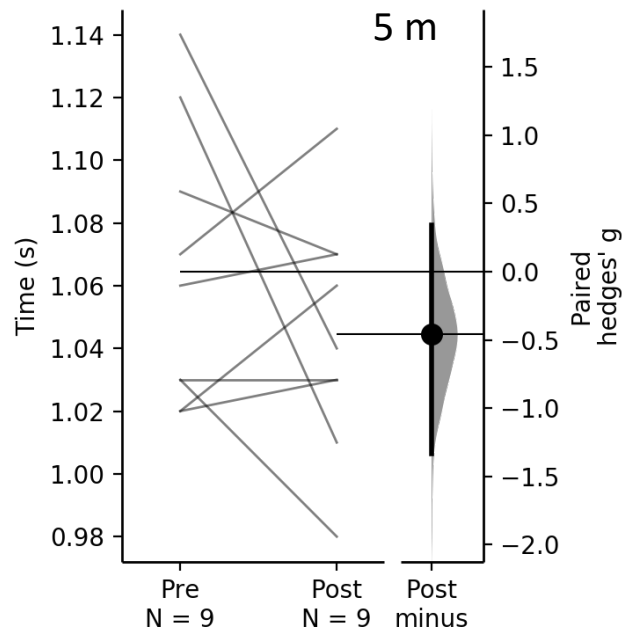
n = 9 (per group)



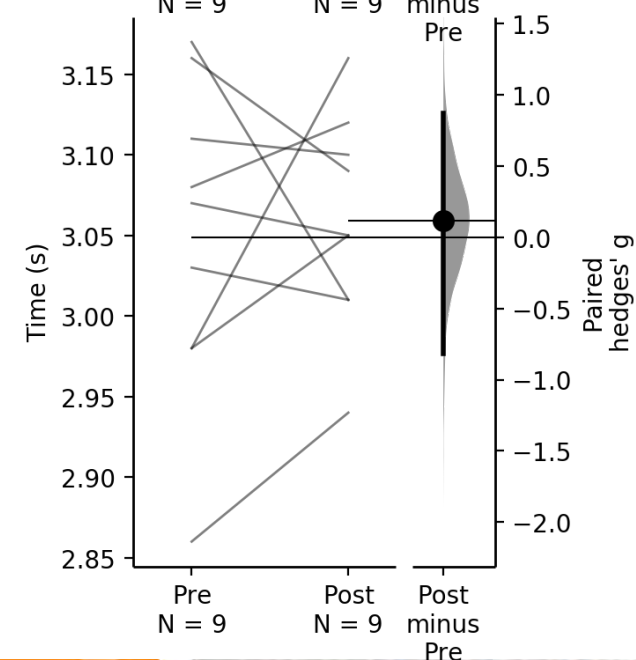
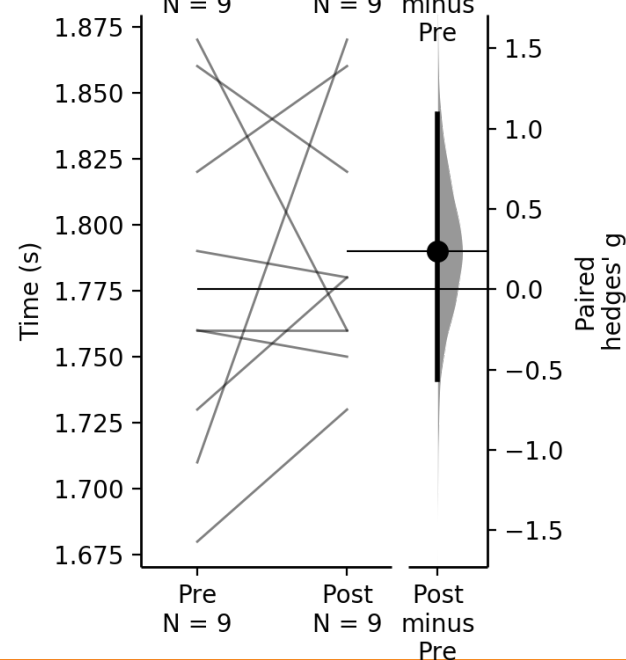
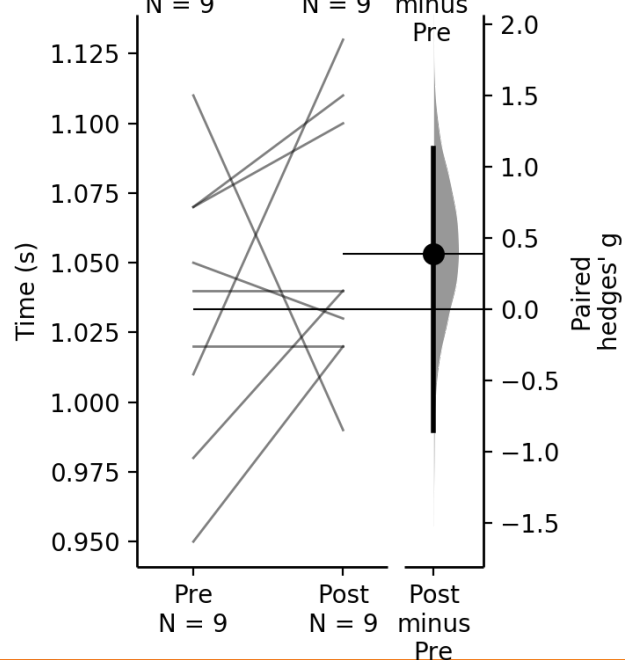
Short Sprint Performance

5-, 10-, 20 m

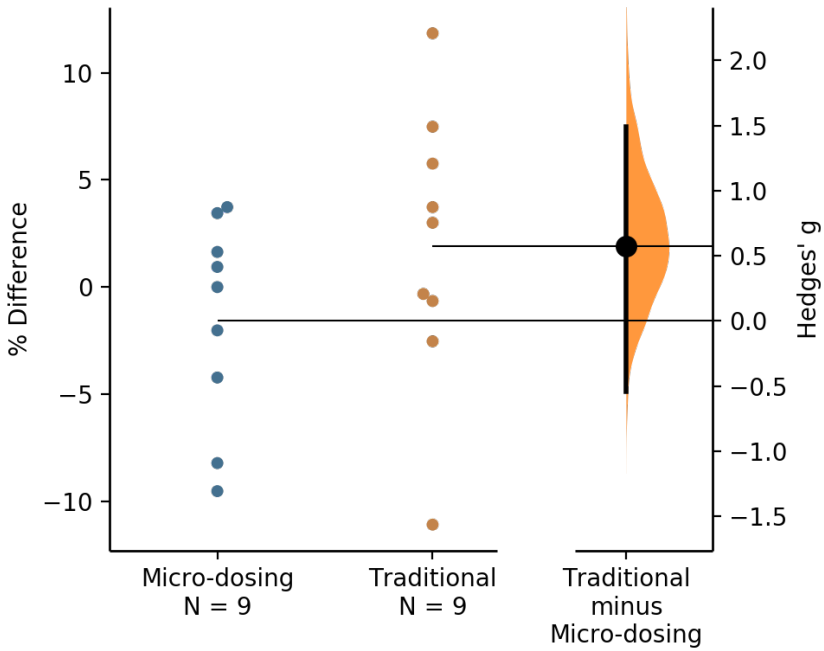
Micro-Dosing



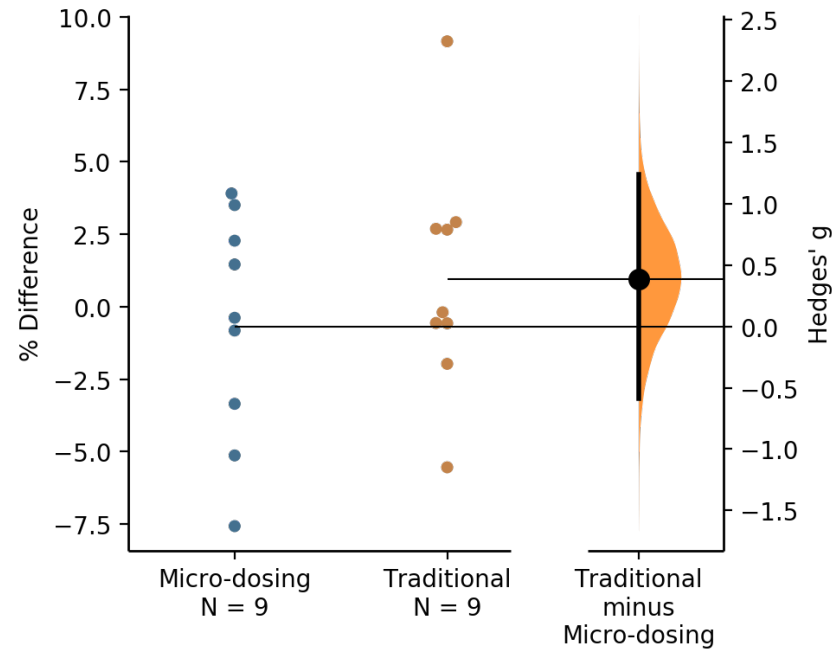
Traditional



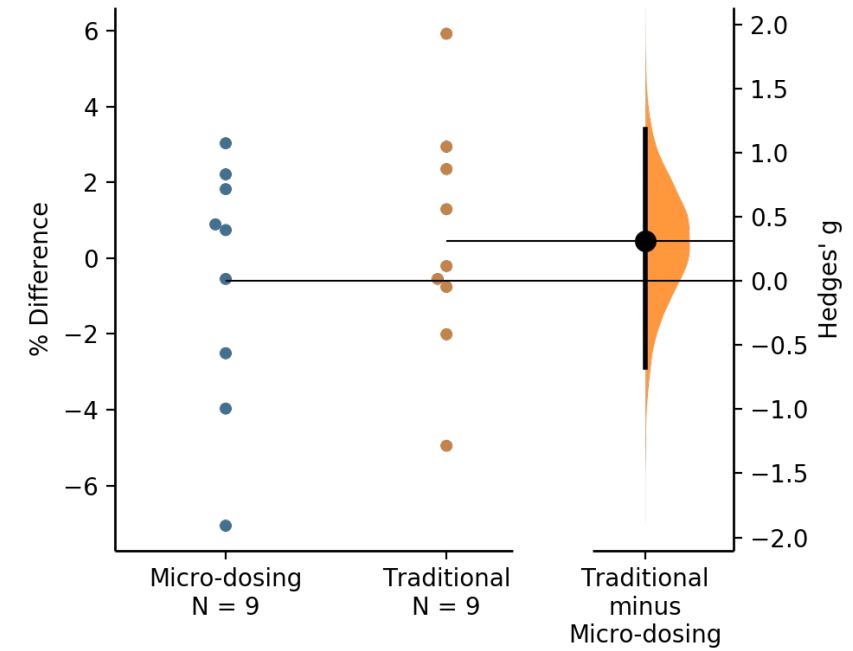
5 m Sprint



10 m Sprint



20 m Sprint

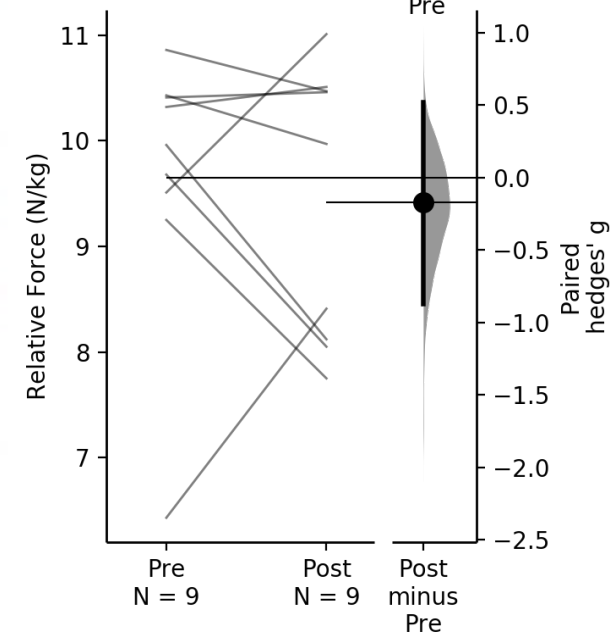
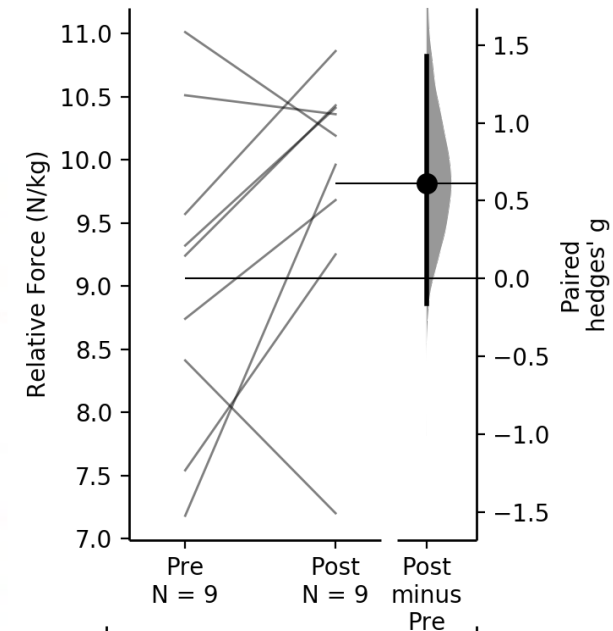
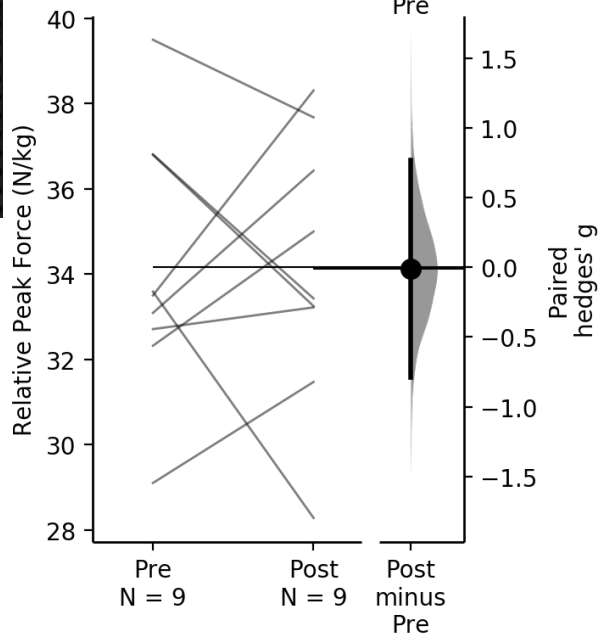
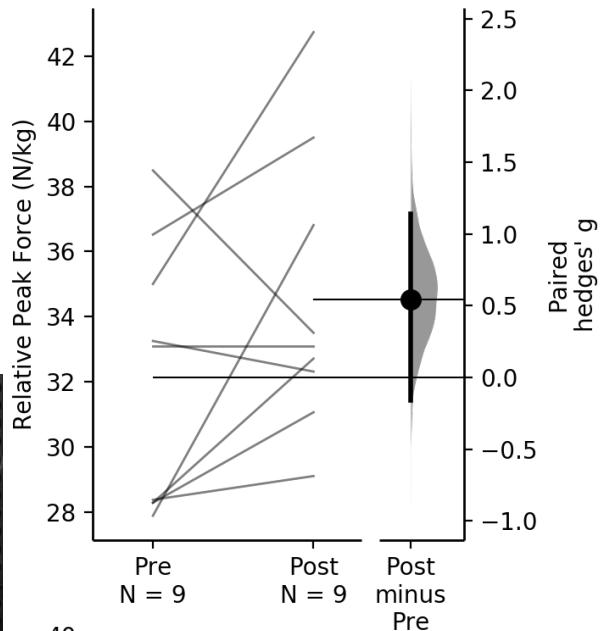


Force Production

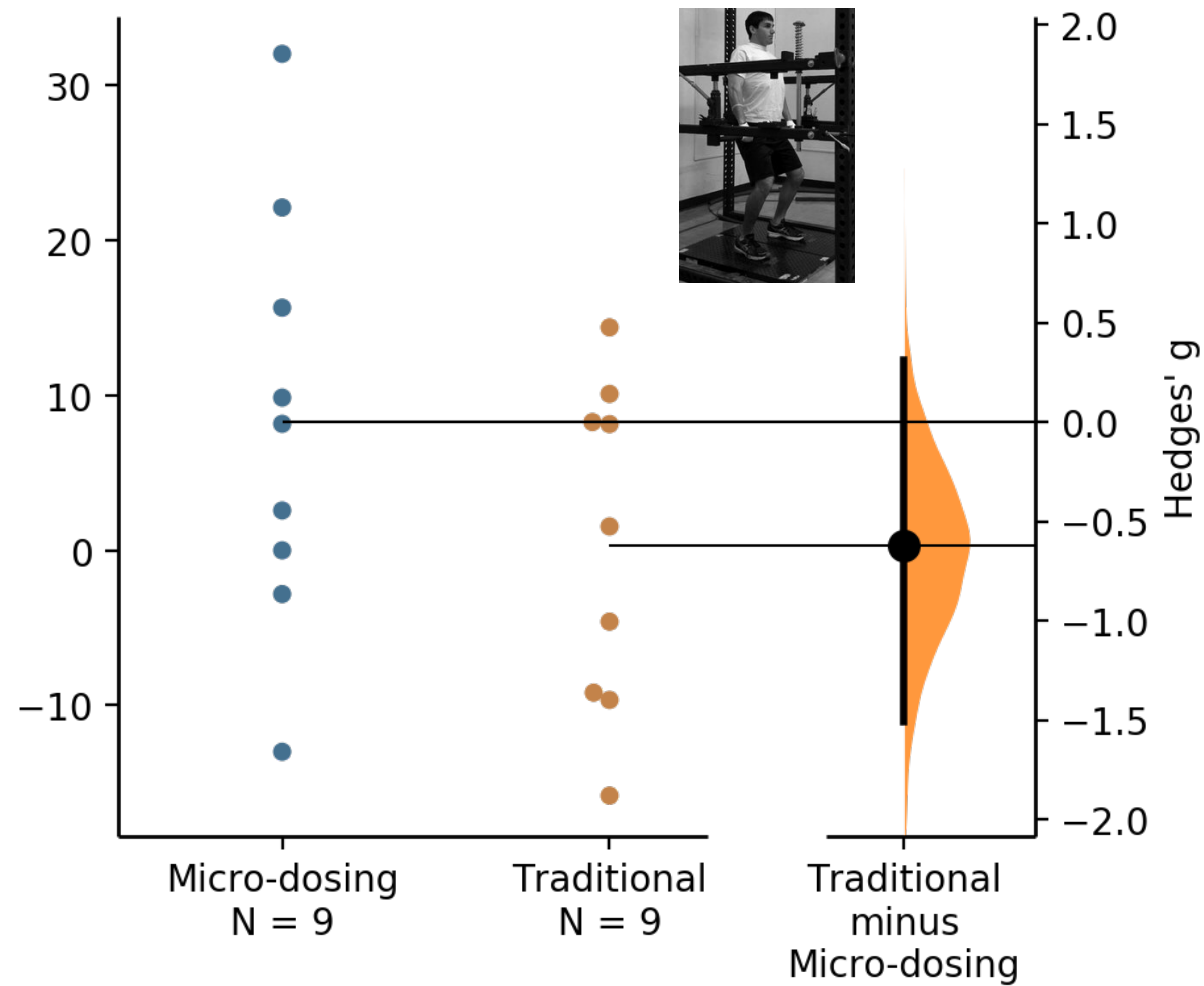
IMTP & Eccentric Hamstring Strength

Micro-Dosing

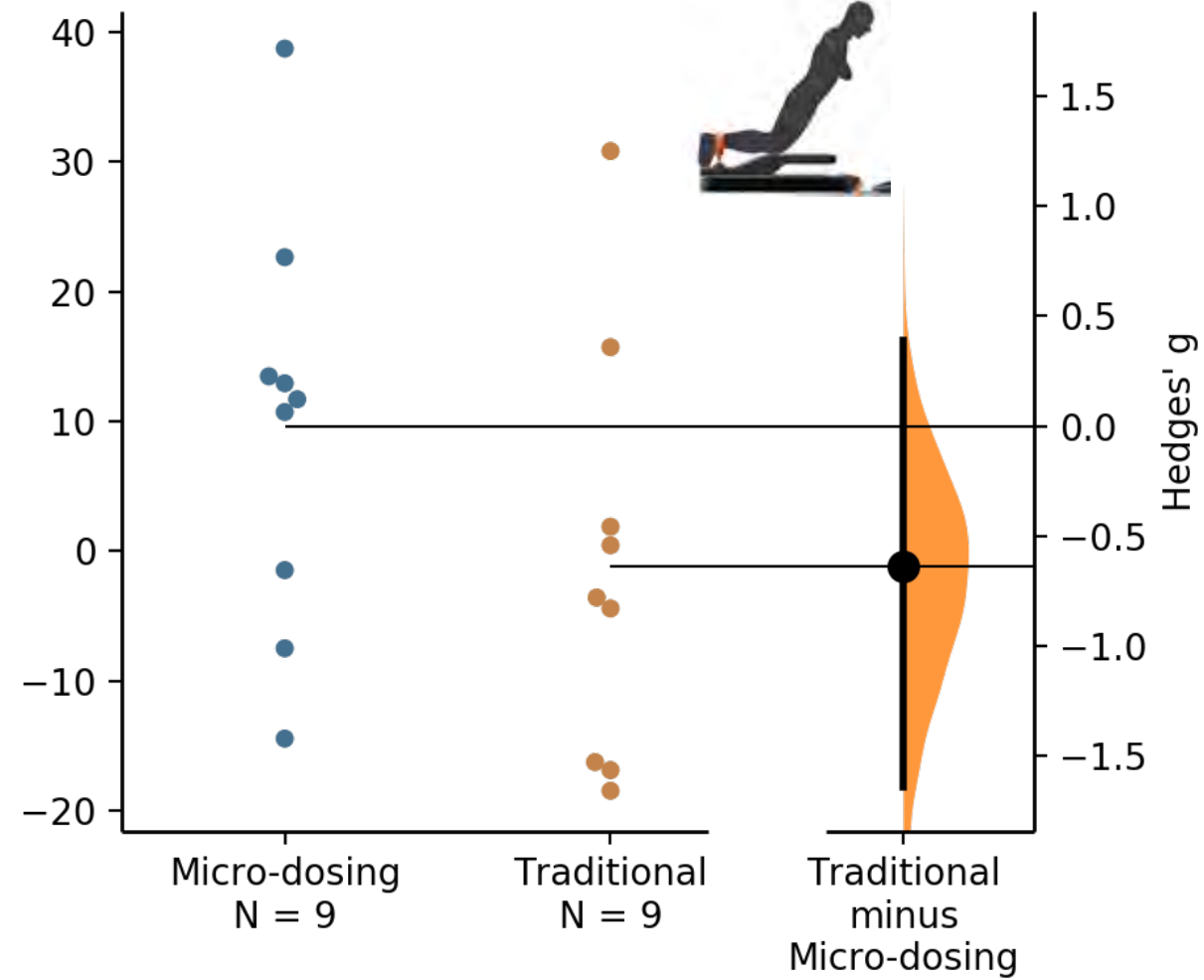
Traditional



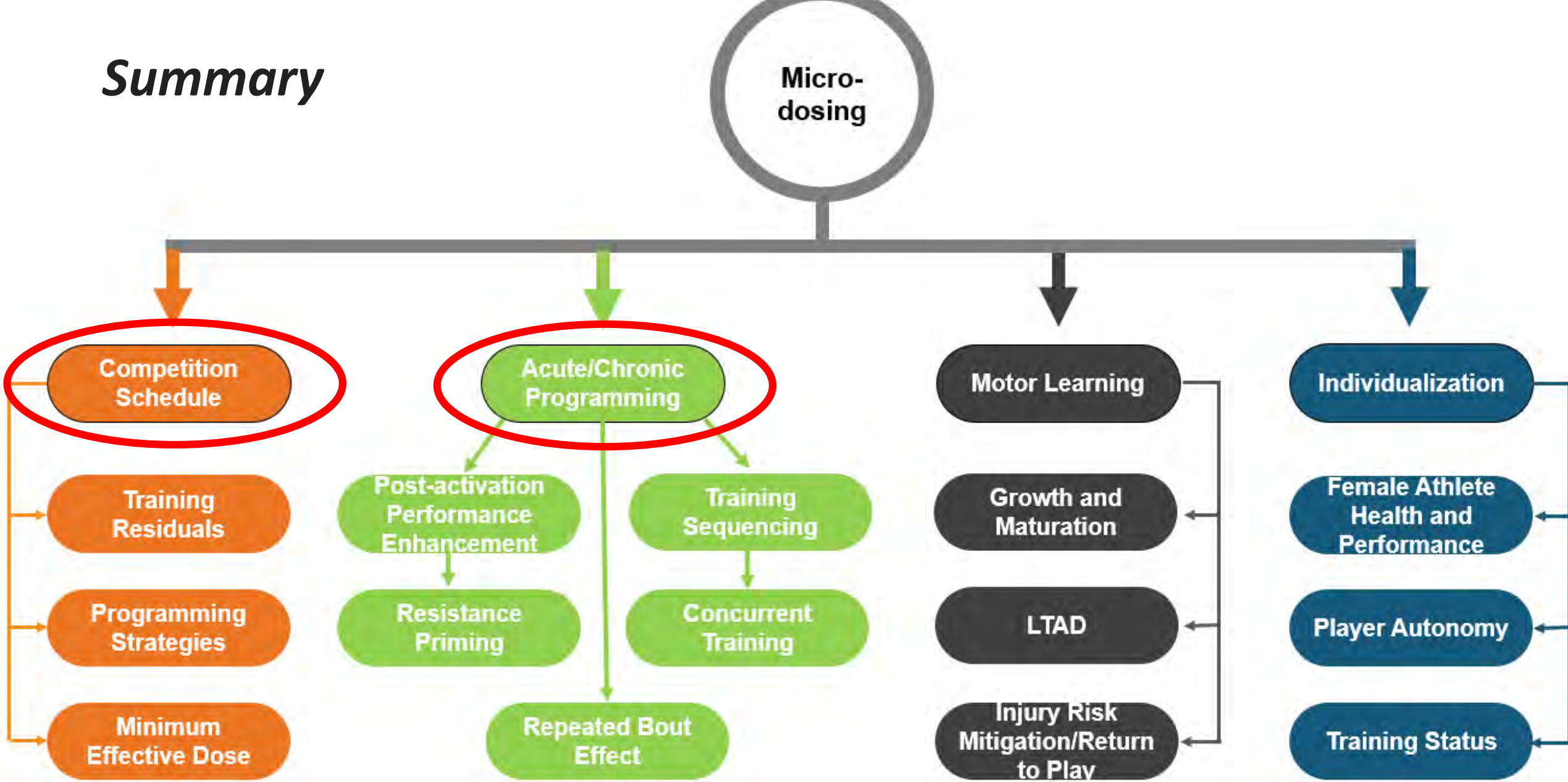
% Difference

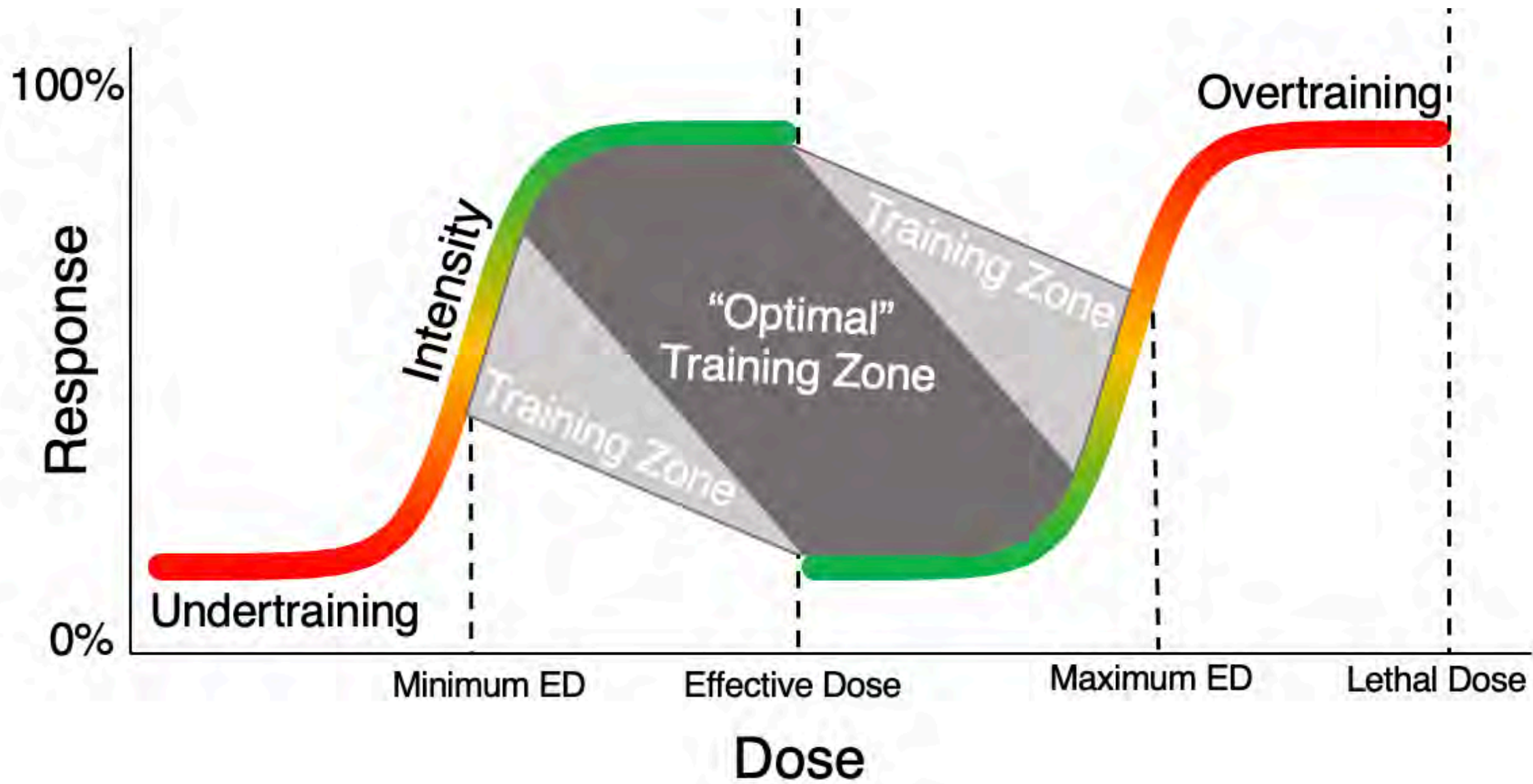


% Difference



Summary





Thank you



- Martin Evans
- Matthew Cuthbert
- Prof. G. Gregory Haff
- Dr John. J. McMahon