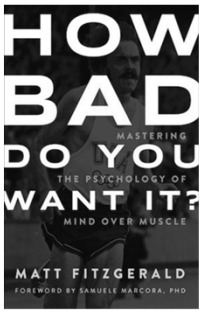
Mind Over Muscle

The New Psychology of Endurance Performance

Overview



How Perception of Effort Limits Running Performance

5 Ways to Master Perception of Effort and Improve Performance

How to Help a "Head Case"

Questions

What We Now Know

Human endurance performance is not directly limited by physiology. It is constrained by physiology, but it is limited—or perhaps more accurately, determined—by psychology, and specifically by perceived effort.

(psychobiological model of endurance performance)

Open-Loop Endurance Tests

Calbert et al, 2015

"Exhaustion (task failure) is not due to lactate accumulation and the associated muscle acidification; neither the aerobic energy pathways nor the glycolysis are blocked at exhaustion."

"Although the maximal rate of ATP provision is markedly reduced at task failure, the resynthesis capacity remaining exceeds the rate of ATP consumption, indicating that task failure during an incremental exercise to exhaustion depends more on central than peripheral mechanisms."

Reserve Functional Capacity at "Exhaustion"?

Marcora et al, 2010

Step 1: 5-Second Max Power Output
1,075 watts

Step 2: Submaximal ride to exhaustion
242 watts

Step 3 (Surprise): 5-Second Max Power Output
731

Only One Measurement Is Limiting at Exhaustion

~~Blood lactate concentration~~
~~Muscle pH~~
~~Muscle cell depolarization~~
~~ATP depletion~~
~~Muscle glycogen depletion~~
~~Core body temperature~~
Perception of effort

People stop exercising <u>not</u> when they cannot continue any longer but when they feel they cannot try any harder.

Closed-Loop Endurance Tests

Maximum output (speed) cannot be sustained longer than 7-9 seconds in running races.

All races lasting long than 30 seconds must be paced to ensure best outcome.

Pacing Is Done by Perceived Effort

Mauger et al, 2009

Cyclists optimize performance in a time trial of unknown distance after four tries.

Viana et al, 2016

Rate of perceived effort increase predicts endpoint in multi-lap mountain bike race.

The Horse and Jockey Analogy

Jockey = Mind

Horse = Body

Perception of effort is the mental effort (jockey) required to do physical work (horse).

There Are Only 2 Ways a Runner Can Improve

Increase Maximum Perceived Effort Tolerance

- Motivation
- Experience
- Anger
- Etc.

Reduce Perceived Effort at Any Given Pace

- Training
- Caffeine
- Group Effect
- Etc.

5 Ways to Master Perception of Effort

Set 50/50 Goals

Muscular Endurance Test

Ranking of Improvement by Goal Type

1. Difficult/Realistic (20%)
2. Easy (10%)
3. Improbable/Unattainable (40%)
4. Subjective (“Do your best”)

Bar-Eli et al., 1997

Sell Your System

Performance in 5 km Time Trial

Hurst et al., 2013

Control Condition	Placebo Condition
20:16	19:55

"Believe in your system, and then sell it to your players."

--Billy Donovan

Practice Feel-Good Training

Jeukendrup et al., 2002

	Time Trial Watts	RPE at 200 Watts
2 weeks normal training	261	9.2
2 weeks intensified training	239	10.9
2 weeks recovery training	265	8.5

Depression	Overtraining
Lethargy	Lethargy
Lack of motivation	Lack of motivation
Sleep disruption	Sleep disruption
Anhedonia	Anhedonia
Changes in neurotransmitters	Changes in neurotransmitters
Altered immune function	Altered immune function

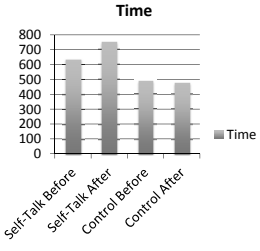
Feel-Good Training Continued

Ceci et al, 1991: Runners go faster at same RPE outdoors

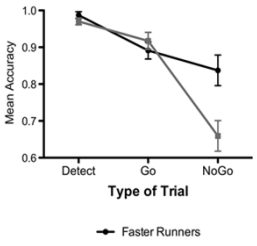
St Clair Gibson, 2012: Difference between good an bad workouts is affective

Think Helpfully

Positive Self-Talk Training Enhances Endurance Performance

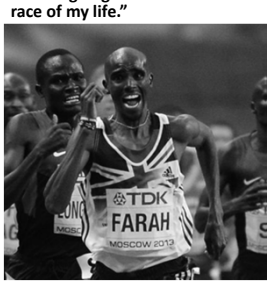


Runners with Great "Inhibitory Control" Race Faster



Brace Yourself

"This is going to be the hardest race of my life."



Acceptance Vs. Suppression

How to Help a "Head Case"

Step 1: Acknowledge the problem and make it an explicit goal to overcome it.

Step 2: Try things

- Toughness training
- Qualitative race goals
- Letting "off the hook"

Questions?

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