Air National Guard

Integrity - Service - Excellence

Fatigue in the Active Adult

U.S. AIR FORCE

Chad Asplund, MD, MC, FS
Chief, Aerospace Medicine
Air National Guard
Past President, AMSSM
Trustee, ACSM

Chad Asplund, MD

- Has no relationships to disclose.

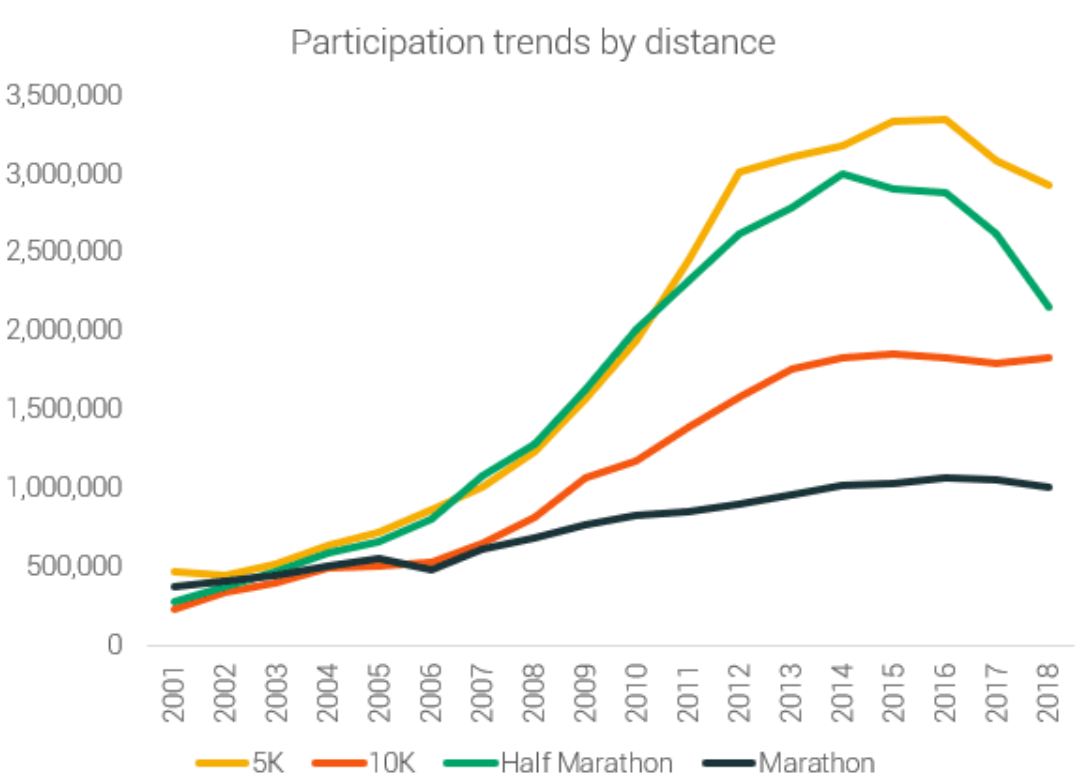
U.S. AIR FORCE

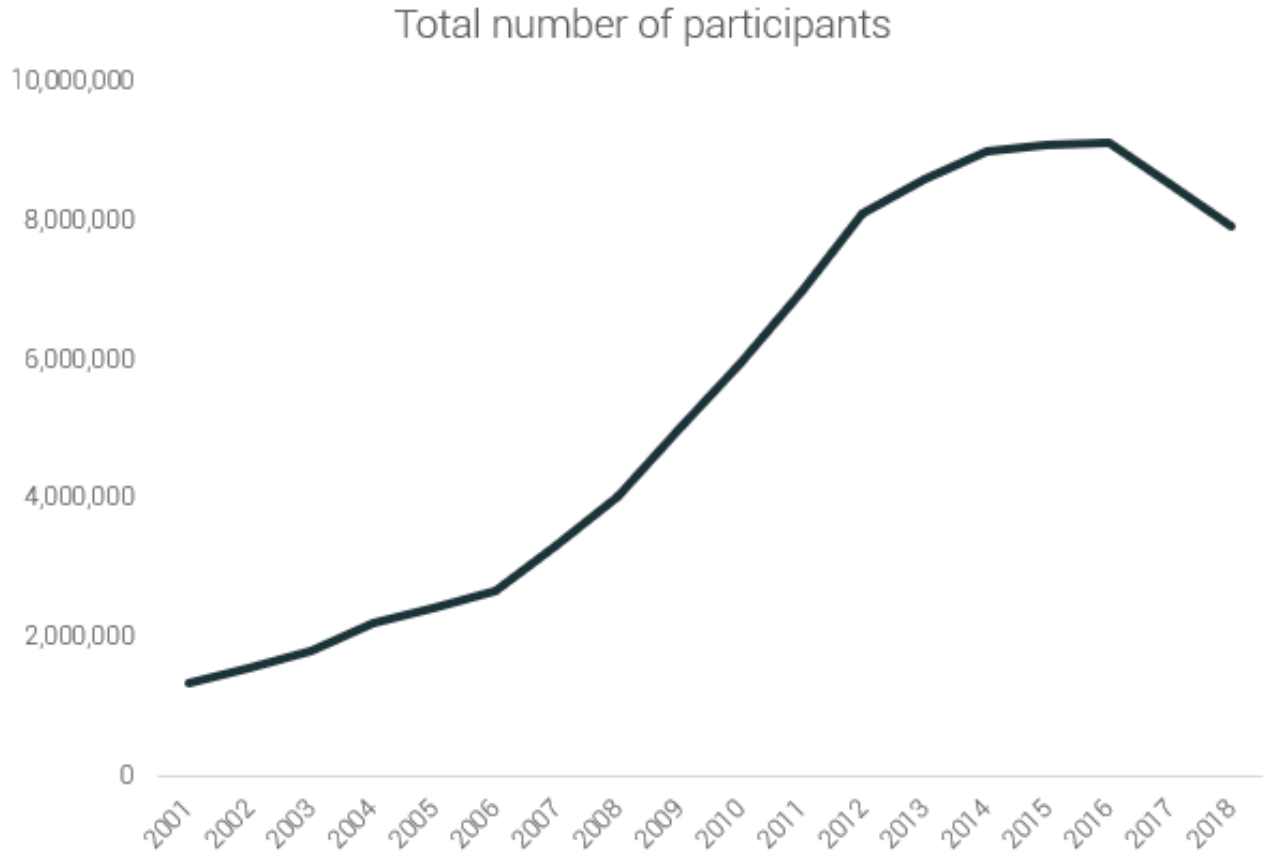
Case

- 52-year-old dedicated endurance athlete reports declining performance, poor recovery, and persistent fatigue despite "training hard." Labs were normal last year.
- "Tired all the time"
- "Harder to perform at same level"

U.S. AIR FORCE

Participation





https://runrepeat.com/the-state-of-us-marathons-2025

U.S. AIR FORCE

Underperforming Athlete Clinic

- Mayo Clinic
- 2019-2023
- 100's of athletes
  - Easy lab fixes
  - Overtraining/RED-S
  - Medical
    - Asthma/EIB, allergy, autoimmune, celiac, lyme, cardiac, MS, mitochondrial myopathy

U.S. AIR FORCE

Objectives

- Build a differential for fatigue in athletic patients.
- Recognize common causes for athlete fatigue
- overtraining syndrome (OTS) and RED-S.
- Apply a practical evaluation framework.
- Speak the language

U.S. AIR FORCE

Endurance Athlete Challenges

- Why are endurance athletes challenging to decipher?
- They often have high pain tolerance, normalize abnormal symptoms, and have their identity tied to training. They can appear “healthy” on standard labs despite underlying issues.

U.S. AIR FORCE

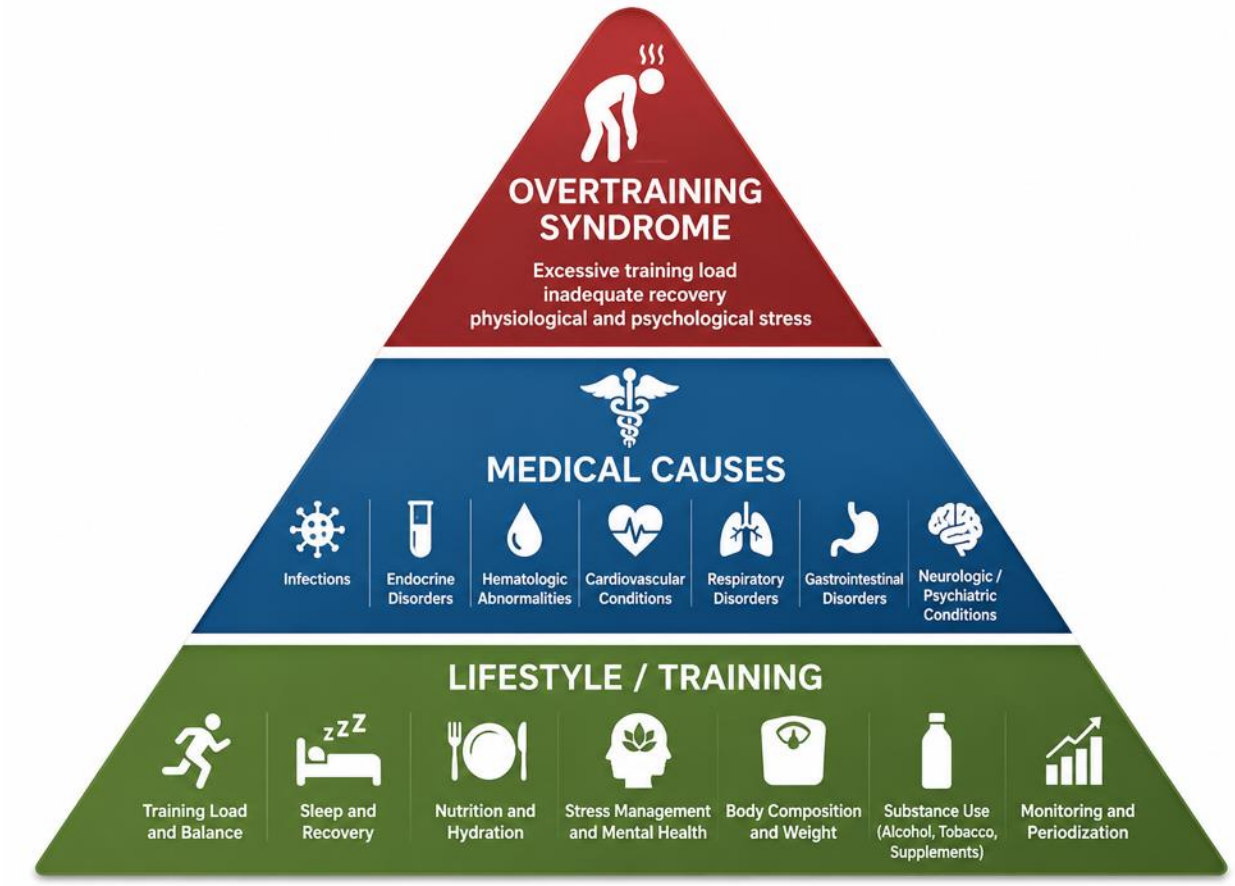
Speaking the Language

- The most critical step. Validate their symptoms. Avoid blame. Frame fatigue as a physiological mismatch, not a weakness.
- Don’t immediately jump to overtraining syndrome
- The cornerstone is reducing training load. Reduce intensity before volume. Avoid complete cessation of activity unless medically necessary.

U.S. AIR FORCE

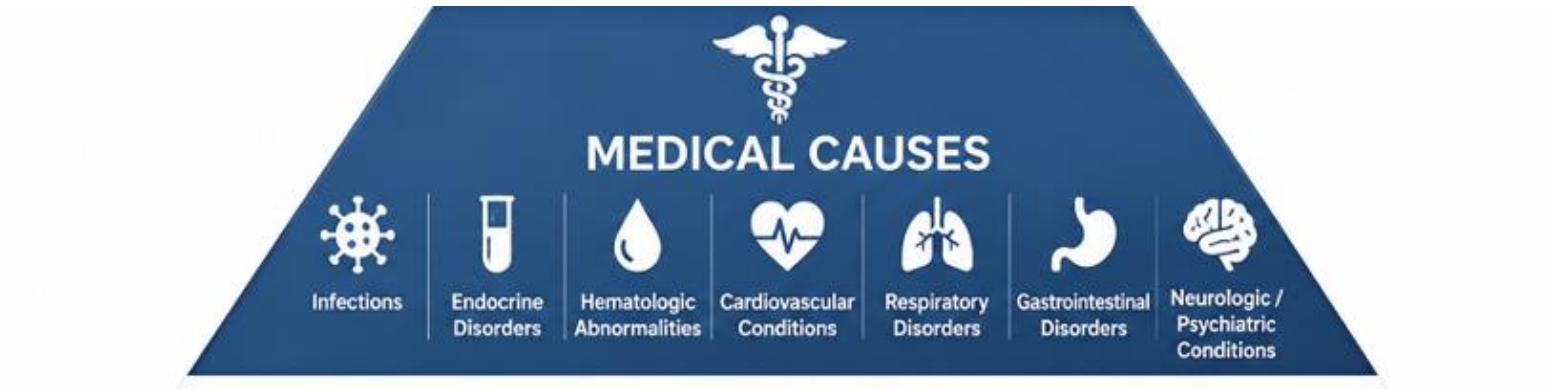
"Fatigue Pyramid"

- **Top: Overtraining syndrome**
  - Diagnosis of exclusion
- **Middle: Medical Causes**
  - Lab work
  - Medical evaluations
- **Base: Lifestyle/Training**
  - Most common
  - Overlooked by many athletes



U.S. AIR FORCE

Medical Visit



U.S. AIR FORCE

History/Physical

History

- Training load and recent changes
- Recovery practices
- Nutrition and hydration
- Sleep patterns
- Psychosocial stressors

Physical

- Usually nonspecific
- Assess weight trends and vitals
- Look for signs of endocrine or systemic disease

U.S. AIR FORCE

Primary Care Labs/Studies

Tier 1 – First Visit

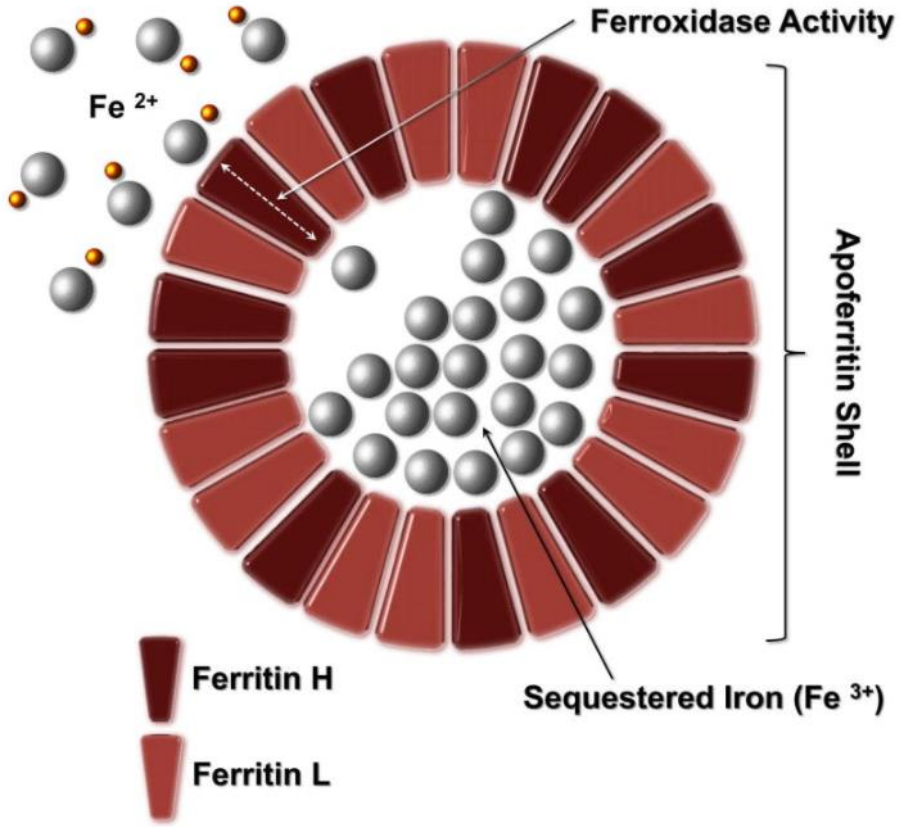
- Fatigue labs:
  - CBC with diff
  - CMP
  - Ferritin
  - Vitamin D
  - TFTs
  - B12

Tier 2 – Subsequent Visits

- EBV IgG/IgM, IgE
- ANA, RF
- Lyme Titer
- Celiac screen
- Spirometry
- Allergy testing
- Cardiac Testing

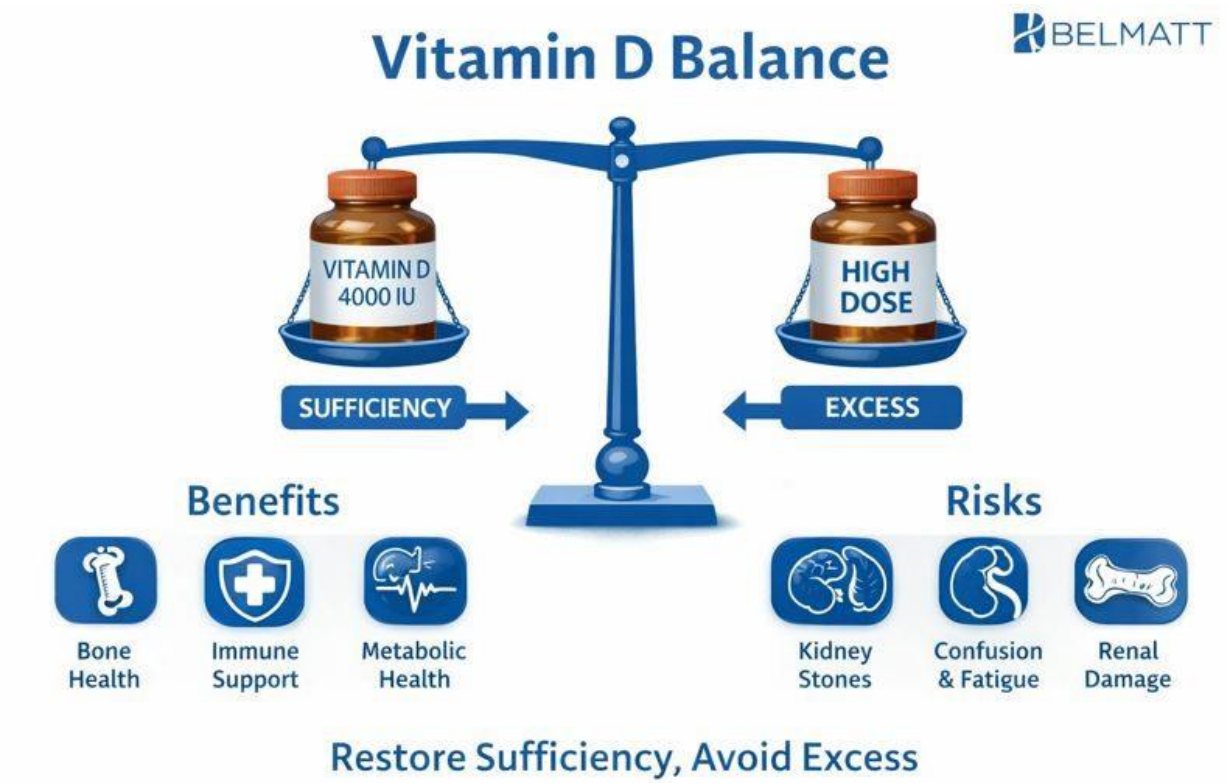
Ferritin

- Normal lab values: >15-20
- Endurance athletes: 30-50 or 60+ high level
- Ferrous Glycinate 25mg 30 min before or after a meal with vitamin C
- 2x/day x 2 weeks then 1x/day x 4 weeks - recheck



Vitamin D

- Important for prevention of stress fractures
- Very low Vit D can impact muscle strength and fatigue
- Serum 25(OH)D
- Should aim for at least 30-40 ng/mL



U.S. AIR FORCE

B12/Folate

- Less common than ferritin or vitamin D, but can have big impact on performance
- Vegetarians/vegans
- Low normal range (LabCorp) 200 pg/mL
- If B12 < 340 pg/mL – check homocysteine or MMA
- If elevated – B12 supplementation recommended
- Supplement 1,000 to 2,000 micrograms of methyl cobalamin
- Don’t take with Vitamin C

U.S. AIR FORCE

Post-viral fatigue

- Athletes should subscribe to the “neck check”
  - Symptoms above the neck – low intensity exercise permitted
  - Below neck – REST
  - Fever – ABSOLUTE REST
- But…

Postviral Fatigue Syndrome

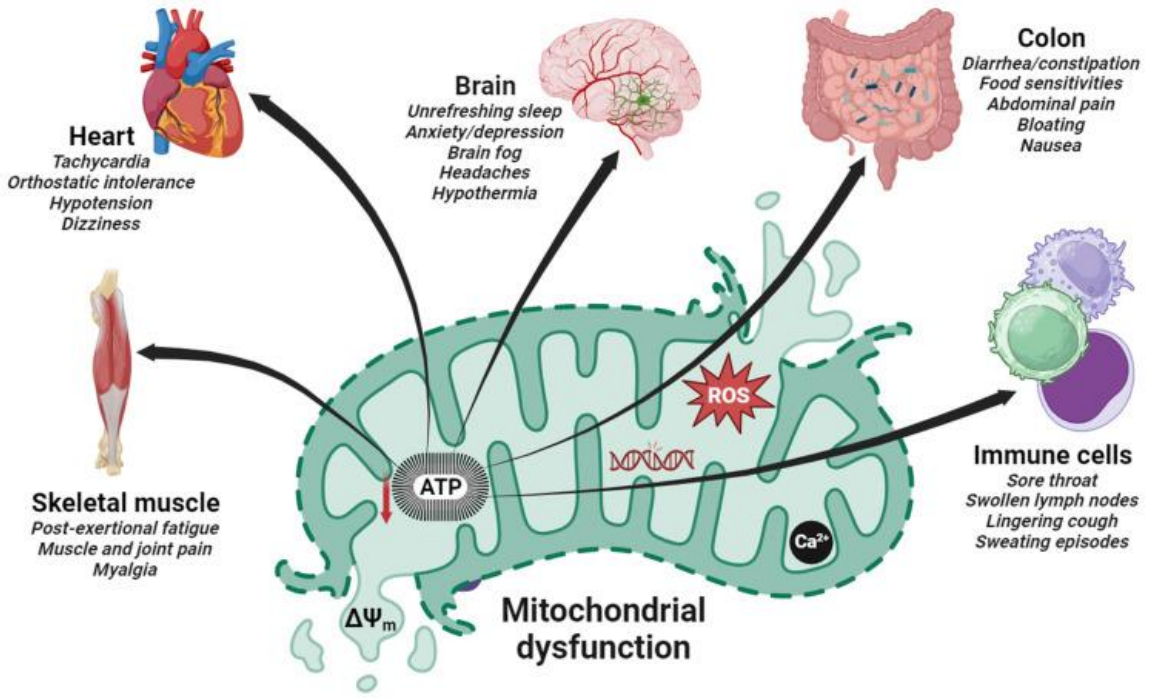
The core clinical symptoms are always the same: severe fatigue made worse by exercise, myalgia, night sweats, atypical depression and excessive sleep. The other common symptoms include dysequilibrium disorders and irritable bowel syndrome.

—Behan et al (2007)

U.S. AIR FORCE

Post-viral Fatigue – CoQ10

- No FDA approved treatment
- Link between mitochondrial dysfunction and low-grade systemic inflammation similar to that found in PVF
- CoQ10 supplementation may play a role
  - Ubiquinol > ubiquinon
  - 100-200mg per day



Int J Mol Sci 2024; Comp Ther in Med, 2022; Front Pharm, 2022

U.S. AIR FORCE

Follow-up visits

- Review labs – supplement where needed
- Recheck in 6-8 weeks
- Review symptoms

- If no improvement – consider Tier 2 labs:
  - EBV, IgE, Lyme, Celiac
  - CMV
  - ANA, RF
  - Spirometry
  - Allergy Testing
  - Cardiac testing

This is where assessing for the "Base of the Pyramid" comes in

U.S. AIR FORCE

Base – Lifestyle/Training

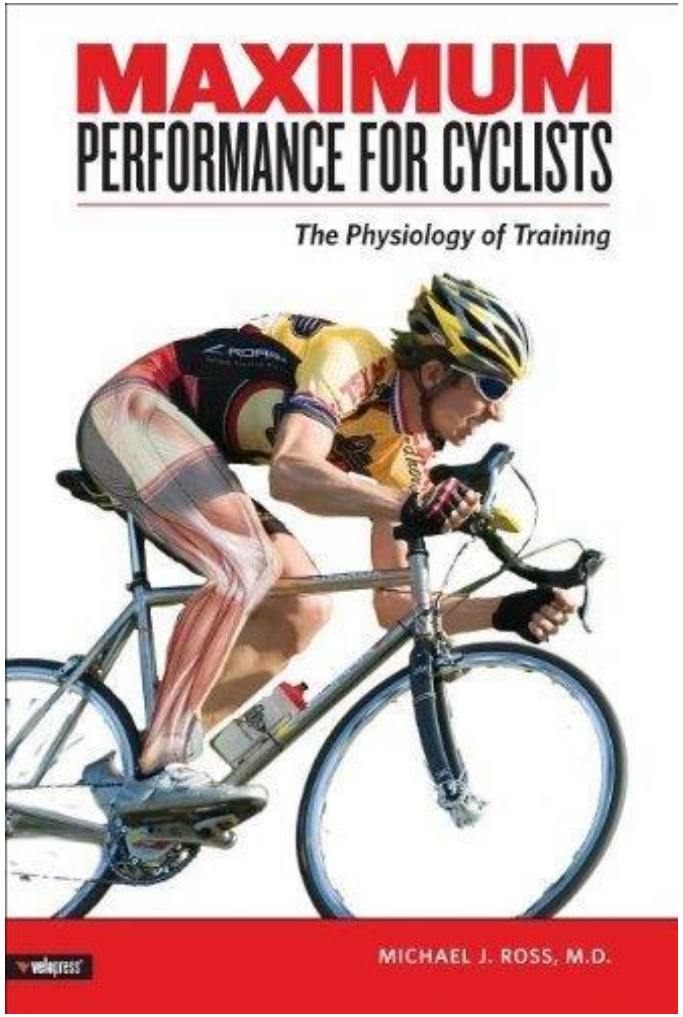
Most common factors in decreased athlete performance

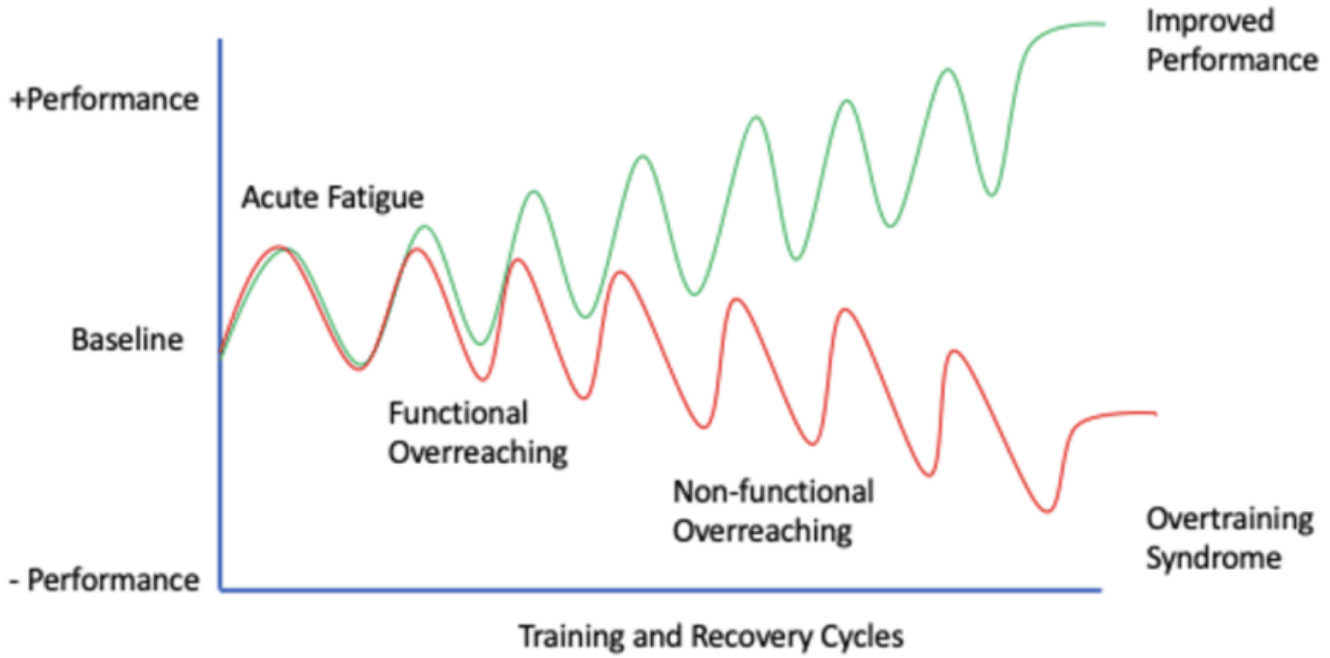
U.S. AIR FORCE

Initial Recommendations

- Check training (w/coach) – deload week – cut volume by 30-50%
- Deep dive on nutrition – food diary counting calories and macronutrients
- Aim for 7-9 hours of consistent sleep
- Revaluate in 2-4 weeks
- If no improvement – go to Tier 2 labs

Overreaching/Overtraining

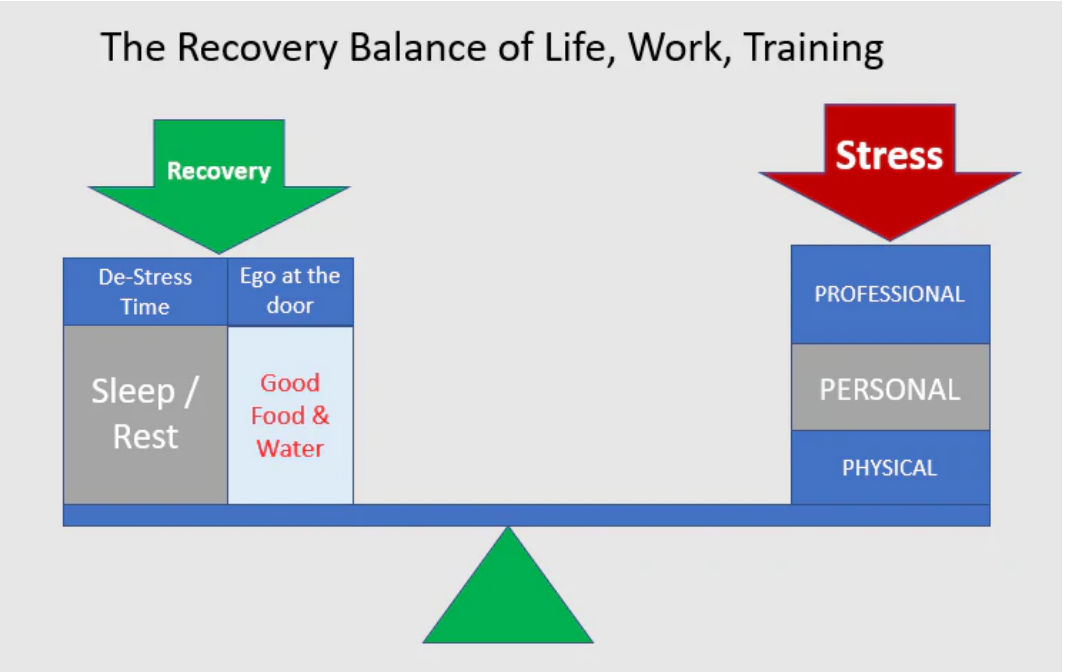




Overtraining Progression as described by Irene Margaritis, 2019.[7]

Diagnostic Framework

- Must get a sense of training hours, intensity, sleep, nutrition
- Also, must assess hours of work
- Other life stresses
- Measurables



U.S. AIR FORCE

Focused History

Category	Key Questions/Focus Areas
Training load	Recent changes in volume, intensity or frequency? Any monotony in training?
Nutritional Status	Intentional/unintentional weight loss? Calorie intake vs. expenditure
Psychosocial	New stressors at home or work? Mood/affect changes?
Review of Systems	Dyspnea, palpitations, orthostasis, post exertional malaise
Medication/Supplements	All OTC supplements, pre-workouts, stimulants, Rx meds

Red flags – Weight loss > 10%, nocturnal fevers, night sweats, lymphadenopathy, chest pain, near syncope during exertion

Nutrition - RED-S

- **Relative Energy Deficiency Syndrome**
  - Low energy availability impairs health and performance
  - Intentional or unintentional
  - Male or Female

- **Simple screening Q's for PC:**

1. Energy – are you an athlete that frequently feels fatigued, sluggish or struggle to focus throughout the day?
2. Nutrition – do you restrict the amount of food you eat, skip meals, or avoid entire food groups?
3. Health/performance - have you experienced a plateau or decrease in sports performance, repeated injuries or irreg periods

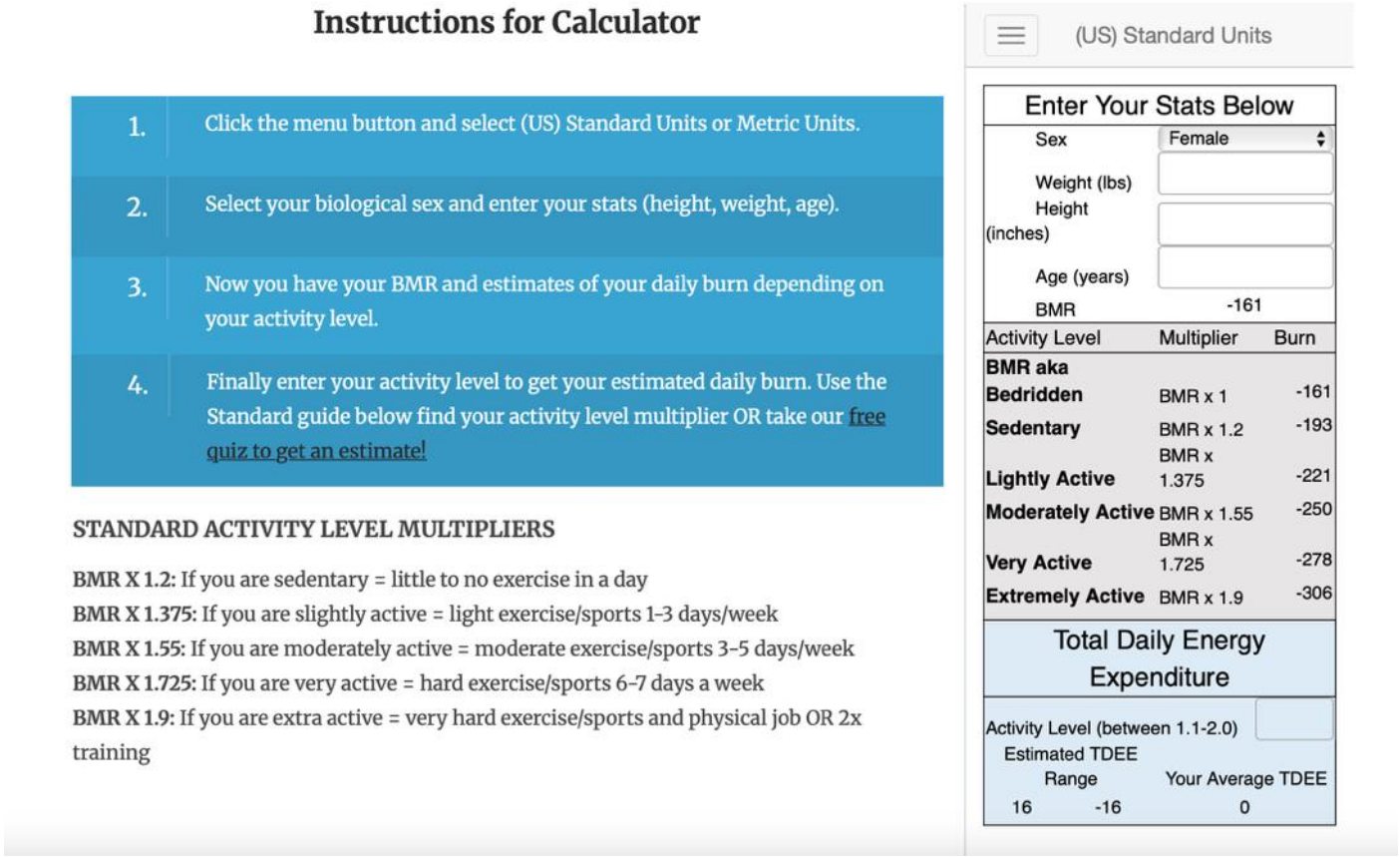
[Br J Gen Pract, 2022]

Nutriton Calculators – Mifflin-St. Jeor

- **Mifflin-St. Jeor most accurate in active adults**

Add in TDEE

Ballpark to assess for meeting nutritional needs



Instructions for Calculator

1. Click the menu button and select (US) Standard Units or Metric Units.
2. Select your biological sex and enter your stats (height, weight, age).
3. Now you have your BMR and estimates of your daily burn depending on your activity level.
4. Finally enter your activity level to get your estimated daily burn. Use the Standard guide below find your activity level multiplier OR take our free quiz to get an estimate!

STANDARD ACTIVITY LEVEL MULTIPLIERS

BMR X 1.2: If you are sedentary = little to no exercise in a day
BMR X 1.375: If you are slightly active = light exercise/sports 1-3 days/week
BMR X 1.55: If you are moderately active = moderate exercise/sports 3-5 days/week
BMR X 1.725: If you are very active = hard exercise/sports 6-7 days a week
BMR X 1.9: If you are extra active = very hard exercise/sports and physical job OR 2x training

(US) Standard Units

Enter Your Stats Below

Sex	Female
Weight (lbs)	
Height (inches)	
Age (years)	
BMR	-161

Activity Level	Multiplier	Burn
BMR aka Bedridden	BMR x 1	-161
Sedentary	BMR x 1.2	-193
Lightly Active	BMR x 1.375	-221
Moderately Active	BMR x 1.55	-250
Very Active	BMR x 1.725	-278
Extremely Active	BMR x 1.9	-306

Total Daily Energy Expenditure

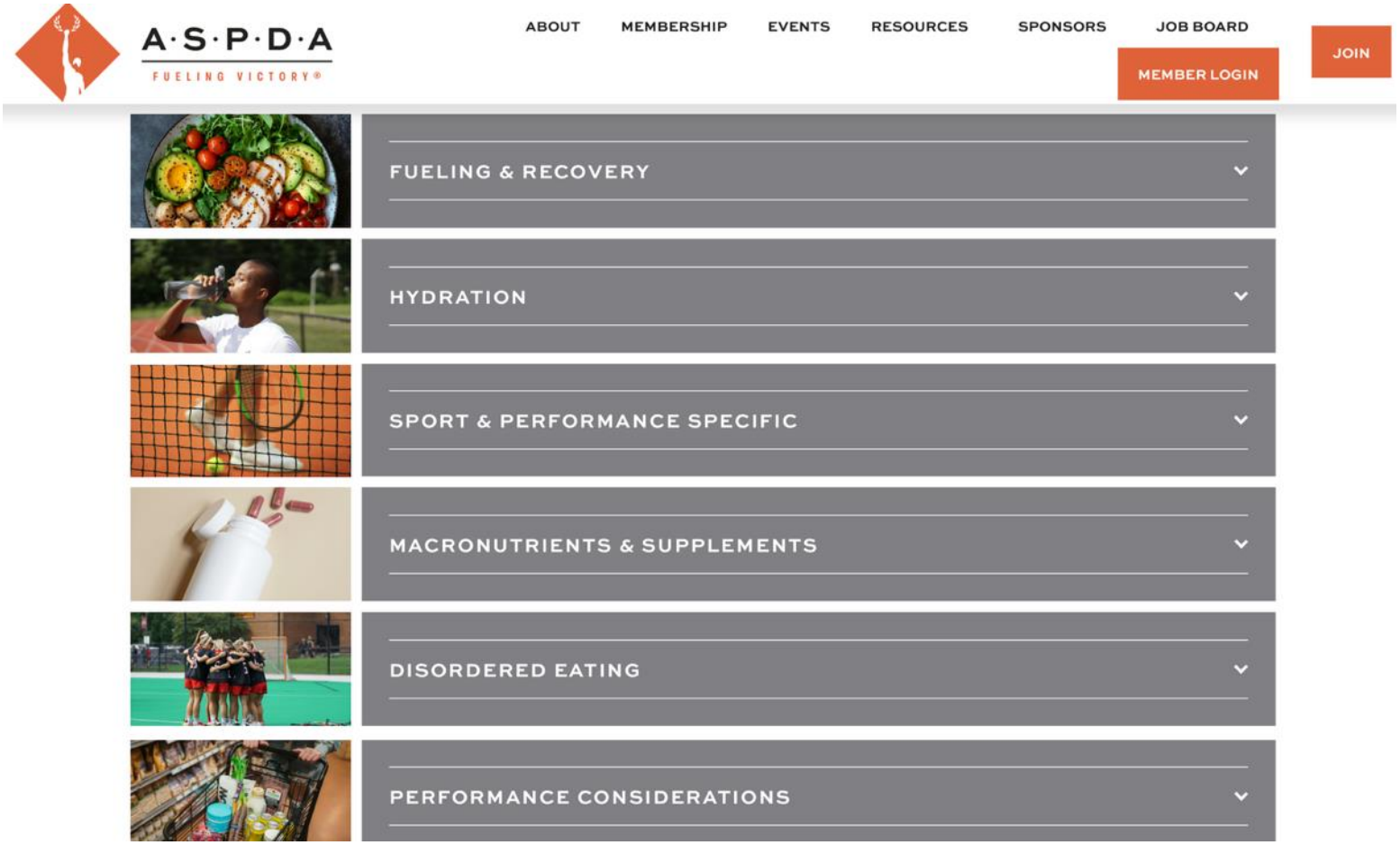
Activity Level (between 1.1-2.0)

Estimated TDEE Range: 16 / -16

Your Average TDEE: 0

https://www.leighpeele.com/mifflin-st-jeor-calculator

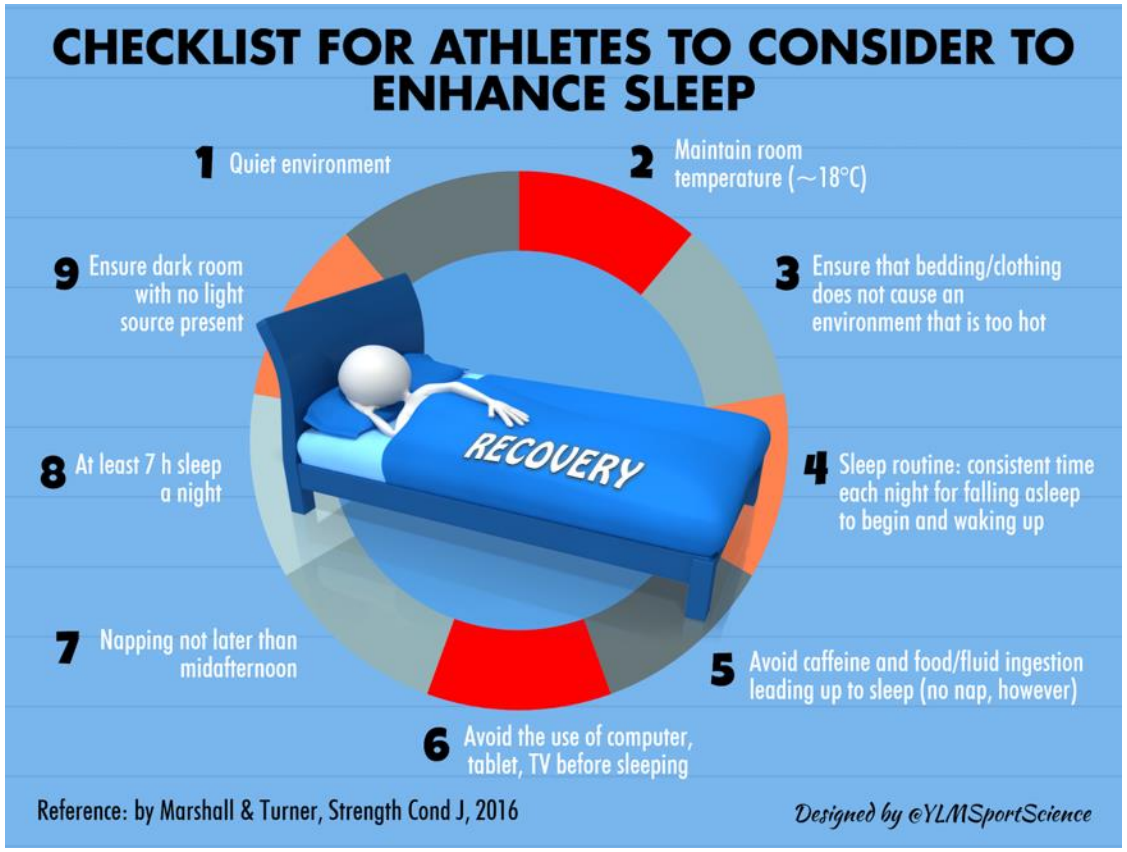
Nutrition Resources



https://sportsrd.org/downloadable-resources

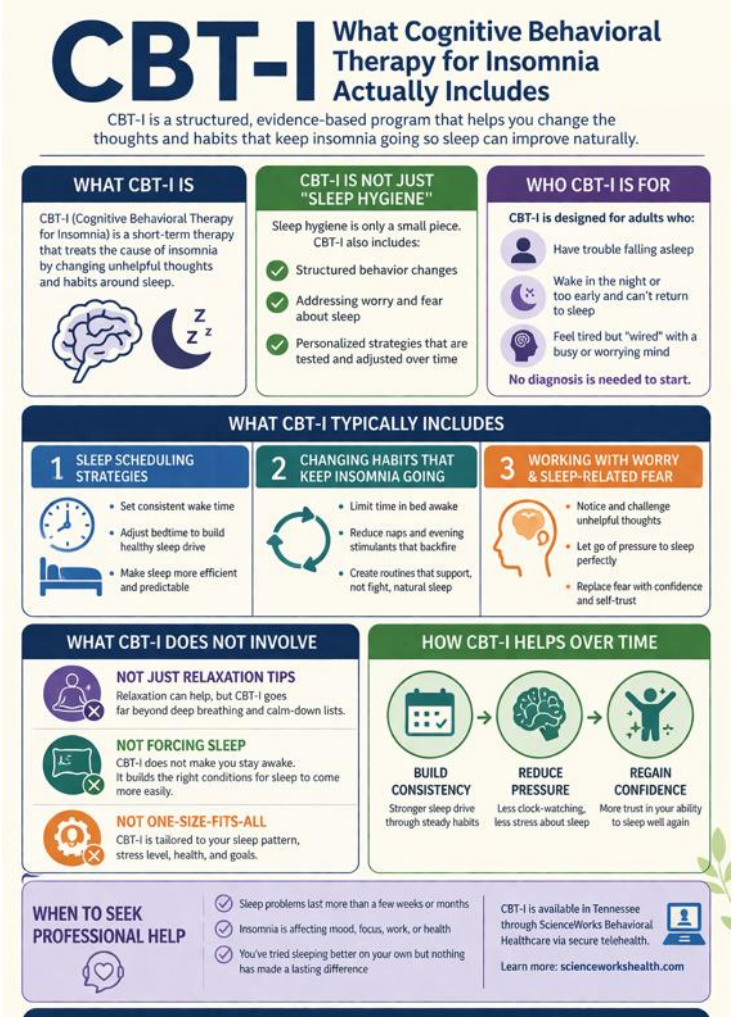
Sleep

- Aim for 7-9 hours per night
- Stress sleep hygiene
- Magnesium glycinate supplementation can be helpful
- 100-200mg 30-60min before bed
- Mindfulness



Sleep - CBTi

- Gold standard for insomnia and sleep disturbances
  - Dedication
  - Self-motivation
- Attacks root cause of insomnia

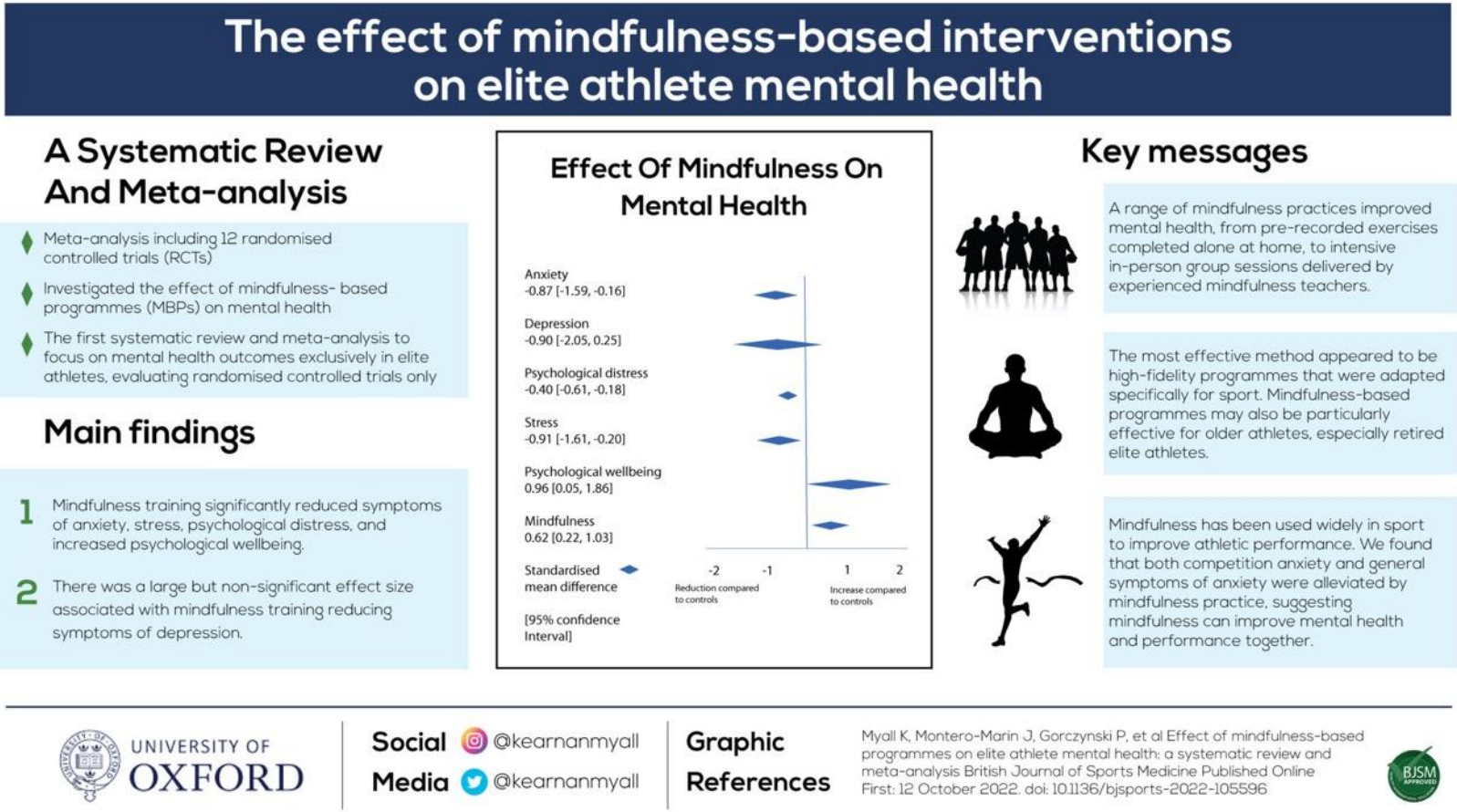


U.S. AIR FORCE

Mental Stress - Mindfulness

- Mediates stress
- Enhances mental and physical recovery [Sport J, 2015]
- Aids in psychological resilience as well as recovery [Front Psych, 2025]
- Lowers cortisol
- Improves sleep quality
- Decreases injury risk [J Sports Sci Med, 2021]
- Enhances endurance performance [Neural Plast, 2020]

Mindfulness

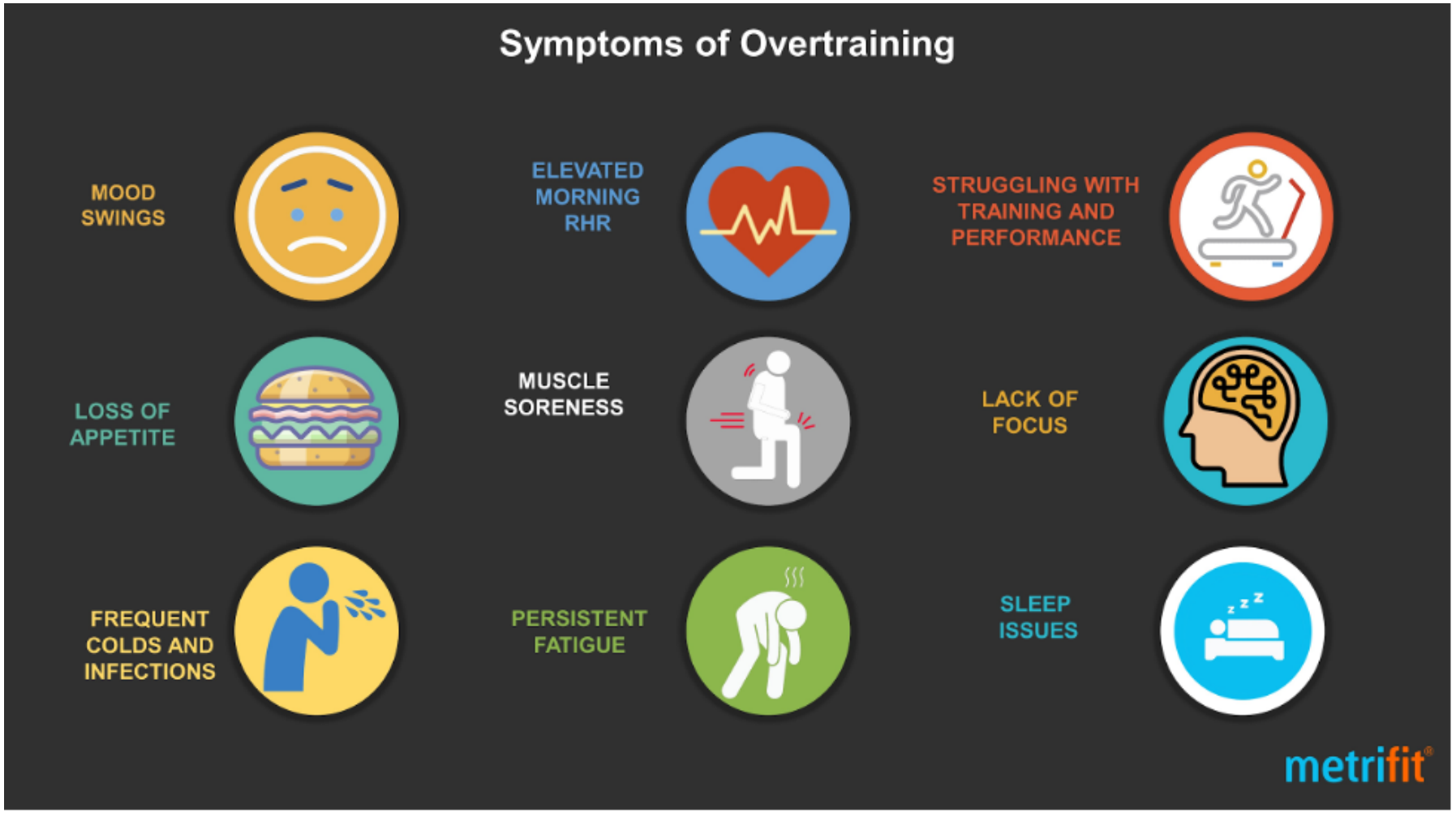


BJSM, The Effect of Mindfulness Interventions on Elite Athlete Mental Health, 2022

OTS – Diagnosis of Exclusion

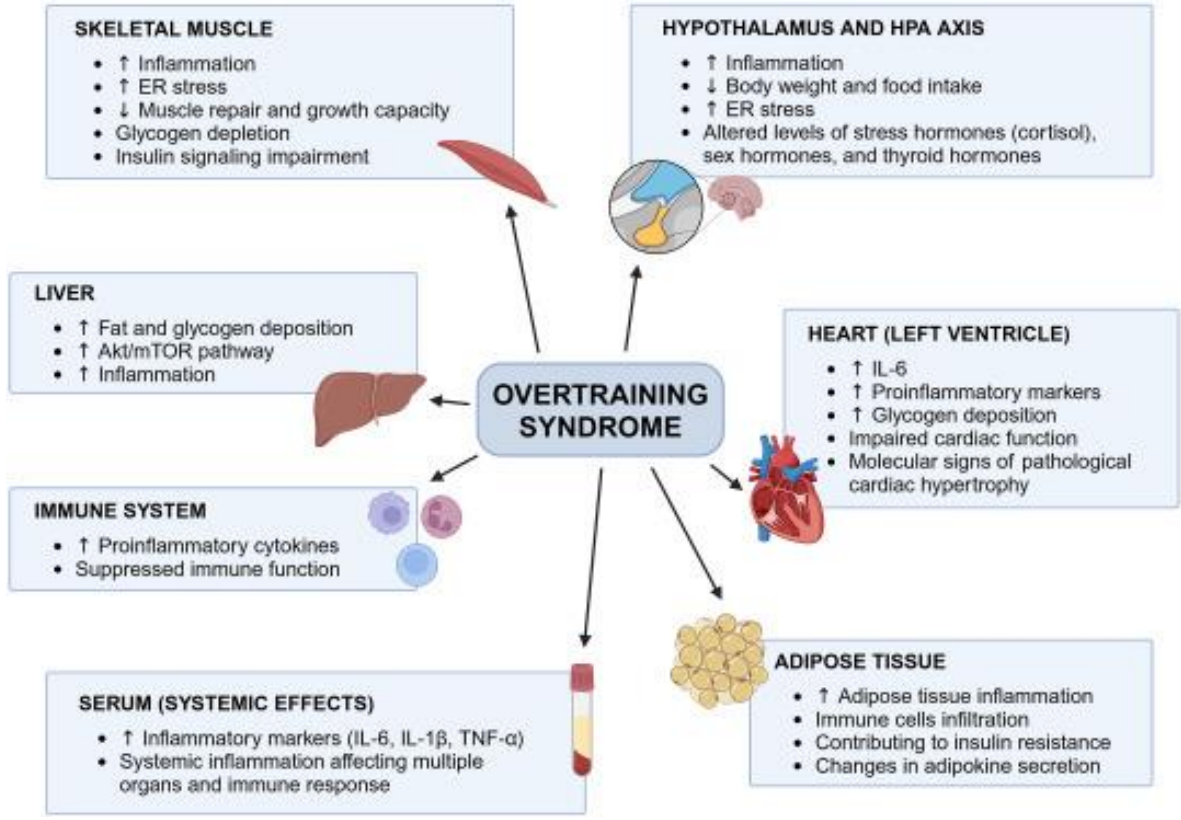
Overtraining Syndrome

- Overtraining syndrome is a complex medical condition that occurs when repetitive, intensive training overwhelms the body's ability to repair and recover.
- It is a state of chronic physical and psychological exhaustion where performance declines despite continued training, often taking weeks to months to heal


Symptoms of Overtraining
MOOD SWINGS
ELEVATED MORNING RHR
STRUGGLING WITH TRAINING AND PERFORMANCE
LOSS OF APPETITE
MUSCLE SORENESS
LACK OF FOCUS
FREQUENT COLDS AND INFECTIONS
PERSISTENT FATIGUE
SLEEP ISSUES
metrifit

- **Multisystem breakdown**
  - **Nervous system – balance of autonomic nervous system thrown off**
  - **Endocrine system – hormones out of balance, elevated cortisol, decreased testosterone or GH**
  - **Immune system – proinflammatory state that suppresses immune function**

[Sp Med Health Sci, 2025]



U.S. AIR FORCE

Stages of Overtraining

A three-stage model of the overtraining syndrome

It can start with the transition from healthy to unhealthy training, functional to nonfunctional overreaching, and positive exercise benefits to the onset of impairment. It is highlighted by abnormal physical, biochemical and mental-emotional injuries.

	Stage 1 Overtraining	Stage 2 Overtraining	Stage 3 Overtraining
Alternative Terms:	Acute uncompensated stress. Nonfunctional overreaching.	Excess stress. Sympathetic overtraining.	Chronic excess stress. Chronic overtraining.
Performance Response:	Increased training stress and/or lack of recovery. increased risk of health and fitness impairments. Onset of abnormal signs/symptoms.	Training and competitive performance decrements without prolonged recovery. Further health and fitness impairment, including immune and GI dysfunction.	Reduced HPA axis response to stress. Training and competitive performance greatly diminished with worsening health.
Symptoms:	Increased sense/awareness of stress and need for recovery/sleep. Increased fatigue, hunger and muscle soreness.	Fatigue, pain, depression, anxiety. Daytime sleepiness. Cravings for sweets.	More serious progression of symptoms from Stage 2. Reduced training and competitive motivation.
Signs:	Reduced submaximal performance (aerobic threshold). Increased resting HR, sleep disturbance.	Increased cortisol/sympathetic tone. Other hormone imbalance. Menstrual problems. Increased resting and exercise HR. Increased illness/physical injury. Sleep disturbance.	Serious progression of illness, injury, poor health. Reduced sympathetic & parasympathetic function, cortisol and other hormones. Reduced resting HR.
Actions:	Reduce training intensity and/or volume. Increase recovery and sleep. Address lifestyle stress including diet. Complete clinical evaluation if no response after one week.	Stop high-intensity training/competition, reduce training volume. Increase recovery/sleep. Address diet/other lifestyle stress. Complete clinical evaluation.	Eliminate hard training, competition. Reduce training volume significantly. Increase sleep. Ongoing clinical care including diet and other lifestyle stress.
Recovery:	Short: ~1-3 weeks	Moderate: ~1-3 or more months.	Long: months to years.

https://philmaffetone.com/the-overtraining-syndrome/

U.S. AIR FORCE

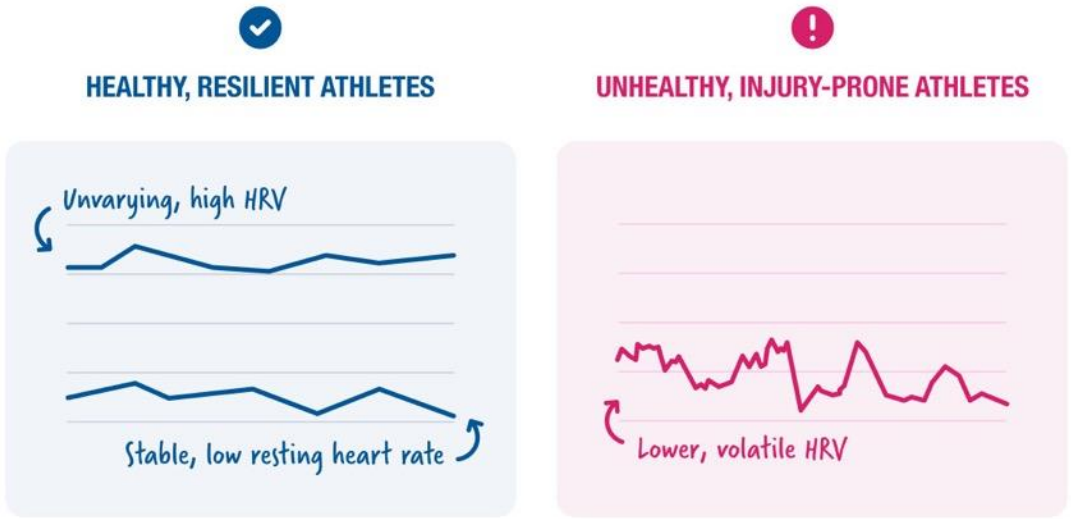
Prevention of Overtraining

- Prioritize structured recovery
  - 1 or 2 rest days per week
  - Sleep 7-9 hours
  - Nutrition/hydration
  - Monitor HRV/Fatigue Score
- HRV elevated = good, reduced = bad
  - Measure of autonomic variability
  - Indicates when body is recovered
  - Best if baseline established
- Monitor HRV
  - Oura ring*
  - Whoop band
  - Apple watch
- * Best at measuring RHR/HRV [Phyisol Rep, 2025]

U.S. AIR FORCE

Heart Rate Variability

- Natural, millisecond-level fluctuation in time intervals between consecutive heart beats
- HRV is driven by autonomic nervous system
  - Parasympathetic – promotes relaxation – increase time b/t
  - Sympathetic – stress – decreases time b/t
  - High HRV – relaxed, well recovered
  - Low HRV – symp syst overdrive



U.S. AIR FORCE

Recovery Coach

- Matt Dixon, a.k.a. “the Recovery Coach”
- “Lifestyle recovery is just as important as training recovery”
- Sleep, nutrition, fueling, naps, meditation
- Most common recovery related mistakes
  - Failing to refuel after workouts
  - Going too hard on easy days
  - Believing life is a spreadsheet

"Recovery" Training

- Busy orthopedic surgeon, small children, training and competing in Ironmans.
- Exhausted, performance dropped off severely.
- Low + ANA, RF
- SLE – DMARD
- Purple patch fitness training

Purple Patch Philosophy

U.S. AIR FORCE

Questions?