

*Practice
Implications*

*Final
Thoughts*

*Psychological
Impacts*

*Physiological
Impacts*

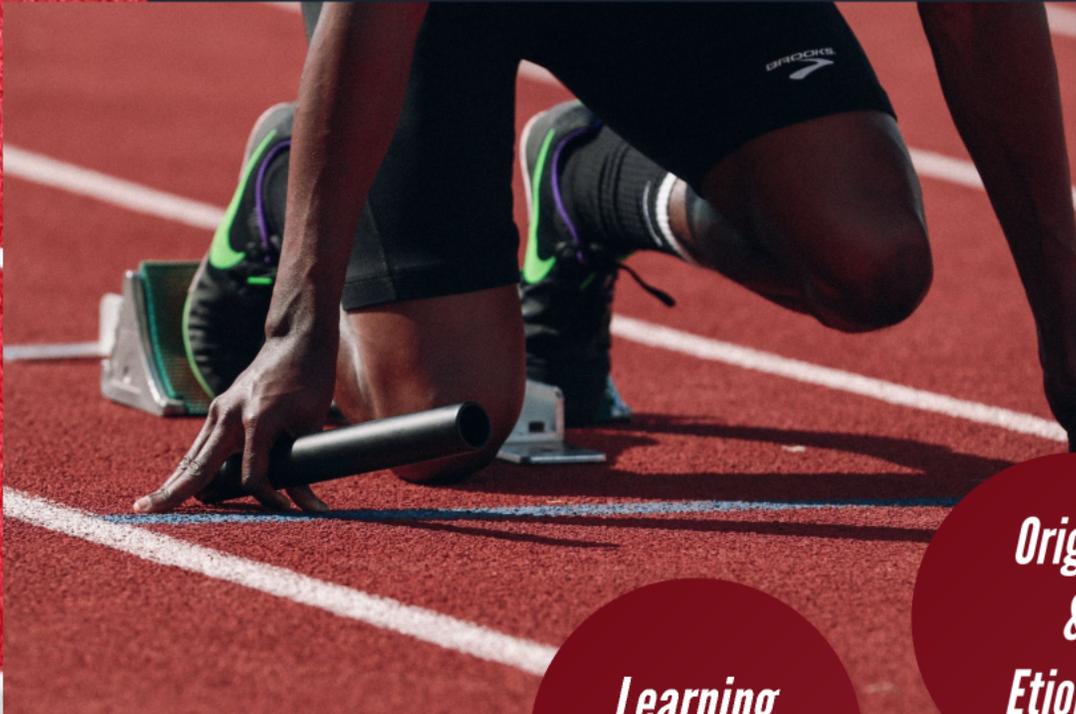
RED-S 101

PennWest
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**Relative Energy Deficiency in Sport (RED-S):
Psychological and Physiological Impacts on Athlete
Health & Performance**

By Brandon Lee, MS, RD, CSSD, CCRP

Relative Energy Deficiency in Sport (RED-S)



*Learning
Objectives*

*Origins
&
Etiology*

*Risk
Factors*

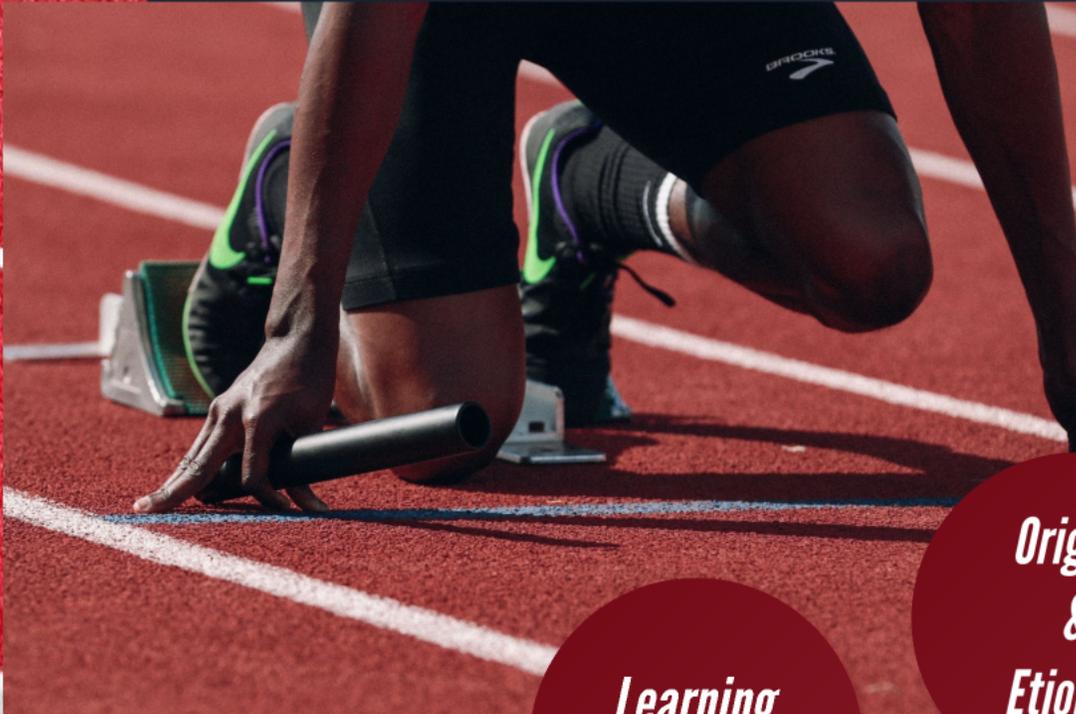
*Associated
Conditions*

Learning Objectives

By the end of the presentation, all attendees will...

1. Understand the origins and etiology of RED-S.
2. Be able to list three physiological impacts of RED-S.
3. Be able to list three psychological impacts of RED-S.
4. Be able to list at least two best practices for mitigating the development of RED-S in athletes.

Relative Energy Deficiency in Sport (RED-S)



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Relative Energy Deficiency in Sport (RED-S)

- Refers to diminished physiological processes due to *relative energy deficiency*.
- Developed in 2014 by the International Olympic Committee (IOC).
- Origins in the Female Athlete Triad.

Etiology= Low energy availability

- Obsessive causes= disordered eating or eating disorders.
- Intentional causes= attempts to modify body mass or composition.
- Inadvertent causes= byproduct of high energy expenditure of exercise.

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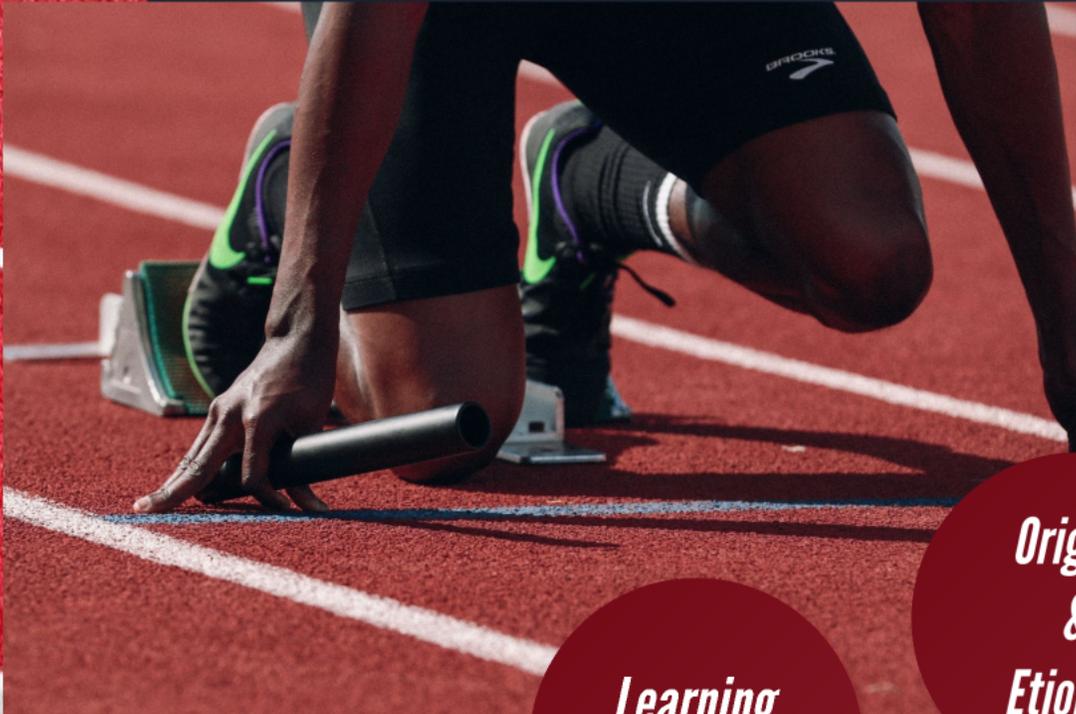
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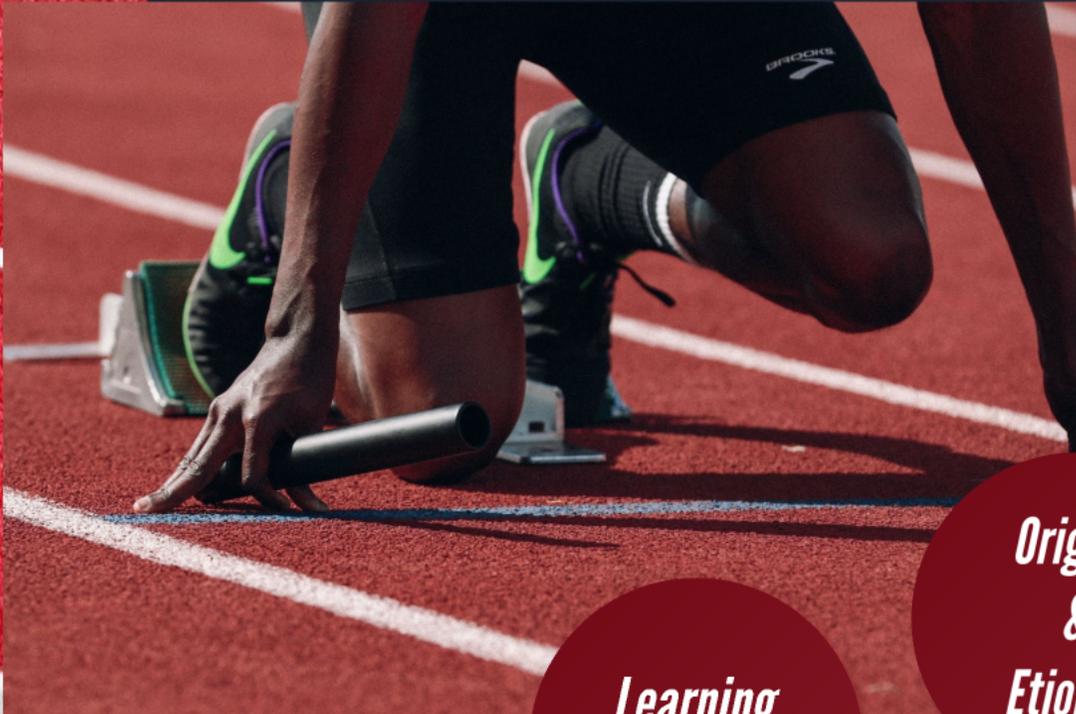
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RED-S Risk Factors:

- Inadequate energy intake.
- Excessive energy expenditure.
- History of disordered eating and eating disorders (DEED).
- Participation in sports of high intensity, duration, volume, or frequency-in both practice or competition schedules.
- Participation in sports that emphasize low body weight/fat, aesthetics, or thinness.



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Associated Conditions

Female Athlete Triad

- Low energy availability
- Impaired bone health
- Amenorrhea

Male Athlete Triad

- Low energy availability
- Impaired bone health
- Hypogonadotropic hypogonadism.

Overtraining Syndrome

- Also, nonfunctional overreaching.

Associated Conditions

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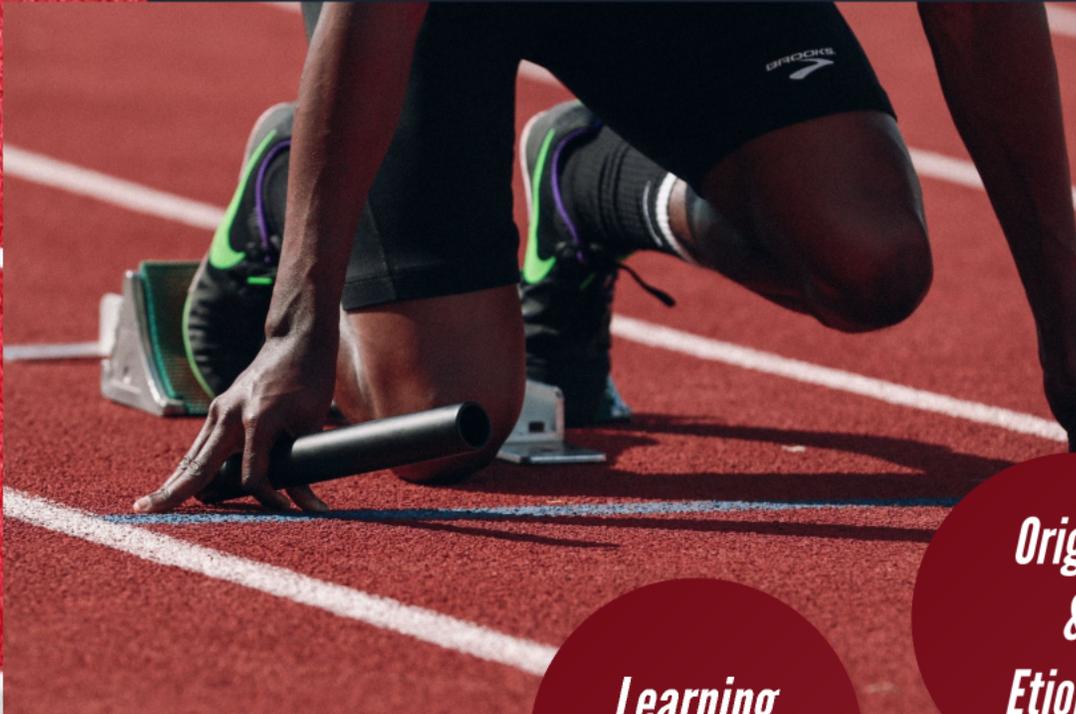


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(Brief Overview)

Physiological Impacts of RED-S



*Health
Impacts*

*Performance
Impacts*

Physiological Health Impacts

Biological Systems Impacted:

- Immunological
- Menstrual/reproductive function
- Bone health
- Metabolic
- Hematological
- Growth and development
- Cardiovascular
- Gastrointestinal



(Brief Overview)

Physiological Impacts of RED-S



*Health
Impacts*

*Performance
Impacts*

Physiological Performance Impacts

- Decreased endurance performance
- Increased injury risk
- Decreased training response
- Decreased glycogen stores
- Decreased muscle strength



(Brief Overview)

Physiological Impacts of RED-S



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Psychological Impacts of RED-S



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Psychological Health Impacts

- Mood disturbances/fluctuations
- Cognitive dietary restraint
- Drive for thinness
- Reduced sleep quality
- Perfectionistic behaviors
- Depressive symptoms and affective disorders
- Reduced well-being (self-reported)
- Exercise dependence/addiction
- Anxiety r/t injury or recovery
- Difficulty coping with weight requirements



Psychological Impacts of RED-S



*Health
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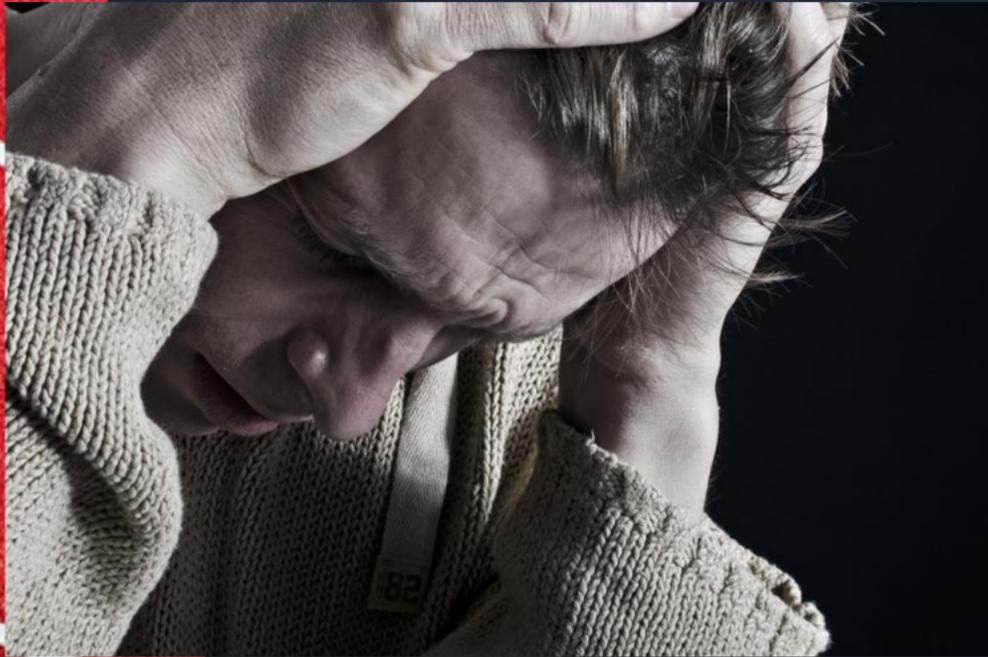
*Performance
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Psychological Performance Impacts

- Decreased training response (self-reported)
- Decreased recovery (self-reported)
- Reduced reaction time
- Impaired judgement, coordination, and concentration (self-reported)
- Decreased motivation
- Decreased endurance performance (self-reported)



Psychological Impacts of RED-S



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Practice Implications



Best Practices

Future Research

Best Practices for RED-S Mitigation



- Prioritize psychologically safe environments.
- Minimize social media influence.
- Discourage belief that a specific physique/weight/appearance will improve performance.
- Encourage body satisfaction.
- Protect athletes from societal/familial pressures.

Practice Implications



Best Practices

Future Research

Research Gaps

Call to action:

- Additional cross-sectional/longitudinal/*intervention* studies.
- *Low energy availability threshold* (especially men).
- Standardized methods for evaluating
 - Menstrual status and hormonal contraceptive
 - Physiological, hormonal and performance status
 - Energy availability

Practice Implications



Best Practices

Future Research

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Interdisciplinary Collaboration

High Performance Units:

- Head and Assistant Coaches
- Certified Mental Performance Consultants (CMPC)
- Sports Psychologists
- Strength and Conditioning Specialists (CSCS)
- Registered Dietitians
- Occupational Therapists
- Sports Scientists (e.g., CPSS)
- Medical Doctors
- Physical Therapists
- Biomechanists
- Biochemists





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References

- Burke, L., Deakin, V., Minehan, M. (2021). *Clinical sports nutrition*. (6th ed.). Sydney, Australia: McGraw Hill Education.
- Mountjoy, M., Ackerman, K. E., Bailey, D. M., Burke, L. M., Constantini, N., Hackney, A. C., Heikura, I. A., Melin, A., Pensgaard, A. M., Stellingwerff, T., Sundgot-Borgen, J. K., Torstveit, M. K., Jacobsen, A. U., Verhagen, E., Budgett, R., Engebretsen, L., & Erdener, U. (2023). 2023 International Olympic Committee's (IOC) consensus statement on Relative Energy Deficiency in Sport (REDs). *British Journal of Sports Medicine*, 57(17), 1073–1097. <https://doi.org/10.1136/bjsports-2023-106994>
- Mountjoy, M., Sundgot-Borgen, J., Burke, L., Ackerman, K. E., Blauwet, C., Constantini, N., Lebrun, C., Lundy, B., Melin, A., Meyer, N., Sherman, R., Tenforde, A. S., Torstveit, M. K., & Budgett, R. (2018). International olympic committee (IOC) consensus statement on relative energy deficiency in sport (RED-S): 2018 update. *International Journal of Sport Nutrition & Exercise Metabolism*, 28(4), 316–331. <https://doi.org/10.1123/ijsnem.2018-0136>



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Continuing Education

Articles:

- *"2023 International Olympic Committee's (IOC) consensus statement on Relative Energy Deficiency in Sport (REDs)" - BMJ*
- *"These young athletes were bound for stardom until a mysterious condition derailed their running careers." -CNN Sports*

Organizations/Networking:

- The Female and Male Athlete Triad Coalition
- American Sports and Performance Dietitians Association (ASPDA)





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