

# Identification Method of Relative Energy Deficiency in Sport (RED-S) in Male Athletes: A Literature Review

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## ABSTRACT

**Introduction:** Relative Energy Deficiency in Sport (RED-S) is a well-established condition in female athletes; however, its prevalence and consequences in male athletes remain underrecognised. Growing evidence indicates that low energy availability in men results in adverse health and performance outcomes, including impaired bone health, endocrine dysfunction, and psychological disturbances such as exercise dependence. Increased awareness of RED-S in male athletes is essential for early identification and prevention of long-term complications.

**Aim:** This systematic review aimed to synthesise current evidence on the presentation, risk factors, and health consequences of RED-S specifically in male athletes.

**Materials and Methods:** A systematic literature search was conducted according to PRISMA guidelines using PubMed, Scopus, Cochrane, MEDLINE, and EMBASE databases. Search terms included relative energy deficiency, bone mineral density, exercise dependence, and male athlete, combined using Boolean operators AND/OR. Filters were applied to include free full-text

articles published within the last five years. A total of 22 articles were identified, of which 15 were available in full text. Seven studies met the inclusion criteria, involving male athletes with LEA and reporting outcomes related to bone health, endocrine function, athletic performance, or psychological risk factors.

**Results:** Analysis of the included studies revealed a high prevalence of RED-S risk, ranging from 51% to 72%, particularly among endurance athletes. LEA was consistently associated with reduced bone mineral density, altered endocrine markers, and impaired athletic performance. Exercise dependence emerged as a significant psychological contributor. Several studies questioned the applicability of female-derived diagnostic thresholds for identifying RED-S in male athletes.

**Conclusion:** RED-S is a prevalent and clinically important syndrome in male athletes, driven by LEA and psychological factors, leading to impaired bone health and performance. Current diagnostic frameworks require modification to incorporate male-specific physiological characteristics.

**Keywords:** Athletic performance, Fatigue, Psychology.

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