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The Effect of Pedal Cadence on Neuromuscular and Physiological Responses: A Scoping Review

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Protocol status: Working

We use this protocol and it's working

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Keywords: Cycling, pedal frequency, motor unit activation, neuromuscular function, fatigue, performance, effect of pedal cadence, pedal cadence, pedal speed, pedal speed on the activation, neuromuscular, physiological response, optimal parameters for different training, different training

Disclaimer

Funding sources/sponsors: None

Conflicts of interest: None

Abstract

The aim of the study is to summarise the data on the influence of pedal speed on the activation of motor units and to determine the optimal parameters for different training and competition conditions.

Guidelines

The study will be conducted in accordance with the Preferred Reporting Items for Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR), The Preferred Reporting Items for Systematic Review and Meta-Analyses Protocols (PRISMA-P) statement.

Inclusion criteria base on the PICOS system.

To increase the breadth of coverage, we will also screen reference lists of potentially relevant studies.

We will not limit our search by publication date or language. If it is not possible to obtain a study from a publicly available database, we will contact the authors by email and wait for a response within 14 days.

Search strategy:



Abstract

- 1 Speed of movement plays a key role in determining various aspects of physical performance, especially in cycling. Cadence (C), measured in pedal revolutions per minute, is an important factor influencing the body's metabolic and mechanical responses to exercise intensity. Research shows that high C at low exercise intensities is associated with increased heart rate and blood lactate concentrations, while at submaximal loads, performance decreases at higher C. These differences are due to the activation of different muscle fiber types (type I, IIa, IIx), which have different metabolic and biomechanical properties. Fast-twitch fibers, active at high C, are less energetically efficient but have high contractile power. In addition, the preferred C in elite athletes varies with training level, reflecting individual differences in fiber type distribution and neuromuscular capabilities.

Original language title

- 2 In Russian: **Влияние частоты вращения педалей на нейромышечные и физиологические реакции: обзор предметного поля**

Anticipated or actual start date

- 3 06.05.2025

Anticipated completion date

- 4 06.06.2025

Stage of review at time of this registration

- 5 Pilot screening has completed

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Inclusion Criteria (PICOS)

8 P – Healthy professional cyclists, recreational cyclists and active people; I – Performance of exercise protocols on a bicycle ergometer with different cycling cadences; C – Comparison with a control group or comparison of protocols with each other; O – Tests assessing physiological and biochemical parameters; S – controlled randomized and non-randomized studies.

Exclusion Criteria

9 Books, research published in collections of materials of scientific and practical conferences

Selection and extraction

10 In parallel by two authors

Protocol references

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