The Effect of Periodization and Training Intensity Distribution Models on Cycling Performance

Systematic Review Protocol Registration

20th January 2021

Review title
The effect of periodization and training intensity distribution models on cycling performance

Start date
January 2021

Estimated Completion date
July 2021

Stage of review at time of this submission
Following inclusion of physiological measures

Review Stage	Started	Completed
Preliminary searches	No	No
Piloting of the study selection process	No	No
Formal screening of the search results against eligibility criteria	No	No
Data extraction	No	No
Risk of bias assessment	No	No
Data analysis	No	No

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Funding sources/sponsors
This review is undertaken as part of Phillip Smith's PhD programme, which is funded by Teesside University.

Conflicts of interest
None

Collaborators
None

Review question
Do training interventions involving different periodization and training intervention models improve performance and lead to positive physiological adaptations in endurance cyclists, either compared to a control or compared to another intervention?

Searches
The following databases will be searched; Scopus, Web of Science, SPORTDiscus, and PubMed. There is no restriction on the date of publication, results are limited to the English language.

Search strategy

PICO Format	Search Term
Participant	"cyclist*" OR "cycling" OR "bicyclist"
AND	
Intervention	"randomi*" OR "intervention" OR "control" OR "trial"
AND	
Comparator	"training" OR "conditioning" OR "program*" OR "intervention"
AND	
Outcome	"time trial" OR "time-trial*" OR "TTE" OR "time to exhaustion" OR "time-to-exhaustion" OR "perform*" OR "VO2*" OR "peak oxygen uptake" OR "maximal oxygen uptake" OR "lactate t*" OR "LT" OR "critical power" OR "ventilatory threshold" OR "aerobic threshold" OR "anaerobic threshold" OR "onset of blood lactate accumulation" OR "OBLA" OR "functional threshold power" OR "FTP" OR "economy" OR "efficiency" OR "cadence" OR "power"

Condition or domain being studied
The outcome being studied is cycling performance, either as a direct measure of performance from time to exhaustion or a time trial, or as a physiological measure associated with performance such as VO_{2max}, or lactate threshold.

Participants/population
Inclusion
Endurance trained cyclists, aged 18+, any sex.

Exclusion
Non-endurance trained cyclists e.g., track sprint, untrained participants, aged under 18.

Intervention(s), exposure(s)
Inclusion
A training intervention of at least four weeks duration. Training intervention involves the manipulation of factors such as intensity, volume, frequency and order of training sessions.
Exclusion
The intervention is under four weeks duration or is just a comparison of two different interval training programmes.

Comparator(s)/control
Inclusion
Studies in which a control group is present (participants' normal training) or another intervention is the comparator.
Exclusion
No control group or comparator, simply the effects of x intervention over time.

Types of study to be included
Inclusion
All settings will be included, including both laboratory and field-based tests of performance.
Exclusion
Studies which do not conduct performance or physiological tests and simply report the training structure and/or distribution of athletes.

Context
Inclusion
The studies for inclusion must involve a specific model of periodization or intensity distribution.
Exclusion
Studies which compare interval training protocols, with no variation in structure or intensity. E.g., 4-minute HIT intervals vs 30 second HIT intervals.

Main outcome(s)
Identify the effects different training intensity distributions and periodization models have on cycling, as measured by performance tests such as time trials and time to exhaustion tests, and physiological tests such as VO_{2max} and lactate threshold tests.

We will also examine the length of an intervention to determine if an optimal effect from a certain model is most effective over a certain period of training e.g., a high intensity TID model is superior over the short-term but a polarised TID is superior over a longer term.

Measures of effect
This is likely to be a change in time trial performance (in seconds or minutes) or a percentage change in cycling performance. Physiological measures may be reported as a percentage change or as absolute units e.g., power output at lactate threshold/VO_{2max} (w). The data will likely be continuous and ratio in nature and the studies would likely involve a statistical test for these types of data, e.g., an independent *t*-test on the baseline to follow-up changes or an ANCOVA approach.

Additional outcome(s)
The physiological measures were previously listed as additional outcomes but are now incorporated into the main aim.

Data extraction (selection and coding)
All articles will be imported from individual databases into a reference management software (EndNote) and duplicates removed. Results will be screened for relevance by one reviewer to ensure they meet the inclusion criteria. Title and abstracts will be screened by two reviewers (do you still want to do this?), followed by full text screening for final articles. Any disagreements regarding inclusion will be resolved by a third reviewer.
Data extracted from studies, suitable for inclusion will be collected into a spreadsheet by one reviewer, with another checking for accuracy.
The data to be extracted includes any physiological and performance measures as well as participant physiological and anthropometric descriptors.

Risk of bias (quality) assessment
Two researchers will independently assess the risk of bias using the Cochrane Collaboration's tool for assessing the risk of bias. Any disputes will be resolved by a third reviewer.
Seven domains will be reviewed:
Sequence generation
Allocation concealment
Blinding of participants and personnel
Blinding of outcome assessment
Incomplete outcome data
Selective outcome reporting
Other (e.g., similarity of baseline and timing outcome assessment)
These will be scored as high, low or unclear by the reviewers, in the case of disagreement a third reviewer will be consulted.
Studies will not necessarily be disregarded based on the risk of bias, but it will be considered and noted when summarising and interpreting the results.

Strategy for data synthesis
A full narrative synthesis will be conducted and if the findings permit, a meta-analysis will be completed using the Comprehensive Meta-Analysis software package.

Analysis of subgroups or subsets
There is potential exploration different TID and periodization models and sex.

Type and method of review
Type of review
Intervention
Meta-analysis
Systematic review
Narrative synthesis

Area of the review
Sports performance

Language
English

Country
England

Dissemination plans
Do you intend to publish the review on completion?
Yes
Journal article, conference presentation and PhD thesis

Keywords
Cycling Performance, Periodisation, Periodization, Intensity distribution, Endurance, VO_{2max}, Lactate threshold.

Details of any existing review of the same topic by the authors
N/A

Current review status
Not yet started