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Self-monitored low-volume sprint interval training with burpees: a practical strategy for enhancing health in aspiring pilots

Submission date 16/01/2025	**Recruitment status** No longer recruiting	[_] Prospectively registered [_] Protocol [_] Statistical analysis plan [X] Results [_] Individual participant data
Registration date 20/01/2025	**Overall study status** Completed	
Last Edited 20/08/2025	**Condition category** Other	

Plain English summary of protocol

Background and study aims

Recent research has explored the applicability of sprint interval training (SIT) among untrained and sedentary individuals, yet traditional four-bout protocols remain challenging due to their high intensity and lengthy recoveries. Low-volume SIT (REHIT) shortens sprints to lessen discomfort while preserving SIT's health benefits. The remarkable time efficiency of REHIT renders it an attractive exercise modality for individuals who face time constraints or lack a consistent window for regular physical activity. Performing REHIT with burpees requires little space and equipment, making it a promising, time-efficient exercise option for individuals such as pilots and flight cadets who have busy schedules and limited access to conventional fitness facilities. The main goal of this study is to determine whether sprint interval training performed through burpees (BIT) is feasible, practical, and effective for improving fitness under these constrained conditions.

Who can participate?

Healthy male individuals aged 18 to 22 years aspiring to become civil aviation pilots and currently enrolled in a university-level aviation training program were recruited for this study.

What does the study involve?

The study involves 12-week exercise interventions with a BIT protocol performed either under supervision or individually, and an identical cycling protocol with an identical protocol design as the BIT.

What are the possible benefits and risks of participating?

Participants are expected to benefit from improved health and the risks associated with the exercise intervention are minimal.

Where is the study run from?

Civil Aviation University of China

When is the study starting and how long is it expected to run for?
January 2024 to July 2024

Who is funding the study?
This study was funded by the Research on the Reform and Practice of College Physical Education Curriculum System for Flight Technology Majors under the Strategy of Building a Strong Civil Aviation Nation in the New Era (Project No. B231005911), supported by the Tianjin Municipal Education Commission in China

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Additional identifiers

Protocol serial number
TRIAL20240301

Study information

Scientific Title
Effects of self-monitored or supervised low-volume sprint interval training with burpees on physical health and mental health in flight cadets

Study objectives
It was hypothesized that sprint interval training performed through burpees (BIT) would induce lower physiological strain and more favorable affective responses than the cycling-sprint interval training (SIT) protocol. Moreover, it was further posited that the BIT intervention would enhance physical fitness and mental health outcomes to a degree comparable to the cycling-SIT protocol.

Ethics approval required
Ethics approval not required

Ethics approval(s)
Under Civil Aviation University of China regulations, the interventions in this study—standard exercise sessions—pose minimal risk to participants. The University does not currently have a formal ethics committee for this type of non-invasive, exercise-based research. Upon review by the University's relevant departments, it was determined that the study's procedures are exempt from requiring additional ethics approval.

Primary study design
Interventional

Study design
Randomized controlled trial

Study type(s)
Quality of life, Efficacy

Health condition(s) or problem(s) studied
Improving physical fitness and mental health in healthy flight cadets

Interventions
A simple randomization using Excel as the pseudo-random number generator for assigning participants to groups was applied, which gives every participant an equal probability of ending up in any group, maintaining the essence of simple randomization. The randomization allocation is concealed from both the participants and the research team until the commencement of the exercise sessions.

The 12-week randomized control intervention involved three exercise groups and one control group without intervention. Two of the exercise groups performed a sprint interval training protocol (SIT) using burpees involving 2 × 20 seconds sprints interspersed with 10-second passive recovery, either under direct supervision in an office setting (BIT) or independently in a real-world environment (BIT-RW). The third exercise group performed identical SIT on cycle ergometers under supervision in a laboratory. Participants were randomly allocated into the four groups. All allocations were concealed from both the participants and the research team until the commencement of the exercise sessions.

Intervention Type
Behavioural

Primary outcome(s)
1. VO2max measured using maximal incremental exercise tests
2. Body mass measured using standardized procedures (i.e., participants wore light clothing and were barefoot) on a weighing scale
3. Blood pressure measured using an electronic sphygmomanometer
4. Stress measured using the 10-item Perceived Stress Scale (PSS-10)
5. Anxiety measured using the 7-item Generalized Anxiety Disorder Scale (GAD-7)

6. Depression measured using the 21-item Beck Depression Inventory-II (BDI-II)
7. Sleep quality measured using the Pittsburgh Sleep Quality Index (PSQI)
8. Health-related quality of life measured using the 36-Item Short Form Health Survey (SF-36)

All measurements (1-8) were conducted at baseline and 72 hours after the 12-week intervention
9. Affective responses measured using the Feeling Scale (FS) during each exercise session throughout the 12-week intervention
10. Enjoyment measured using the Physical Activity Enjoyment Scale (PACES) and the Exercise Enjoyment Scale (EES0 during each exercise session throughout the 12-week intervention

Key secondary outcome(s)
1. Heart rate measured using the heart rate sensor during each exercise session throughout the 12-week intervention
2. Perceived exertion measured by the Borg Rating Of Perceived Exertion during each exercise session throughout the 12-week intervention

Completion date
31/07/2024

Eligibility

Key inclusion criteria
Healthy male individuals aspiring to become civil aviation pilots and currently enrolled in a university-level aviation training program

Participant type(s)
Healthy volunteer, Learner/student

Healthy volunteers allowed
No

Age group
Adult

Lower age limit
18 Years

Upper age limit
22 Years

Sex
Male

Total final enrolment
319

Key exclusion criteria

1. Medical history of chronic conditions, including type 2 diabetes, cardiovascular diseases, or any other illnesses or abnormalities that could potentially impact exercise performance
2. Obesity (defined as a BMI exceeding 35 kg/m²)
3. Classified as highly active according to the International Physical Activity Questionnaire (IPAQ)

Date of first enrolment
01/03/2024

Date of final enrolment
10/03/2024

Locations

Countries of recruitment
China

Study participating centre
Civil Aviation University of China
No. 2898 Jinbei Road
Dongli District
Tianjin
China
300300

Sponsor information

Organisation
Tianjin Municipal Education Commission

ROR
https://ror.org/01z7y3r39

Funder(s)

Funder type
Government

Funder Name
Research on the Reform and Practice of College Physical Education Curriculum System for Flight Technology Majors under the Strategy of Building a Strong Civil Aviation Nation in the New Era (Project No. B231005911)

Results and Publications

Individual participant data (IPD) sharing plan

The data-sharing plans for the current study are unknown and will be made available at a later date

IPD sharing plan summary

Data sharing statement to be made available at a later date

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article		25/06/2025	20/08/2025	Yes	No