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High-intensity interval training improves the reactive strength index and motor ability of youth football players

Submission date 15/07/2025	**Recruitment status** No longer recruiting	[_] Prospectively registered [X] Protocol
Registration date 16/07/2025	**Overall study status** Completed	[X] Statistical analysis plan [_] Results
Last Edited 17/07/2025	**Condition category** Other	[_] Individual participant data [X] Record updated in last year

Plain English summary of protocol

Background and study aims
This study looks at how a type of exercise called high-intensity interval training (HIIT) might help young football players improve their physical abilities. Researchers wanted to see if HIIT could make them faster, stronger, more agile, and better at jumping.

Who can participate?
The study involved 20 healthy boys aged 11 to 13 who were already training at a local football academy.

What does the study involve?
The boys were split into two groups. One group did extra HIIT workouts for four weeks, along with their regular football training. The other group just continued with their usual training. The HIIT sessions included short sprints and jumping exercises, done three times a week. Before and after the training, all participants took part in physical tests to measure things like speed, agility, strength, and jumping ability.

What are the possible benefits and risks of participating?
The main benefit is that the training might help improve athletic performance, especially in speed and explosive power. The risks were very small and mostly related to normal muscle soreness or feeling tired. All sessions were supervised to make sure the boys stayed safe.

Where is the study run from?
The study was carried out on a football field in Tatvan, Bitlis, Turkey.

When is the study starting and how long is it expected to run for?
Recruitment for the study began on 1 February 2025 and ended on 10 February 2025. The training program ran from 15 February to 15 March 2025.

Who is funding the study?
Investigator initiated and funded

Who is the main contact?
Dr Serkan Kızılca, skizilca@beu.edu.tr

Contact information

Type(s)
Public, Scientific, Principal investigator

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Additional identifiers

Clinical Trials Information System (CTIS)
Nil known

ClinicalTrials.gov (NCT)
Nil known

Protocol serial number
Nil known

Study information

Scientific Title
The effects of high-intensity training on jumping and movement skills in youth football players

Acronym
HIIT-RSI-Football-Youth

Study objectives
The aim of this study was to determine the effects of a four-week high-intensity interval training (HIIT) intervention on reactive strength index (RSI) and motor skills in youth football players. In this context, the contributions of the HIIT protocol, implemented in addition to regular football training, to motor performance indicators such as speed, agility, jump performance, and back strength were evaluated. This study aims to contribute to the development of scientifically based training programs to support performance improvement in young athletes.

Ethics approval required
Ethics approval required

Ethics approval(s)
approved 02/01/2025, Non-Invasive Clinical Research Ethics Committee of Bitlis Eren University (Bitlis, Bitlis, 13000, Türkiye; +90 4342220000; beugokaek@beu.edu.tr), ref: Decision No: 13, Protocol No: 2024/9

Study design
Interventional randomized controlled trial

Primary study design
Interventional

Study type(s)
Efficacy

Health condition(s) or problem(s) studied
Neuromuscular performance, reactive strength, and motor abilities related to physical fitness and athletic development in adolescent football players.

Interventions
The experimental group underwent a 4-week high-intensity interval training (HIIT) program in addition to their regular football training. Training sessions were conducted three times per week (Monday, Wednesday, and Friday) on a natural grass field. Each session consisted of 2 sets of 6 sprint-based repetitions lasting 15 seconds each, with 30 seconds of passive rest between repetitions and 3 minutes of rest between sets. The training intensity was progressively increased from 80% to 90% throughout the intervention. A standardized 15-minute warm-up protocol was performed before each session. Target heart rate zones were monitored using the Karvonen formula. The control group continued with their routine football training without any additional intervention.

To evaluate the effects of the intervention, the following physical performance tests were conducted before and after the training period:
10 m, 20 m, and 30 m sprint tests
Back strength test (using a dynamometer)
Illinois agility test
Countermovement jump (CMJ) test
Reactive strength index (RSI) assessment
All tests were conducted on a natural grass field using standardized warm-up and recovery procedures.

Participants were randomly assigned to either the experimental or control group using a computer-generated sequence created in Microsoft Excel. The allocation sequence was generated by an independent researcher who was not involved in participant recruitment or assessment. Group assignments were concealed in sequentially numbered, opaque, sealed envelopes to maintain allocation concealment.

Intervention Type
Behavioural

Primary outcome(s)
Reactive Strength Index (RSI), measured using the Smart Jump system, assessed pre- and post-intervention

Key secondary outcome(s))
Assessed pre- and post-intervention:
1. Sprint Performance: 10 m, 20 m, and 30 m sprint times measured using electronic timing gates to assess linear speed.
2. Back Strength: Assessed using a Takei dynamometer to evaluate maximal isometric strength.
3. Illinois Agility Test: Used to assess agility and change of direction ability on a standardized slalom course.
4. Countermovement Jump (CMJ): Vertical jump height measured using the Smart Jump system to assess explosive leg power.
5. Anthropometric Measurements: Body height and body weight measured to monitor physical characteristics of participants.

Completion date
15/03/2025

Eligibility

Key inclusion criteria
1. Aged 13 years or younger
2. Actively playing football (registered at a football academy)
3. Participated in regular football training within the past 6 months
4. Physically healthy (no chronic illness or injury)
5. Willing to voluntarily participate in the study
6. Signed informed assent form
7. Written parental/legal guardian consent obtained

Participant type(s)
Healthy volunteer

Healthy volunteers allowed
No

Age group
Child

Lower age limit
11 years

Upper age limit
13 years

Sex
Male

Total final enrolment
20

Key exclusion criteria
1. Presence of any chronic disease
2. Orthopedic disorders or musculoskeletal injuries
3. Recent or ongoing infections
4. Requirement for continuous medication use
5. Lack of informed assent or parental/legal guardian consent
6. Voluntary withdrawal from the study at any stage
7. Failure to regularly attend training sessions or test procedures

Date of first enrolment
01/02/2025

Date of final enrolment
10/02/2025

Locations

Countries of recruitment
Türkiye

Study participating centre
Tatvan Fairground Football Field
Fairground Area, next to Tatvan Municipality
Bitlis
Türkiye
13200

Sponsor information

Organisation
Bitlis Eren University

ROR
https://ror.org/00mm4ys28

Funder(s)

Funder type
Other

Funder Name

Investigator initiated and funded

Results and Publications

Individual participant data (IPD) sharing plan

The individual participant data (IPD) collected and/or analyzed during this study will not be shared publicly due to ethical and privacy considerations involving underage participants. The datasets will be securely stored by the principal investigator and used solely for the purposes of the current study. No repository or public access is planned at this time.

Participants' data will remain confidential and will not be uploaded to any open-access repository. There are currently no plans to make these datasets available upon request, and no timeline has been set for future sharing. If any data sharing is considered in the future, proper anonymization and ethical approval will be obtained before release.

IPD sharing plan summary

Not expected to be made available

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Participant information sheet			16/07/2025	No	Yes
Participant information sheet	Participant information sheet	11/11/2025	11/11/2025	No	Yes
Protocol file			16/07/2025	No	No
Statistical Analysis Plan			16/07/2025	No	No