Clinical Trial Protocol
Iranian Registry of Clinical Trials

22 Nov 2026

Comparison of the effects of eight weeks of neuromuscular, plyometric, and combined training on soccer performance and skills in adolescent male players with different levels of biological maturation and motor competence

Protocol summary

Study aim

Comparing the effects of eight weeks of neuromuscular, plyometric, and combined training on physical performance indicators (strength, speed, agility, explosive power, and endurance) and football technical skills (passing accuracy, shooting accuracy, dribbling, ball control, and decision-making) in adolescent male players aged 13-16 years with different levels of biological maturation and motor competence.

Design

Randomized controlled trial, single-blind (outcome assessors), parallel four-group, pre-test/post-test, sample size 60, software randomization, phase not applicable.

Settings and conduct

Study setting: Football academy. After screening and consent, 8-week intervention will be held in standard hall under expert trainer supervision. Blinding: Assessments by blinded assessors at pre-test and post-test.

Participants/Inclusion and exclusion criteria

Inclusion criteria: male adolescents 13-16 years; at least 2 years of football training; medical clearance; no injury in last 3 months; consent. Exclusion criteria: grade 2 or higher injury in last 6 months; uncontrolled chronic disease; use of steroids or growth hormones; concurrent participation in another training program.

Intervention groups

Intervention group 1 (Neuromuscular) : 8 weeks, 3×45-60min/week, balance, core stability, and motor control exercises. Intervention group 2 (Plyometric): 8 weeks, 3×45-60min/week, jumping and explosive exercises. Intervention group 3 (Combined): 8 weeks, 3×45-60min/week, combination of neuromuscular and plyometric training. Control group: no intervention.

Main outcome variables

Physical performance (lower body strength by vertical jump; speed by 20m sprint; agility by T-test; upper body strength by bench press; aerobic endurance by Yo-Yo test; anaerobic power by RAST); football technical skills (passing accuracy, shooting accuracy, dribbling, ball control, and decision-making).

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20260624069940N8**
Registration date: **2026-09-09, 1405/06/18**
Registration timing: **prospective**

Last update: **2026-09-09, 1405/06/18**
Update count: **0**

Registration date

2026-09-09, 1405/06/18

Registrant information

Name

Atiye Gholizadeh

Name of organization / entity

Tarbiat modares university

Country

Iran (Islamic Republic of)

Phone

+98 911 279 9319

Email address

gholizade.atiye@gmail.com

Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2026-09-16, 1405/06/25

Expected recruitment end date
2026-11-11, 1405/08/20
Actual recruitment start date
empty
Actual recruitment end date
empty
Trial completion date
empty

Scientific title
Comparison of the effects of eight weeks of neuromuscular, plyometric, and combined training on soccer performance and skills in adolescent male players with different levels of biological maturation and motor competence

Public title
Comparison of three training methods on soccer performance and skills in adolescent players
Purpose
Supportive
Inclusion/Exclusion criteria
Inclusion criteria:
Male adolescents aged 13 to 16 years At least 2 years of regular football training in an academy or club Medical clearance from a sports physician No acute or chronic injury in the last 3 months Biological maturation within -2 to +2 years from Peak Height Velocity Motor competence at least at the 10th percentile of normal Written informed consent from both adolescent and parents No use of performance- or growth-affecting medications
Exclusion criteria:
History of grade 2 or higher acute lower limb injury in the last 6 months Uncontrolled chronic diseases Use of steroidal medications or growth hormones Concurrent participation in another training program outside the study
Age
From **13 years** old to **16 years** old
Gender
Male

Phase
N/A
Groups that have been masked

- Outcome assessor

Sample size
Target sample size: **60**
Randomization (investigator's opinion)
Randomized
Randomization description
After initial screening and confirmation of eligibility, the names of all eligible participants are recorded alphabetically in a preliminary list. Using the free online software Randomization.com (available at: www.randomization.com), a simple randomization sequence is generated with individual as the unit of randomization. The total number of participants (60) is entered into the software and the "Simple Randomization" option is selected. The software assigns each participant equally and randomly to one of four study groups (Neuromuscular, Plyometric, Combined, and Control) using a random number-based algorithm. Since no stratification is used, all participants have an equal chance of being assigned to any of the four groups. The randomization sequence is printed as a table and placed into sealed, opaque, and numbered envelopes to ensure full allocation concealment. Each envelope is numbered externally and is opened only after completion of pre-test assessments by an independent person (not involved in the research process), in the order of the envelope numbers, and the participant is allocated to the corresponding group. This process is repeated for all 60 participants, with no possibility of interference or prediction in group allocation.
Blinding (investigator's opinion)
Single blinded
Blinding description
In this study, due to the nature of the exercise intervention, complete blinding is not possible. However, outcome assessors who are responsible for administering the performance and skill tests will be blinded to participants' group allocation. Participants, the principal investigator, and trainers are aware of the intervention type. Outcome assessors are blinded through participant coding and lack of access to group allocation information.
Placebo
Not used
Assignment
Parallel
Other design features
Randomized controlled trial, single-blind (outcome assessors), with four parallel groups and pre-test/post-test design

Secondary Ids

empty

Ethics committees

1

Ethics committee
Name of ethics committee
Research Ethics Committee of Tarbiat Modares University
Street address
Tarbiat Modares University, Shahid Chamran Blvd., Tehran, Iran
City
Tehran
Province
Tehran
Postal code
۱۴۱۱۵۱۱۱۱
Approval date
2026-07-18, 1405/04/27
Ethics committee reference number
IR.MODARES.REC.1405.121

Health conditions studied

1

Description of health condition studied
Soccer
ICD-10 code
Y93.66
ICD-10 code description
Activity, soccer (فعالیت، فوتبال)

Primary outcomes

1

Description
Lower Body Strength
Timepoint
Before the intervention and after 8 weeks of intervention
Method of measurement
Vertical Jump Test using Vertec device or jump mat; measuring jump height in centimeters; each test repeated three times and the best result is recorded

2

Description
Sprint Speed
Timepoint
Before the intervention and after 8 weeks of intervention
Method of measurement
20-Meter Sprint Test using digital stopwatch or photocells; recording time in seconds; each test repeated twice and the best time is recorded

3

Description
Agility
Timepoint
Before the intervention and after 8 weeks of intervention
Method of measurement
T-Agility Test; recording completion time using digital stopwatch in seconds; each test repeated twice and the best time is recorded

4

Description
Upper Body Strength
Timepoint
Before the intervention and after 8 weeks of intervention
Method of measurement
Bench Press Test with light to moderate barbell; recording maximum repeatable weight (one repetition maximum) in kilograms

5

Description
Aerobic Endurance
Timepoint
Before the intervention and after 8 weeks of intervention
Method of measurement
Yo-Yo Intermittent Recovery Test Level 1; recording distance covered until exhaustion in meters

6

Description
Anaerobic Power
Timepoint
Before the intervention and after 8 weeks of intervention
Method of measurement
Running-based Anaerobic Sprint Test (six 35-meter maximal sprints with 10 seconds rest); calculating peak power, mean power, and fatigue index

7

Description
Passing Accuracy
Timepoint
Before the intervention and after 8 weeks of intervention
Method of measurement
Passing to designated targets from a standard distance; recording the number of accurate passes to the target out of total attempts (as a percentage)

8

Description
Shooting Accuracy
Timepoint
Before the intervention and after 8 weeks of intervention
Method of measurement
Shooting to designated targets in four corners of the goal from a standard distance; recording the number of accurate shots to the target out of total attempts (as a percentage)

9

Description
Ball Control and Dribbling
Timepoint
Before the intervention and after 8 weeks of intervention
Method of measurement
Dribbling Test in a zigzag course with designated obstacles; recording completion time using stopwatch in seconds

10

Description
Decision-Making in Game
Timepoint
Before the intervention and after 8 weeks of intervention
Method of measurement
Small-Sided Game Test; recording decision-making quality (correct pass, positioning, appropriate dribbling) by coaches using a standard performance analysis checklist

Secondary outcomes

empty

Intervention groups

1

Description

Intervention group 1 (Neuromuscular): Neuromuscular training for 8 weeks, three sessions per week, each session lasting 45 to 60 minutes. Each session includes 10 minutes of warm-up with light running and dynamic stretching, 30 to 40 minutes of specialized exercises including core stability, motor control, proprioception, balance, correction of basic movement patterns (squats, lunges, change of direction), and low to moderate intensity strength exercises (2 to 3 sets of 8 to 12 repetitions), and 5 to 10 minutes of cool-down with static stretching. Exercise intensity and difficulty will gradually increase over the 8 weeks.

Category

Behavior

2

Description

Intervention group 2 (Plyometric): Plyometric training for 8 weeks, three sessions per week, each session lasting 45 to 60 minutes. Each session includes 10 minutes of warm-up with light running and dynamic stretching, 30 to 40 minutes of specialized exercises including vertical jumps, horizontal jumps, single-leg hops, continuous bounding, reactive plyometrics, and explosive change of direction (2 to 3 sets of 6 to 10 repetitions) with gradual progressive overload, and 5 to 10 minutes of cool-down with static stretching. Special emphasis is placed on landing quality and motor control in all exercises.

Category

Behavior

3

Description

Intervention group 3 (Combined): Combined training (neuromuscular and plyometric) for 8 weeks, three sessions per week, each session lasting 45 to 60 minutes. Each session includes 10 minutes of warm-up with light running and dynamic stretching, 30 to 40 minutes of combined training including 20 to 25 minutes of neuromuscular exercises (core stability, motor control, balance, and movement pattern correction) and 15 to 20 minutes of plyometric exercises (vertical jumps, horizontal jumps, and explosive change of direction) with gradual progressive overload, and 5 to 10 minutes of cool-down with static stretching. The goal is to create integrated effects on neuromuscular control and explosive power.

Category

Behavior

4

Description

Control group: Participants in this group receive no structured training intervention outside their regular team training and are asked to continue their normal daily activities and football training throughout the 8-week study period. After the study completion, if the interventions prove effective, the beneficial training program will be offered to this group as well.

Category

Other

Recruitment centers

1

Recruitment center

Name of recruitment center
Tarbiat Modares University

Full name of responsible person
Alaa Al-shamilavi

Street address
Tarbiat Modares University, Shahid Chamran Blvd.

City
Tehran

Province
Tehran

Postal code
۱۴۱۱۵۱۱۱۱

Phone
+98 21 8288 5063

Email
Al-shamilavi@modares.ac.ir

Sponsors / Funding sources

1

Sponsor

Name of organization / entity
Tarbiat Modares University

Full name of responsible person
Dr. Mohammad Javan

Street address
Tarbiat Modares University, Shahid Chamran Blvd., Tehran, Iran

City
Tehran

Province
Tehran

Postal code
۱۴۱۱۵۱۱۱۱

Phone
+98 21 8288 5063

Email
mjavan@modares.ac.ir

Grant name

Grant code / Reference number

Is the source of funding the same sponsor organization/entity?

Yes

Title of funding source
Tarbiat Modares University
Proportion provided by this source
100
Public or private sector
Public
Domestic or foreign origin
Domestic
Category of foreign source of funding
empty
Country of origin
Type of organization providing the funding
Academic

Person responsible for general inquiries

Contact
Name of organization / entity
Tarbiat Modares University
Full name of responsible person
Alaa Al-shamilavi
Position
PhD Candidate in Exercise Physiology
Latest degree
Master
Other areas of specialty/work
Exercise Physiology
Street address
Tarbiat Modares University, Shahid Chamran Blvd., Tehran, Iran
City
Tehran
Province
Tehran
Postal code
۱۴۱۱۵۱۱۱۱
Phone
+98 21 8288 5063
Email
Al-shamilavi@modares.ac.ir

Person responsible for scientific inquiries

Contact
Name of organization / entity
Tarbiat Modares University
Full name of responsible person
Dr. Shahnaz Shahrbanian
Position
Associate Professor of Exercise Sciences
Latest degree
Ph.D.
Other areas of specialty/work
Exercise Physiology
Street address
Tarbiat Modares University, Shahid Chamran Blvd., Tehran, Iran
City
Tehran
Province
Tehran
Postal code
۱۴۱۱۵۱۱۱۱
Phone
+98 21 8288 5063
Email
sh.shahrbanian@modares.ac.ir

Person responsible for updating data

Contact
Name of organization / entity
Tarbiat Modares University
Full name of responsible person
Atiyeh Gholizadeh
Position
Research Assistant
Latest degree
Ph.D.
Other areas of specialty/work
Exercise Physiology
Street address
Tarbiat Modares University, Shahid Chamran Blvd., Tehran, Iran
City
Tehran
Province
Tehran
Postal code
۱۴۱۱۵۱۱۱۱
Phone
+98 21 8288 5063
Email
gholizade.atiye@gmail.com

Sharing plan

Deidentified Individual Participant Data Set (IPD)
Yes - There is a plan to make this available
Study Protocol
Yes - There is a plan to make this available
Statistical Analysis Plan
Yes - There is a plan to make this available
Informed Consent Form
Yes - There is a plan to make this available
Clinical Study Report
Yes - There is a plan to make this available
Analytic Code
No - There is not a plan to make this available
Data Dictionary
Yes - There is a plan to make this available
Title and more details about the data/document
De-identified individual participant data, study protocol, statistical analysis plan, informed consent form, clinical study report, and data dictionary: All collected data related to outcome variables (physical performance indicators and football technical skills) will be shared completely without identifying information. Documentation regarding methodology, forms used, and analysis plan will also be provided.
When the data will become available and for how long
Six months after publication of study results

To whom data/document is available

Researchers affiliated with reputable academic and scientific institutions who have an approved research proposal by their institutional ethics committee.

Under which criteria data/document could be used

Data may be used solely for research purposes and secondary analyses related to exercise physiology and sports performance. Commercial use of the data is not permitted. All users must adhere to ethical requirements and maintain data confidentiality, and must report any findings from their analyses to the primary authors. Requests must include a detailed description of the project and its objectives.

From where data/document is obtainable

To request data, please contact the corresponding author, Mr. Alaa Al-shamilavi, via email at Al-shamilavi@modares.ac.ir. Requests may also be submitted through the Department of Exercise Sciences at Tarbiat Modares University.

What processes are involved for a request to access data/document

Upon submission of a request via email, the corresponding author will review the application. After approval by the university ethics committee, the request will be forwarded to the research team. If finally approved, de-identified data will be provided within two to four weeks via email or a secure data-sharing platform.

Comments

Data will be provided solely for non-commercial purposes, with full adherence to ethical principles and confidentiality of participant information.