Clinical Trial Protocol
Iranian Registry of Clinical Trials

08 Nov 2026

The Effects of Four Instructional Methods (Constraints-Led Approach, Differential Learning, Traditional, and Hybrid) on Simplifying Information Processing, Decision-Making, and Handball Shot Execution: An Experimental Test of Simplified Information Processing Theory During Action

Protocol summary

Study aim
The effect of constraint-based, differential, combined, and explicit learning methods on information processing, decision-making, and shooting performance in handball.

Design
The statistical population includes 80 first-year female physical education students at Kharazmi University (age range 20-30 years, novice in handball, no competitive training history). A sample size of 80 participants was determined using G*Power software . Participants were randomly divided into four groups of 20: Differential Learning group, Constraint-Based Learning approach group, Combined group (DL + CLA), and Traditional group. The training intervention will consist of 15 sessions of 60 minutes each over 5 weeks (3 sessions per week) with handball shooting drills under simulated game conditions (presence of two defenders and a dual-task countdown). Kinematic data will be measured using an IMU system, eye-tracking data with an eye-tracker, and decision-making quality through video evaluation by two expert reviewers. A pre-test will be conducted before the intervention, and a post-test will be performed after its completion.

Settings and conduct
kharazzmi University Sports hall

Participants/Inclusion and exclusion criteria
20 to 30 years old, complete beginners in handball, no competitive training history, willing to participate, and free from injury or illness.

Intervention groups
Intervention groups included four experimental groups and one control group. In the experimental groups, handball shooting skills were taught using constraint-based, differential, combined, and explicit learning methods.

Main outcome variables
Shooting accuracy, decision-making quality, movement variability, movement coordination, and temporal indicators of the Behavioral Classification Approach, including response time in the SDA-M software.

General information

Reason for update

Acronym

IRCT registration information
IRCT registration number: **IRCT20260524069516N1**
Registration date: **2026-06-15, 1405/03/25**
Registration timing: **prospective**

Last update: **2026-06-15, 1405/03/25**
Update count: **0**

Registration date
2026-06-15, 1405/03/25

Registrant information
Name
Motahare sadat Fanian
Name of organization / entity
Kharazmi University
Country
Iran (Islamic Republic of)
Phone
+98 21 8883 4995
Email address
std_fanian@khu.ac.ir

Recruitment status
recruiting

Funding source

Expected recruitment start date
2026-09-29, 1405/07/07
Expected recruitment end date
2026-11-29, 1405/09/08
Actual recruitment start date
empty
Actual recruitment end date
empty
Trial completion date
empty

Scientific title
The Effects of Four Instructional Methods (Constraints-Led Approach, Differential Learning, Traditional, and Hybrid) on Simplifying Information Processing, Decision-Making, and Handball Shot Execution: An Experimental Test of Simplified Information Processing Theory During Action

Public title
The Effect of Educational Methods on Handball Shooting Skill
Purpose
Education/Guidance
Inclusion/Exclusion criteria
Inclusion criteria:
No injuries or diseases. No history of regular training at a competitive level Absolute beginner in handball.
Exclusion criteria:
Age
From **20 years** old to **30 years** old
Gender
Female

Phase
N/A
Groups that have been masked
No information
Sample size
Target sample size: **80**
Randomization (investigator's opinion)
Randomized
Randomization description
Randomization in this study is of the simple randomization type, and the unit of randomization is the individual. A total of 80 participants will be randomly allocated in equal numbers into one of the four intervention and control groups (20 participants per group). The random allocation sequence will be generated using an online random sequence generation system (Sealed Envelope website). To ensure allocation concealment and prevent bias, the generated codes will be placed inside sequentially numbered (1 to 80), opaque, sealed envelopes. Upon the entry of each eligible participant into the study, the corresponding envelope will be opened in the order of entry, and their training group will be determined. The generation of the sequence and preparation of the envelopes will be performed by an individual outside the main research team to ensure that the judgment regarding the realization of random allocation remains completely independent.
Blinding (investigator's opinion)
Not blinded
Blinding description
Placebo
Not used
Assignment
Parallel
Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee
Name of ethics committee
Ethics Committee of Kharazmi University
Street address
No. 2, Sahand Alley, Malek o-Shoara Bahar St., Somayyeh St.
City
تهران
Province
Tehran
Postal code
1571817415
Approval date
2026-05-13, 1405/02/23
Ethics committee reference number
IR.KHU.REC.1405.022

Health conditions studied

1

Description of health condition studied
Handball shooting skill training
ICD-10 code
ICD-10 code description

Primary outcomes

1

Description
Shooting accuracy Decision-making qualityFixation duration Decision-making quality Number of fixations Movement variability Movement coordination
Timepoint
Measurements will be conducted at two time points: pre test before the intervention and post test after the intervention.
Method of measurement
برای اندازه‌گیری دقت شوت و ارزیابی کیفیت تصمیم‌گیری، از نرم‌افزار SDA-M و نیز ارزیابی ویدئویی توسط دو کارشناس خبره استفاده می‌شود.مدت زمان خیرگی و تعداد فیکساسیون‌ها:برای اندازه‌گیری این متغیرها از دستگاه ردیابی چشم (Eye-tracking system) استفاده می‌شود.تغییرپذیری حرکتی و هماهنگی حرکتی:برای اندازه‌گیری این متغیرها از سیستم واحد اندازه‌گیری اینرسی (IMU) استفاده می‌شود.

Secondary outcomes

empty

Intervention groups

1

Description
Intervention group: Control group: Traditional handball training with direct instructions, repeated corrective feedback, and repetitive practice without changes; 3 sessions per week for a total of 15 sessions.Intervention group 1: Differential learning training for handball shot execution with unplanned variability and without repetitive identical practice; 3 sessions per week for a total of 15 sessions.Intervention group 2: Constraints-led approach training for handball shot execution through the purposeful manipulation of individual, environmental, and task constraints; 3 sessions per week for a total of 15 sessions.Intervention group 3: Hybrid training combining differential learning principles and the constraints-led approach for handball shot execution; 3 sessions per week for a total of 15 sessions.

Category
Behavior

Recruitment centers

1

Recruitment center

Name of recruitment center
دانشگاه خوارزمی

Full name of responsible person
Motahare sadat Fanian

Street address
No. 2, Sahand Alley, Malek o-Shoara Bahar St., Somayyeh St.

City
تهران

Province
Tehran

Postal code
1571817415

Phone
+98 21 8883 4995

Email
std_fanian@khu.ac.ir

Sponsors / Funding sources

1

Sponsor

Name of organization / entity
The Kharazmi University

Full name of responsible person
Rasoul Yaali

Street address
No. 2, Sahand Alley, Malek o-Shoara Bahar St., Somayyeh St.

City
Tehran

Province
Tehran

Postal code
1571817415

Phone
+98 21 8883 4995

Email
std_fanian@khu.ac.ir

Grant name

Grant code / Reference number

Is the source of funding the same sponsor organization/entity?
No

Title of funding source
The Kharazmi University

Proportion provided by this source
50

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
The Kharazmi University

Full name of responsible person
Motahare sadat Fanian

Position
PhD Student

Latest degree
Master

Other areas of specialty/work
Sports Sciences

Street address
No. 2, Sahand Alley, Malek o-Shoara Bahar St., Somayyeh St.

City
Tehran

Province
Tehran

Postal code
1571817415

Phone
+98 21 8883 4995

Email
std_fanian@khu.ac.ir

Person responsible for scientific inquiries

Contact

Name of organization / entity
The Kharazmi University

Full name of responsible person
Motahare sadat Fanian
Position
PhD Student
Latest degree
Master
Other areas of specialty/work
Sports Sciences
Street address
No. 2, Sahand Alley, Malek o-Shoara Bahar St., Somayyeh St
City
Tehran
Province
Tehran
Postal code
1571817415
Phone
+98 21 8883 4995
Email
std_fanian@khu.ac.ir

Person responsible for updating data

Contact
Name of organization / entity
Kharazmi University
Full name of responsible person
Motahare sadat Fanian
Position
PhD Student
Latest degree
Master
Other areas of specialty/work
Physical Education
Street address
No. 2, Sahand Alley, Malek o-Shoara Bahar St., Somayyeh St.
City
Tehran
Province
Tehran
Postal code
1571817415
Phone
+98 21 8883 4995
Email
std_fanian@khu.ac.ir

Sharing plan

Deidentified Individual Participant Data Set (IPD)
No - There is not a plan to make this available
Justification/reason for indecision/not sharing IPD
No further information is 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
Not applicable
Title and more details about the data/document
De-identified participant-level data, study protocol, and statistical analysis plan. The shared data will include only anonymized information and may be provided upon reasonable request after publication of the study results.
When the data will become available and for how long
Data and documents will be available 6 months after publication of the study results.
To whom data/document is available
Qualified researchers affiliated with academic or scientific institutions.
Under which criteria data/document could be used
Data may be used only for scientific research purposes, in accordance with the approved research proposal, with proper citation of the original study, and without any attempt to re-identify participants.
From where data/document is obtainable
Requests should be addressed to the corresponding author via email:std_fanian@khu.ac.ir
What processes are involved for a request to access data/document
Requests will be reviewed by the research team. If the request is approved, the requested documents or de-identified data will be shared within a reasonable timeframe, usually within 4 weeks.
Comments