Clinical Trial Protocol
Iranian Registry of Clinical Trials

10 Jun 2026

Investigating the Impact of 8 Weeks of Virtual Reality Training on Motor Proficiency and Executive Function in Children with Developmental Coordination Disorder

Protocol summary

Study aim
The general objective of this study is to investigate the effect of 8 weeks of virtual reality training on motor competence and executive function in children with developmental coordination disorder.

Design
The study has a control group, an intervention group, is triple-blinded, targeted based on a score lower than 16 on the MABC test, randomized using a lottery program, and is single-phase on 30 patients.

Settings and conduct
The exercises in this study will be conducted in the sports hall of schools in Hamadan and will be free of any distracting visual and auditory stimuli. The children's exercise coach will be blind to the existence and level of visual impairment in the children, and in each training session, they will exercise with the children for 45 minutes, including specific warm-up and cool-down exercises.

Participants/Inclusion and exclusion criteria
Inclusion criteria: 1. DCD diagnosis based on (DSM-5) 2. Age 7 to 9 years Exclusion criteria: 1. Children who did not wish to continue participating in the research process. 2. Children who were required to use a specific medication.

Intervention groups
Virtual Reality Group: Received specific exercises using virtual reality headsets for two months. Control Group: Received normal school instruction during this time.

Main outcome variables
Motor competence, inhibition, working memory, attention, hot executive function

General information

Reason for update

Acronym
DCD

IRCT registration information
IRCT registration number: **IRCT20250122064475N1**
Registration date: **2025-07-26, 1404/05/04**
Registration timing: **retrospective**

Last update: **2025-07-26, 1404/05/04**
Update count: **0**

Registration date
2025-07-26, 1404/05/04

Registrant information

Name
Maryam Khoshniat

Name of organization / entity
The University of Abu Ali Sina

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Recruitment status
Recruitment complete

Funding source

Expected recruitment start date
2025-04-05, 1404/01/16

Expected recruitment end date
2025-05-22, 1404/03/01

Actual recruitment start date
empty

Actual recruitment end date
empty

Trial completion date
empty

Scientific title

Investigating the Impact of 8 Weeks of Virtual Reality Training on Motor Proficiency and Executive Function in Children with Developmental Coordination Disorder

Public title

Examining the effect of virtual reality training on children with developmental coordination disorder

Purpose

Supportive

Inclusion/Exclusion criteria

Inclusion criteria:

Achieving a standard score on the DCD-Q (15 to 46 for 7-year-olds and 15 to 55 for 8 to 9-year-olds) Age 7 to 9 years Diagnosis of DCD based on (DSM-V) using the Movement Assessment Battery for Children-2 (MABC-2): a score less than or equal to the 16th percentile, (DSM-5, Criterion A); motor deficits severely and persistently interfere with a person's daily activities (Criterion B, DSM-5); parents of children confirm the onset of motor problems from early developmental periods (Criterion C). Children should not have any pathological damage. They should have the ability to understand and collaborate with the researcher. Be able to attend the intervention program regularly throughout the study period. Be able to walk independently without assistance. Have no prior experience participating in a virtual reality based program. Have normal or corrected-to-normal vision. Do not use psychiatric medication. All participants and their supervisors must provide written consent. They are right-handed.

Exclusion criteria:

Children who are absent for more than 3 training sessions during the study. Children who are forced to use a specific medication. Children who do not wish to continue participating in the research process.

Age

From **7 years** old to **9 years** old

Gender

Both

Phase

N/A

Groups that have been masked

- Outcome assessor
- Data analyser

Sample size

Target sample size: **30**

Randomization (investigator's opinion)

Randomized

Randomization description

After identifying 30 eligible participants, they were randomly divided into two groups, intervention and control (15 people in each group), using a simple random method through a draw. The names of the participants were written on identical cards and placed in an opaque container. To conceal the grouping, a person outside the research team drew the cards by lot. As soon as each card was drawn, the participant was assigned to one of the two groups, intervention or control; the first card drawn was placed in the intervention group, the second card in the control group, and this process continued until the last card. The results were immediately placed in sealed envelopes. The unit of allocation was the individual. Given the limited sample size and the homogeneity of the study population (in terms of age and severity of disorder), stratification was not used. The grouping sequence was also generated by a person outside the research team and recorded and kept in a separate document. The screening team remained unaware of the groups until the end of the grouping process.

Blinding (investigator's opinion)

Double blinded

Blinding description

Blinding in this study was applied at the level of outcome assessment and data analysis. Due to the nature of the intervention, blinding of participants is not possible, as the virtual reality-based exercises and their implementation differ between the two groups, which participants will notice. However, to prevent bias in data collection and evaluation, outcome assessors will be unaware of group allocation to ensure data is collected independently and without conscious influence. Furthermore, data analysts will be unaware of group allocation until the final processing is complete to avoid bias in the review of results. If necessary, allocation concealment methods, such as randomization lists and the use of data processing systems, will be used to maintain impartiality in the analysis. This level of control in allocation and data processing increases the validity of the results and prevents side effects caused by bias.

Placebo

Not used

Assignment

Parallel

Other design features

This study will be conducted by designing exercises for 12 sports, from simple to complex, with specialized warm-ups and 3 sessions of 45 minutes per week.

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee

Ethics Committee in Biomedical Research

Street address

Boulevard Ahmadinejad

City

Hamadan

Province

Hamadan

Postal code

6517683819

Approval date

2025-03-03, 1403/12/13

Ethics committee reference number

IR.BASU.REC.1403.042

Health conditions studied

1

Description of health condition studied
Developmental Coordination Disorder
ICD-10 code
ICD-10 code description

Primary outcomes

1

Description
Motor Proficiency
Timepoint
7 days before the study
Method of measurement
Movement Assessment Battery for Children– Second Edition

Secondary outcomes

1

Description
Motor Competence
Timepoint
Before the intervention and 24 sessions after the start of the intervention
Method of measurement
MABC-2 Test

2

Description
executive functions
Timepoint
Before the intervention and 24 sessions after the start of the intervention
Method of measurement
Stroop, go/no-go, n-back, hungry donkey tests

3

Description
Impact of virtual reality training
Timepoint
24 sessions after the start of the intervention
Method of measurement
The extent of progress in cognitive and motor functions

Intervention groups

1

Description
Warm-up for 10 minutes, exercise for 30 minutes, cool-down for 5 minutes. Week 1, Session 1, Warm-up: running, shoulder rotations, stretching the arm, forearm, triceps muscles, wrist rotations, rope skipping, boxing shadow boxing. Exercises: darts, boxing. Cool-down: overhead stretch, down, left and right. Session 2, Warm-up: running, shoulder rotations, stretching the arm, forearm, triceps muscles, wrist rotations, rope skipping, boxing shadow boxing. Exercises: darts, boxing. Cool-down: hip flexion, triceps stretch, shoulder stretch. Session 3, Warm-up: running, shoulder rotations, stretching the arm, forearm, triceps muscles, wrist rotations, rope skipping, boxing shadow boxing. Exercises: darts, boxing. Cool-down: bending forward as much as possible, neck stretch. Week 2, Session 1: running, lateral lunge with inner thigh stretch, arm rotations, knee-to-chest jumps, ankle circles, stationary dribbling, stretching back and waist muscles, ball release exercise, stretching shoulders and triceps, wrists and forearms - basketball, bowling - overhead stretch, down, left and right. Session 2: running, lateral lunge with inner thigh stretch, arm rotations, knee-to-chest jumps, ankle circles, stationary dribbling, stretching back and waist muscles, ball release exercise, stretching shoulders and triceps, wrists and forearms - basketball, bowling - hip flexion, triceps stretch, shoulder stretch. Session 3: running, lateral lunge with inner thigh stretch, arm rotations, knee-to-chest jumps, ankle circles, stationary dribbling, stretching back and waist muscles, ball release exercise, stretching shoulders and triceps, wrists and forearms - basketball, bowling - bending forward as much as possible, neck stretch. Week 3: Session 1: rope skipping, boxing shadow boxing, paw boxing, short runs with change of direction, trunk rotation with racket, leg and hamstring stretches, service practice without ball, zigzag jumping - boxing, clay tennis - overhead stretch, down, left and right. Session 2: rope skipping, boxing shadow boxing, paw boxing, short runs with change of direction, trunk rotation with racket, leg and hamstring stretches, service practice without ball, zigzag jumping - boxing, clay tennis - hip flexion, triceps stretch, shoulder stretch. Session 3: rope skipping, boxing shadow boxing, paw boxing, short runs with change of direction, trunk rotation with racket, leg and hamstring stretches, service practice without ball, zigzag jumping - boxing, clay tennis - bending forward as much as possible, neck stretch. Week 4, Session 1: jogging in place, stretching back and shoulders, neck and shoulder rotations, deep breathing exercise, wrist and forearm stretches, fast lateral movement, wrist rotation with racket, ball dribbling with racket - archery, table tennis - overhead stretch, down, left and right. Session 2: jogging in place, stretching back and shoulders, neck and shoulder rotations, deep breathing exercise, wrist and forearm stretches, fast lateral movement, wrist rotation with racket, ball dribbling with racket - archery, table tennis - hip flexion, triceps stretch, shoulder stretch. Session 3: jogging in place, stretching back and shoulders, neck and shoulder rotations, deep breathing exercise, wrist and forearm stretches, fast lateral movement, wrist rotation with racket, ball dribbling with racket - archery, table tennis - bending forward as much as possible, neck stretch.Week 5 Session 1: Lateral movements with speed, dynamic lunges with change of direction, shoulder and arm rotation, wrist exercises with racket, vertical jumps, hitting the ball in the air Badminton, Golf Stretching overhead, down, left and right. Session 2: Lateral

movements with speed, dynamic lunges with change of direction, shoulder and arm rotation, wrist exercises with racket, vertical jumps, hitting the ball in the air - Badminton, Golf - Hip flexion, triceps stretch, shoulder stretch. Session 3 Lateral movements with speed, dynamic lunges with change of direction, shoulder and arm rotation, wrist exercises with racket, vertical jumps, hitting the ball in the air Badminton, Golf Bending forward as much as possible, stretching the neck and head. Week 6: Session 1: Running, multi-directional lunge movements, footwork training with agility ladder, torso rotation with racket, dynamic stretches for shoulder and wrist, vertical jumps, fast lateral movements, shoulder and arm rotations, stretching triceps and wrist Squash, Volleyball Stretching overhead, down, left and right. Session 2 Running, multi-directional lunge movements, footwork training with agility ladder, torso rotation with racket, dynamic stretches for shoulder and wrist, vertical jumps, fast lateral movements, shoulder and arm rotations, stretching triceps and wrist-Squash, Volleyball-Hip flexion, triceps stretch, shoulder stretch. Session 3: Running, multi-directional lunge movements, footwork training with agility ladder, torso rotation with racket, dynamic stretches for shoulder and wrist, vertical jumps, fast lateral movements, shoulder and arm rotations, stretching triceps and wrist Squash, Volleyball Bending forward as much as possible, stretching the neck and head Week 7. Session 1 Short runs with change of direction, torso rotation with racket, leg and hamstring stretches, serving practice without ball, zigzag jumping, stretching back and lumbar muscles, ball release practice, stretching shoulders and triceps, wrists and forearms - Clay court tennis, Bowling - Stretching overhead, down, left and right. Session 2: Short runs with change of direction, torso rotation with racket, leg and hamstring stretches, serving practice without ball, zigzag jumping, stretching back and lumbar muscles, ball release practice, stretching shoulders and triceps, wrists and forearms - Clay court tennis, Bowling - Hip flexion, triceps stretch, shoulder stretch Session 3: Short runs with change of direction, torso rotation with racket, leg and hamstring stretches, serving practice without ball, zigzag jumping, stretching back and lumbar muscles, ball release practice, stretching shoulders and triceps, wrists and forearms - Clay court tennis, Bowling - Bending forward as much as possible, stretching the neck and head. Week 8: Session 1: Running, multi-directional lunge movements, footwork training with agility ladder, torso rotation with racket, dynamic stretches for shoulder and wrist, vertical jumps, fast lateral movements, shoulder and arm rotations, stretching triceps and wrist - Volleyball, Squash - Stretching overhead, down, left and right. Session 2: Running, multi-directional lunge movements, footwork training with agility ladder, torso rotation with racket, dynamic stretches for shoulder and wrist, vertical jumps, fast lateral movements, shoulder and arm rotations, stretching triceps and wrist - Volleyball, Squash - Hip flexion, triceps stretch, shoulder stretch Session 3 Running, multi-directional lunge movements, footwork training with agility ladder, torso rotation with racket, dynamic stretches for shoulder and wrist, vertical jumps, fast lateral movements, shoulder and arm rotations, stretching triceps and wrist - Volleyball, Squash - Bending forward as much as possible, stretching the neck and head.

Category

Behavior

2

Description

Control group: This group will continue their normal life routine throughout the study and will only participate in school programs that are the same for everyone.

Category

Behavior

Recruitment centers

1

Recruitment center

Name of recruitment center
General Directorate of Education of Hamadan Province

Full name of responsible person
Rasul Sheydayi

Street address
Taleghani Street, Farhang Street

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Province
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Email
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Sponsors / Funding sources

1

Sponsor

Name of organization / entity
non

Full name of responsible person
non

Street address
non

City
Hamedan

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Hamadan

Postal code
1234567899

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Email
khoshniat.basu.ac.ir@gmail.com

Grant name

Grant code / Reference number

Is the source of funding the same sponsor

organization/entity?
No
Title of funding source
non
Proportion provided by this source
1
Public or private sector
Private
Domestic or foreign origin
Domestic
Category of foreign source of funding
empty
Country of origin
Type of organization providing the funding
Other

Person responsible for general inquiries

Contact
Name of organization / entity
Bu-Ali Sina University
Full name of responsible person
Maryam Khoshniat
Position
Student
Latest degree
Bachelor
Other areas of specialty/work
Motor behavior
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Person responsible for updating data

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Manijeh Arabi
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Other areas of specialty/work
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Email
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Web page address

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
Yes - There is 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
The data will be shared after individuals are anonymized.
When the data will become available and for how long
The course starts with 6 months access after the publication of the article.
To whom data/document is available
Researchers of academic institutions
Under which criteria data/document could be used
In review studies
From where data/document is obtainable
People can contact Maryam Khoshniat at the email

address khoshniat.basu.ac.ir@gmail.com

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

In a letter, provide a complete introduction of yourself and your resume, stating your purpose and how you intend to use it, and email it to Ms. Khoshniyat. She will announce the result to you within a 6-month timeframe.

Comments