

Clinical Trial Protocol

Iranian Registry of Clinical Trials

19 Jun 2026

Comparison of implicit learning methods such as errorless learning and analogical inference with the focus of external attention on retention and transfer of bowling skills in children with autism

Protocol summary

Study aim

The purpose of this research is to compare the effects of implicit learning methods such as errorless learning and analogical inference with the focus of external attention on the retention and transfer of bowling skills in children with autism.

Design

This study will have an intervention group with parallel groups for 8 children with autism.

Settings and conduct

This study will be conducted in the Ordibehesht Rehabilitation Center under the supervision of an occupational therapist and researcher.

Participants/Inclusion and exclusion criteria

Autistic children Inclusion criteria: The Edinburg Handedness Inventory is used to assess right-handedness. not having vision and hearing problems Absence of pathology in the upper and lower limbs Having a consent form Exclusion criteria: Not having a consent form Inability to perform the pre-test Unwilling to continue training Any problem that the participants ran into that stopped them from doing the exercises

Intervention groups

Intervention Group 1: Learning the method of analogical inference with an emphasis on external focus of attention Intervention Group 2: Learning the method of errorless with an emphasis on external focus of attention

Main outcome variables

Retention of bowling ball throwing skills Transferring bowling ball throwing skills

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20220920056007N1**

Registration date: **2022-12-06, 1401/09/15**

Registration timing: **prospective**

Last update: **2022-12-06, 1401/09/15**

Update count: **0**

Registration date

2022-12-06, 1401/09/15

Registrant information

Name

Mina Khodayari

Name of organization / entity

Kharazmi University

Country

Iran (Islamic Republic of)

Phone

+98 21 8832 9220

Email address

std_mina.khodayari98@khu.ac.ir

Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2023-01-28, 1401/11/08

Expected recruitment end date

2023-05-31, 1402/03/10

Actual recruitment start date

empty

Actual recruitment end date

empty

Trial completion date

empty

Scientific title

Comparison of implicit learning methods such as errorless learning and analogical inference with the focus of external attention on retention and transfer of bowling

Public title

Learning methods for bowling skills in children with autism

Purpose

Education/Guidance

Inclusion/Exclusion criteria**Inclusion criteria:**

The Edinburg Handedness Inventory is used to assess right-handedness Not having vision and hearing problems Absence of pathology in the upper and lower limbs Having a consent form

Exclusion criteria:

Inability to perform the pre-test Unwilling to continue training Any problem that the participants ran into that stopped them from doing the exercises

Age

From **5 years** old to **12 years** old

Gender

Male

Phase

N/A

Groups that have been masked

No information

Sample size

Target sample size: **8**

Randomization (investigator's opinion)

N/A

Randomization description**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**

Sport Sciences Research Institute

Street address

No. 3, 5th Alley, Miremad Street, Motahhari Street, Tehran, Iran.

City

Tehran

Province

Tehran

Postal code

1587958711

Approval date

2022-10-22, 1401/07/30

Ethics committee reference number**Health conditions studied****1****Description of health condition studied**

Autistic disorder

ICD-10 code

F84.0

ICD-10 code description

Autistic disorder

Primary outcomes**1****Description**

Retention of bowling ball throwing abilities

Timepoint

After the training interventions, it will be measured separately for each group.

Method of measurement

After one week from the last intervention session, the ball throwing test will be taken, the score will be calculated based on the pins that fall on the ground due to the ball throwing, and the progress during the intervention sessions and trial will be measured.

2**Description**

Transferring bowling ball throwing skills

Timepoint

After the training interventions, it will be measured separately for each group.

Method of measurement

Participants will be given a lighter ball than the one used in the intervention sessions and will throw the lighter ball at the bowling pins.

Secondary outcomes

empty

Intervention groups**1****Description**

Intervention Group 1 (Analogical inference method + external focus of attention): In this study, to learn the method of analogical inference, first, a toy car will be used instead of a ball, and the path of the ball towards the pins will be built as a road. A cartoon character will be placed on the bowling pins, which the occupational therapist will do by stating that the toy car must hit the cartoon characters by crossing the road. In the next sessions, we will teach the subjects how to move their hands and feet using the fictional story of the cat and the fish

Category

Rehabilitation

2

Description

Intervention Group 2 (Errorless Learning Method + External Focus of Attention): Participants will throw the ball at the bowling pins from a distance of 30 cm, then 40 cm, 50 cm, 60 cm, and up to 1 meter.

Category

Rehabilitation

Recruitment centers

1

Recruitment center

Name of recruitment center

Ordibehesht Rehabilitation Center

Full name of responsible person

Mina Khodayari

Street address

No. 18, 10 Salman Savji Alley., Falahat St., Saveh

City

Saveh

Province

Markazi

Postal code

3917796585

Phone

+98 86 4222 6555

Email

mina.khodayari2407@gmail.com

Sponsors / Funding sources

1

Sponsor

Name of organization / entity

Kharazmi University

Full name of responsible person

Dr. Hamid Rajabi

Street address

KhU, No. 43. South Mofatteh Ave., Tehran, Iran

City

Tehran

Province

Tehran

Postal code

1571914911

Phone

+98 21 2388 0229

Email

hrajabi@khu.ac.ir

Grant name

Grant code / Reference number

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

Yes

Title of funding source

Kharazmi 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

Kharazmi University

Full name of responsible person

Mina Khodayari

Position

Student

Latest degree

Master

Other areas of specialty/work

Motor Behavior

Street address

KhU, No. 43. South Mofatteh Ave., Tehran, Iran

City

Tehran

Province

Tehran

Postal code

1571914911

Phone

+98 21 8832 9220

Email

mina.khodayari2407@gmail.com

Person responsible for scientific inquiries

Contact

Name of organization / entity

Kharazmi University

Full name of responsible person

Dr. Rasoul Yaali

Position

Assistant Professor

Latest degree

Ph.D.

Other areas of specialty/work

Motor Behavior

Street address

KhU, No. 43. South Mofatteh Ave., Tehran, Iran

City

Tehran

Province

Tehran

Postal code

1571914911

Phone

+98 21 2222 6040

Email

r.yaali@khu.ac.ir

Person responsible for updating data**Contact****Name of organization / entity**

Kharazmi University

Full name of responsible person

Mina Khodayari

Position

Student

Latest degree

Master

Other areas of specialty/work

Motor Behavior

Street address

KhU, No. 43. South Mofatteh Ave., Tehran, Iran

City

Tehran

Province

Tehran

Postal code

1571914911

Phone

+98 21 8832 9220

Email

mina.khodayari2407@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

Not applicable

Data Dictionary

Not applicable

Title and more details about the data/document

The data related to the comparison of errorless learning and analogical inference with external focus of attention will be provided to the audience after the interventions.

When the data will become available and for how long

September 2023

To whom data/document is available

Professors and university students

Under which criteria data/document could be used

This study is published in the form of a master's thesis

From where data/document is obtainable

One should refer to the library of Kharazmi University

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

Students go to the library of Kharazmi University and get the file from the librarian

Comments