

Can brain training games help improve thinking skills in children and teens with autism?

Submission date 24/08/2025	Recruitment status No longer recruiting	<input type="checkbox"/> Prospectively registered
		<input checked="" type="checkbox"/> Protocol
Registration date 26/08/2025	Overall study status Completed	<input type="checkbox"/> Statistical analysis plan
		<input type="checkbox"/> Results
Last Edited 26/08/2025	Condition category Mental and Behavioural Disorders	<input type="checkbox"/> Individual participant data
		<input checked="" type="checkbox"/> Record updated in last year

Plain English summary of protocol

Background and study aims

This study is looking at whether a type of brain training called “dual n-back” can help improve thinking and memory skills in children and teenagers with autism. People with autism often find it harder to plan, focus, and remember things. The training involves a computer game that challenges memory and attention. Researchers want to find out if doing this training can lead to improvements not just in memory, but also in other areas like problem-solving and emotional control.

Who can participate?

Children and teenagers aged 10 to 15 years who have been diagnosed with autism (including Asperger’s syndrome) can take part. People cannot join if they have serious mental health conditions, intellectual disabilities, sensory impairments, serious medical illnesses, or recent substance misuse.

What does the study involve?

Participants will be randomly placed into one of two groups. One group will do the dual n-back brain training, and the other group will do a simpler version of the task. Both groups will use a computer program for 2 weeks, doing short daily sessions. Researchers will measure thinking and memory skills before and after the training, and again 3 months later. Parents will help monitor how often their child uses the program.

What are the possible benefits and risks of participating?

The training may help improve memory and thinking skills, which could make everyday tasks easier. There are no known risks from doing the computer-based training, but it may be tiring or frustrating for some children. All data will be kept private and secure.

Where is the study run from?

The study is being run from the child and adolescent psychiatric outpatient clinic at Queen Mary Hospital in Hong Kong.

When is the study starting and how long is it expected to run for?

August 2024 to September 2025.

Who is funding the study?

No external funding has been received. The training program is provided by the Institute of Psychology at the Chinese Academy of Science.

Who is the main contact?

Dr Novia Mozart Kong , noviamozartkong@gmail.com

Contact information

Type(s)

Public, Scientific, Principal investigator

Contact name

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Additional identifiers

Study information

Scientific Title

Transfer effects of dual N-back training in children and adolescents with autism spectrum disorder: a randomized controlled trial

Acronym

TEDNB

Study objectives

Primary objective:

To examine the impact of dual n-back training on the near transfer effect on WM performance in children and adolescents with ASD.

Secondary objectives:

1. To assess the far transfer effects of dual n-back training on cognitive functioning in children and adolescents with ASD.
2. To investigate the long-term maintenance of any observed training effects in the follow-up period after the completion of the dual n-back intervention.
3. To explore potential moderators and mediators of the training effects in children and adolescents with ASD.

Null hypothesis in this study:

There will be no significant impact of dual n-back training on the near transfer effect on WM performance in children and adolescents with ASD.

Ethics approval required

Ethics approval required

Ethics approval(s)

approved 01/08/2024, HKU/ HA HKW Institutional Review Board (Room 901, 9/F, Administrative Block, Queen Mary Hospital, 102 Pokfulam Road, -, Hong Kong; +852 22553923; hkwirb@ha.org.hk), ref: UW 24-422

Study design

Single-center interventional double-blinded randomized controlled trial

Primary study design

Interventional

Study type(s)

Treatment

Health condition(s) or problem(s) studied

Working memory improvement in children with autism spectrum disorder

Interventions

Dual n-back training is a cognitive training task designed to target and improve working memory abilities specifically. It has been utilised in research studies and has shown promising results in enhancing working memory performance in children and adolescents.

During the dual n-back training, participants will engage in a computer-based task that requires them to simultaneously remember and recall two different types of stimuli, including spatial and auditory stimuli. The training sessions will be conducted daily for 2 consecutive weeks. Each training session would involve five blocks with a 10+n trial in each block. The 2-back task would be utilised as the experimental intervention, while the 0-back task would be the control group.

Participants were randomly assigned to either the intervention group (dual 2-back training) or the active control group (0-back task) using a computer-generated randomisation sequence. A block randomisation method (with varying block sizes of 6) was used to ensure balanced group sizes. The randomisation sequence was generated using computerised random number generation. The sequence was prepared by an independent statistician not involved in recruitment, assessment, or intervention delivery. To prevent selection bias, allocation concealment was maintained using digital folders. The folder contains the group assignment (intervention or control) corresponding to the pre-generated randomisation sequence. Folders were only opened after baseline assessments were completed and the participant was formally enrolled in the trial. After obtaining informed consent and confirming eligibility, participants underwent baseline assessments. The following digital folder was opened in sequence to reveal the group assignment. The person handling randomisation did not participate in post-intervention evaluations.

Intervention Type

Behavioural

Primary outcome(s)

Working Memory improvement by dual n-back task, digit span, Corsi Block Tapping Test and Sternberg Test at baseline, immediately post-intervention (i.e. 2 weeks) and 3 months

Key secondary outcome(s)

Executive Function and behavioral improvement by Operation Span Task, Go No-Go Test, Tower of London, BRIEF and CBCL at baseline, immediately post-intervention (i.e. 2 weeks) and 3 months

Completion date

30/09/2025

Eligibility

Key inclusion criteria

1. Age range of 10-15 years
2. Diagnosis of DSM-5 ASD, or DSM-4 Asperger's syndrome or ICD-10 Childhood autism, atypical autism or Asperger syndrome

Participant type(s)

Patient

Healthy volunteers allowed

No

Age group

Child

Lower age limit

10 years

Upper age limit

15 years

Sex

All

Total final enrolment

69

Key exclusion criteria

1. Diagnosed with comorbid active mood or psychotic disorder
2. Diagnosed with mental retardation
3. Visual or hearing impairment
4. Serious medical illness
5. Substance misuse in the past 6 months

Date of first enrolment

01/08/2024

Date of final enrolment

30/09/2025

Locations

Countries of recruitment

Hong Kong

Study participating centre

Child and Adolescent Psychiatric Outpatient Clinic, Department of Psychiatry, Queen Mary Hospital

5/F, Block J, Queen Mary Hospital, 102 Pok Fu Lam Road

Hong Kong

Hong Kong

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Sponsor information

Organisation

Hospital Authority

ROR

<https://ror.org/05sn8t512>

Funder(s)

Funder type

Other

Funder Name

Investigator initiated and funded

Results and Publications

Individual participant data (IPD) sharing plan

The datasets generated during and/or analysed during the current study will be available upon request form. (Contact name: Novia Kong, Email address: noviamozartkong@gmail.com)

IPD sharing plan summary

Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Participant information sheet	version 4	26/07/2024	26/08/2025	No	Yes
Protocol file			26/08/2025	No	No