INPLASY

Optimizing Exercise Prescription for Obesity in Intellectual Disability: A Network Meta-analysis of Randomized Evidence

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ADMINISTRATIVE INFORMATION

Support - No.

Review Stage at time of this submission - Data extraction.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 27 July 2025 and was last updated on 27 July 2025.

INTRODUCTION

Review question / Objective To compare and rank the effectiveness of different structured exercise modalities for reducing obesity-related parameters in children and adolescents with intellectual disabilities (ID), using randomized evidence and network meta-analysis.

P (Participants): Children and adolescents aged 6–18 years with ID (including unspecified ID, Down syndrome, and ASD+ID). Trials including participants up to 22 years will be retained for sensitivity analyses.

I (Interventions): Any structured exercise/physical activity program (e.g., aerobic [AE], resistance [RE], combined AE+RE [ARE], HIIT, swimming, whole-body vibration, tai chi, adapted rhythmic gymnastics/exergames, school-based physical activity) and multi-component programs that combine exercise with diet (PAD), provided the exercise component is analytically separable.

C (Comparators): Usual care/wait-list/non-exercise attention control (e.g., health education, stretching) or another eligible exercise modality; "no-treatment/usual activities" (TUA) serves as the network reference.

O (Outcomes): Primary—body weight (kg), BMI, total fat mass, and waist circumference; Secondary—waist-to-hip ratio (WHR). We prioritize post-intervention (≈12–24 weeks) change scores; DXA or multi-frequency BIA are preferred for fat mass.

S (Study design): Parallel or cluster randomized controlled trials and well-described quasi-RCTs; cross-over and single-arm pre–post studies are excluded. No language or publication-status restrictions.

Overall objective: Using a Bayesian network meta-analysis, synthesize and rank the relative effectiveness of aerobic, resistance, combined training, HIIT, swimming, and other adapted modalities (and exercise+diet programs) for improving body weight, BMI, fat mass, and waist circumference in youth with ID, and explore moderators (age, sex, ID subtype, intervention dose) to inform precision exercise prescriptions.

Condition being studied This review focuses on overweight and obesity among children and adolescents with intellectual disability (ID)—that is, excess adiposity arising from an imbalance between energy intake and expenditure. In this context, the obesity burden is primarily assessed by body weight, body mass index (BMI), fat mass, and waist circumference. Compared with age-matched peers in the general population, youth with ID carry a substantially higher obesity burden (U.S. national estimates suggest ~29% are obese), alongside elevated risks of metabolic syndrome, obstructive sleep apnea, and reduced functional independence. Contributing factors include hypotonia, lower habitual physical activity, psychotropic medication use, and environmental barriers.

The target population includes unspecified ID and common subtypes (e.g., Down syndrome), highlighting the need for adapted weight-management strategies across different phenotypes. Given that physical activity is a cornerstone of obesity management, yet evidence for exercise interventions in youth with ID remains limited and heterogeneous, this review examines the potential and comparative effectiveness of structured exercise (and multi-component programs combining exercise with diet) in improving obesity-related parameters in this population.

METHODS

Search strategy (((((((intellectual* disab*[MeSH Terms]) OR (Intellectual* Development Disorder*[Title/Abstract])) OR (Mental Retard*[Title/Abstract])) OR (Psychosocial Mental Retardation[Title/Abstract])) OR (Mental Deficienc*[Title/Abstract])) AND (((child[MeSH Terms]) OR (Children[Title/Abstract])) OR (((adolescent[MeSH Terms]) OR (Youth*[Title/Abstract])) OR (Teen*[Title/Abstract]))))) AND ((overweight[MeSH Terms]) OR ((obesity[MeSH Terms]) OR (obese[Title/Abstract])))) AND ((((((((((((((((Weight loss[Title/Abstract]) undefined (Weight reduction[Title/Abstract])) OR (weight control[Title/Abstract])) OR (intervention*[Title/Abstract])) OR (program*[Title/Abstract])) OR (evaluation*[Title/Abstract])) OR (treatment*[Title/Abstract])) OR (fitness[Title/Abstract])) OR (exercis*[Title/Abstract])) OR (sport*[Title/Abstract])) OR (physical activ*[Title/Abstract])) OR (nutrition[Title/Abstract])) OR (diet*[Title/Abstract])) OR (health* lifestyle[Title/Abstract])) OR (health* education[Title/Abstract])) OR (behavior modification[Title/Abstract])).

Participant or population This review targets children and adolescents with intellectual disabilities (ID), including both unspecified ID and diagnosed subtypes such as Down syndrome and autism spectrum disorder with comorbid ID (ASD+ID). Eligible participants are typically between 6 and 18 years of age, although studies including youth up to 22 years old will be considered for sensitivity analysis if they primarily focus on the adolescent age range.

Participants may reside in schools, rehabilitation centers, or community settings, and may vary in terms of cognitive, motor, and adaptive functioning. The review includes trials that explicitly state that participants were diagnosed with mild, moderate, severe, or profound intellectual disability, or where eligibility was based on clinical, educational, or standardized cognitive assessments indicative of ID.

All participants must be classified as overweight or obese at baseline or at risk for obesity, based on accepted criteria such as BMI percentile cut-offs, age- and sex-adjusted z-scores, or clinical diagnosis. Studies targeting mixed populations are only included if data for participants with ID can be separately extracted or clearly constitute the majority of the sample.

This specific population is highly vulnerable to obesity-related health complications due to low physical activity levels, metabolic dysregulation, and various psychosocial and environmental barriers. Tailoring physical activity interventions for this group is therefore critical to improving long-term health outcomes and reducing health disparities.

Intervention This review will evaluate structured physical activity and exercise programs designed for children and adolescents with intellectual disabilities (ID), either alone or as part of multi-component interventions.
Included interventions may involve:
Aerobic training (e.g., walking, jogging, dancing)
Resistance training (e.g., bodyweight or weight-based strength exercises)
Combined aerobic and resistance training (ARE)
High-Intensity Interval Training (HIIT)
Swimming or aquatic exercises
Whole-body vibration training
Traditional or adapted activities (e.g., Tai Chi, rhythmic gymnastics, exergames)
School-based or home-based physical activity programs
Multi-component interventions include programs that combine exercise with diet or health education, as long as the exercise part is clearly described.

The programs must be planned, supervised, and repeated regularly over a period (e.g., 2–6 months), and delivered either individually or in groups, in schools, clinics, or community settings.

Comparator
Comparators in this review include:
Usual care (e.g., routine activities, no structured intervention)
Wait-list control
Non-exercise attention control (e.g., health education, stretching, recreational play)
Other structured exercise programs (for head-to-head comparisons)
The most common reference group will be no structured exercise or typical daily activities (TUA). When studies compare two or more active exercise interventions, these will be included for direct and indirect comparisons in the network meta-analysis.

Study designs to be included
This review will include the following study designs:Randomized Controlled Trials (RCTs), including:Individually randomized trialsCluster RCTs (e.g., by school or class)Well-described quasi-randomized trials, where allocation is not purely random but still controlled (e.g., by birth date or alternate assignment)The following designs will not be included:Cross-over trialsSingle-group pre–post studiesObservational studies (e.g., cohort, case-control, cross-sectional)Case reports or seriesThere will be no restriction on language or publication status (published or unpublished.

Eligibility criteria
Additional inclusion criteria:
Participants must be diagnosed with intellectual disability (ID)
Studies must report at least one obesity-related outcome (e.g., body weight, BMI, fat mass, waist circumference)
Exercise must be structured and planned, not spontaneous activity
Exclusion criteria:
Studies where data for participants with ID cannot be separated from other populations
Interventions shorter than 2 weeks
Trials without a comparator group
Non-original research (e.g., reviews, protocols, editorials)

Information sources
This review will search the following electronic databases:
PubMed
Embase
Web of Science
Scopus

Cochrane CENTRAL
CNKI (for Chinese-language studies)
Additional sources include:
Clinical trial registries (e.g., ClinicalTrials.gov, WHO ICTRP)
Grey literature (e.g., dissertations, conference abstracts)
Manual searching of reference lists from relevant reviews and included studies
Contacting authors for missing or unclear data, if needed.

Main outcome(s) The main outcomes of this review are obesity-related physical health indicators in children and adolescents with intellectual disabilities (ID). Specifically:
Body weight (kg)
Body Mass Index (BMI)
Total fat mass (kg or %)
Waist circumference (cm).

Quality assessment / Risk of bias analysis The risk of bias in included studies will be assessed using the revised Cochrane Risk of Bias 2 (RoB 2.0) tool for randomized controlled trials. This tool evaluates bias across five domains:
Randomization process
Deviations from intended interventions
Missing outcome data
Measurement of the outcome
Selection of the reported result.

Strategy of data synthesis We will conduct a Bayesian network meta-analysis (NMA) to compare and rank the effectiveness of different exercise interventions on obesity-related outcomes in children and adolescents with intellectual disabilities (ID). This approach allows for both direct and indirect comparisons across multiple interventions within a unified model.
Key steps include:
Effect sizes will be expressed as mean differences (MD) or standardized mean differences (SMD) with 95% credible intervals.
Random-effects models will be used to account for between-study variability.
Intervention rankings will be estimated using surface under the cumulative ranking curve (SUCRA) values.
Subgroup analyses may be conducted by ID subtype, age group, or intervention duration.
Sensitivity analyses will test the impact of excluding quasi-randomized or high-risk-of-bias studies.

Subgroup analysis If data permit, the following subgroup analyses will be conducted to explore

sources of heterogeneity and intervention effectiveness:

Type of intellectual disability (e.g., unspecified ID, Down syndrome, ASD+ID)

Age group (e.g., children 12 weeks)

Exercise type (e.g., aerobic vs. resistance vs. combined)

Setting (e.g., school-based vs. home- or clinic-based programs)

Sex of participants (if data are reported separately).

Sensitivity analysis Sensitivity analyses will be conducted to test the robustness and reliability of the main findings. Planned analyses include:

Excluding studies with high risk of bias (based on RoB 2.0 overall judgment)

Excluding quasi-randomized trials

Using post-intervention values instead of change scores, if both are reported

Removing studies with small sample sizes (e.g., n < 20 per group)

Excluding studies with unclear or mixed diagnoses (e.g., ID not clearly defined).

Country(ies) involved The review is being carried out by authors affiliated with institutions in China, based on the affiliation information provided in the protocol. If additional co-authors from other countries are later.

Keywords intellectual disability; children; adolescents; obesity; exercise intervention; physical activity; network meta-analysis; structured training; Down syndrome; body mass index.

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