Child and adolescent mental disorders module - evidence profile CAMH3: Psychosocial interventions for children and adolescents with neurodevelopmental delays and disabilities

WHO mhGAP guideline update: Mental Health Gap Action Programme (mhGAP) guideline for mental, neurological and substance use disorders

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World Health Organization

Contents

Mental Health Gap Action Programme (mhGAP) guideline for mental, neurological and substance use disorders, available at: https://www.who.int/publications/i/item/9789240084278

1. Background

Mental, neurological, and substance use (MNS) disorders are prevalent in all regions of the world and are major contributors to morbidity and premature mortality. In 2016, they caused 7% of all global burden of disease as measured in disability-adjusted life-years (DALYs), 19% of all years lived with disability. The resources that have been provided to tackle the huge burden of MNS disorders are insufficient, inequitably distributed, and inefficiently used. The result is a large treatment gap, more than 75% in many countries with low and lower middle incomes.

To reduce the treatment gap and to enhance the capacity of countries to respond to the growing challenge, WHO developed the Mental Health Gap Action Programme (mhGAP). An essential component of mhGAP is an integrated package of evidence-based guidelines for MNS disorders identified as conditions of high priority. The mhGAP guideline was first published in 2010, and last updated in 2015. These evidence-based guidelines were developed following the WHO Handbook for Guidelines Development (World Health Organization, 2014).

In keeping with WHO's practice of regularly monitoring new and emerging evidence in these areas, we believe an update of the mhGAP guidelines is now timely. The first and second edition of the mhGAP guidelines, and derivative products, have been used by more than 100 countries and translated into more than 20 languages through an integrated intervention package of programs over the past 11 years. This TOR describes the activities and deliverables for conducting evidence reviews on psychosocial interventions for developmental disabilities.

This evidence summary report presents evidence of psychosocial interventions for individuals (children and adolescents to age 24) with neurodevelopmental disorders. Neurodevelopmental disorders (WHO, 2022) are a category of behavioural and cognitive disorders that begin in childhood that impair functioning in one or more developmental domain (e.g. language, social, motor). Current diagnostic guidelines include eight neurodevelopmental disorders (1) disorders of intellectual development, (2) developmental speech or language disorders, (3) autism spectrum disorder, (4) developmental learning disorder, (5) developmental motor coordination disorder, (6) attention deficit hyperactivity disorder, (7) stereotype movement disorder, and (8) other specified neurodevelopmental disorder (WHO, 2022).

Psychosocial interventions are one intervention or treatment approach for aiding individuals with neurodevelopmental disorders. Psychosocial interventions have been shown to be beneficial for improving outcomes for individuals, including children and adolescents, with neurodevelopmental disorders when delivered in multiple settings (i.e. both high-income and lower- and middle-income countries) by various intervention agents (i.e. both specialist and non-specialist providers) (cf. Reichow, Servili et al., 2013; Naveed et al., 2019). The current mhGAP Intervention Guide recommends developmental monitoring and providing caregiver skills training for children with intellectual and developmental disabilities (2015; https://cdn.who.int/media/docs/default-source/mental-health/mhgap/child-and-adolescent-mental-disorders/caregiver-skills-training-for-the-management-of-developmental-disorders.pdf?sfvrsn=b28b0378_0).

This evidence summary report presents a new synthesis of psychosocial interventions (apart from caregiver skills training) to improve child development, health and well-being, and multiple functional domains for children and adolescents with neurodevelopmental disorders. For this evidence summary, we chose to look specifically to psychosocial approaches without the use of pharmacological agents or broader environmental interventions as primary intervention methods. We confirmed, based on preliminary searches, that existing systematic reviews with meta-analytic syntheses would be available and sufficient to prepare this report. The methodology detailed in the remaining sections is tailored to

this context and presents the methods for the use of extant reviews based on Cochrane Overview of Reviews methodology (e.g. Becker & Oxman, 2011; Pollock, 2022).

2. Methodology

2.1. Report methodology

Prior to completion of the synthesis for this report, we confirmed, based on preliminary searches, that existing systematic reviews with meta-analytic syntheses would be available and sufficient to prepare this report. Therefore, the methodology detailed in the remaining sections is tailored to this context and presents the methods for the use of extant reviews based on Cochrane Overview of Reviews methodology (e.g. Becker & Oxman, 2011; Pollock, 2022).

2.2. PICO question

Population (P): Children, adolescents, and youth (aged birth to 24 years) with neurodevelopmental delays and disabilities
Intervention (I): Psychosocial interventions (apart from caregiver skills training)
Comparator (C): No treatment (including waitlist control), treatment as usual (e.g. standard treatment)
Outcomes (O):

List critical outcomes (primary outcomes):

- **Critical outcome 1 –**developmental (e.g. cognition, language and communication, socialization)
- **Critical outcome 2 –** health and well-being
- **Critical outcome 3 –** functioning

List important outcomes (secondary outcomes):

- **Important outcome 1** – participation
- **Important outcome 2 –** caregiver well-being
- **Important outcome 3 –** satisfaction with care
- **Important outcome 4 –** adverse effects

2.3. Search strategy

We searched MEDLINE, APA PsycInfo, Embase, the Cumulative Index to Nursing and Allied Health (CINAHL), and Education Resources Information Centre (ERIC) for relevant systematic reviews with meta-analytic syntheses of randomized controlled trials. We searched these databases in May 2022 through July 2022. The search strategies used for each database is shown in Appendixes II.1 through II.5. Records from the five bibliographic databases were downloaded and imported into electronic reference management (EndNote 20.2; Clarivate, 2022). Records were deduplicated in EndNote and then titles and abstracts were screened to exclude clearly irrelevant records. The full texts of the remaining records were then screened independently, in duplicate, against the inclusion criteria to establish the reviews included to answer the questions of interest of this report.

We also searched three repositories of systematic review protocols: PROSPERO, Campbell Collaboration, and Cochrane. Searches were also completed in May 2022 through July 2022. The search strategies used for the repositories are shown in Appendix II.6. For the repository search, titles and abstracts were searched online, with records for further examination imported into EndNote for full-text screening as described above.

- Systematic reviews were selected meeting all of the following criteria:
    - Types of review: Systematic reviews with meta-analytic syntheses of randomized controlled trials or quasi-randomized controlled trials were prioritized. Systematic reviews with meta-analytic evidence of RCTs and other group comparative designs with a control condition/comparison (e.g. clinical controlled trial, two-group

comparison without random assignment) were included as additional evidence when meta-analyses of RCTs were not located in the search.

- Types of participants: Systematic reviews with meta-analytic syntheses that included studies in which at least 50% of the sample included children who had one of the following neurodevelopmental disorders: disorders of intellectual development, including, intellectual disability; developmental delay; cerebral palsy; attention-deficit/hyperactivity disorder; Down syndrome; fragile x syndrome; autism spectrum disorder; speech and language delays/disorders/disabilities; developmental learning disorders/disabilities; stereotyped movement disorders; and developmental motor coordination disorder.
- Types of interventions: Systematic reviews with meta-analytic syntheses in which all included studies examined the effects of psychosocial interventions (apart from caregiver skills training) i.e. interventions that use a psychological, behavioural or social approach, or a combination of these to improve psychosocial well-being and/or reduce the risk of poor mental health outcomes.
- Types of outcome measures: Systematic reviews with meta-analytic syntheses that meta-analysed data for at least one of the following outcome categories: child development, children's health and well-being, functioning, participation, caregiver well-being, satisfaction with care, and adverse effects.
- Date range: Systematic reviews with meta-analytic syntheses published since 2015.
- Published language of study: Systematic reviews with meta-analytic syntheses published in English, Spanish, or French (if reviews were located in other languages, they would have been indexed to await confirmation of inclusion pending translation services).
- Publication status: Systematic reviews with meta-analytic syntheses regardless of publication status; i.e. no restrictions on publication status were made – we included both published and unpublished (grey) literature.

The flow of records throughout the search and up to the final cohort of included systematic reviews is depicted using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram (Page et al., 2021; see Figure 1). The flow diagram includes the number of excluded records and the reasons for any exclusions at the full-text screening stage.

2.3.1. Review Selection and Prioritization

Systematic reviews with meta-analytic syntheses meeting all inclusion criteria were included in this report. When we located more than one review with like population, intervention, comparator, and outcome, we selected a single representative review, when possible based on the following criteria for the report:

- Date of publication: We prioritized reviews that had the most current search – we prioritized based on search date (month and year), not year of publication.
- Number of studies: If reviews had similar search dates, we would have prioritized a review with more comprehensive coverage (i.e. a greater number of included studies).
- Precision: If multiple reviews with similar search dates and number of included studies had been located, we would have prioritized based on the review with a more precise estimate of effect (i.e. a review with the smaller confidence interval around the weight mean effect size).

2.4. Data collection and analysis

Data from eligible reviews were extracted from published reports and online supplemental information using pre-defined data collection forms and imported into an electronic spreadsheet. The data that were extracted included information on the methods utilized in the systematic review, including search methods, inclusion criteria, and methods used for the statistical synthesis. We also extracted information on characteristics of the studies included in each review with respect to participant characteristics, intervention characteristics, and outcomes and results. Two researchers

independently performed all data extraction, with discrepancies resolved through consensus. If critical information was missing from a report, we would have contacted the authors to inquire of the data. Data were extracted for the following variables:

1. Review characteristics including, but not limited to publication year; search strategy, characteristics and number of included studies; and study locations (including determination if a study was conducted in a lower- and middle-income country according to World Bank)
2. Population characteristics including, but not limited to diagnostic characteristics, child age, child skill level, and gender
3. Intervention characteristics including, but not limited to content and components of the intervention; intervention delivery methods; and metrics associated with intervention density (e.g. duration of each session, and duration, in weeks, of complete program)
4. Results and effects including, but not limited to outcome measures used across studies and systematic reviews, individual effect size estimates (by outcome by review), review-level heterogeneity, and subgroup/sensitivity analyses (by outcome)

2.5. Selection and coding of identified records

We used EndNote 20.2 (Clarivate, 2022) to manage the records retrieved during the selection process (a copy of the reference library in electronic format is available upon request). Systematic reviews were coded using paper/pencil methods and transferred to a spreadsheet for further analysis.

2.6. Quality assessment

2.6.1. Quality assessment of individual systematic reviews: AMSTAR 2

We used AMSTAR 2 (Shea et al., 2017) to assess the quality of the systematic reviews included in this report. AMSTAR 2 includes items related to registration, study retrieval, inclusion/exclusion criteria, risk of bias assessment, and meta-analytic techniques and applications, including assessment of publication and other biases.

2.6.2. Quality assessment of cumulative (overall) evidence: GRADE

We used AMSTAR 2 We used the Grading of Recommendations Assessment, Development and Evaluation (GRADE; Guyatt et al., 2008; Schünemann et al., 2013) approach to evaluate the overall quality of the evidence for this report. For application with randomized controlled trials, GRADE includes the following domains: risk of bias, inconsistency, indirectness, imprecision, and publication bias. We used WHO guidance for the assessment of each domain using the criteria outlined below. The GRADE criteria that were used for this report were adapted from the WHO Guidelines for use of GRADE in mental health applications (e.g. Barbui et al. 2010).

2.6.3. Limitations (risk of bias)

Risk of bias identifies limitations in the study design and implementation that may effect the estimates on the effectiveness of the treatment. We reviewed the risk of bias presented in the study reports, where available, pertaining to randomization, blinding of outcome assessors, and attrition. We used the following criteria for these three areas:
(1) trials are described as randomized;
(2) outcome assessment is described as masked;
(3) drop-out rate (both treatment arms) is below or equal to 30% (and drop-outs are similarly distributed between treatment arms).

For our GRADE assessment, we rated limitations (i.e. risk of bias) using the following determinations:

- If one or more of the three criteria reported below is not met in up to 10% of trials included in the systematic review = no downgrading (negligible limitations)
- If one or more of the three criteria reported below is not met in 10-30% of trials included in the systematic review = - 1 (serious limitations)

- If one or more of the three criteria reported below is not met in more than 30% of trials included in the systematic review = - 2 (very serious limitations)

2..4. Inconsistency

Inconsistency refers to an unexplained heterogeneity of results across studies. Widely differing estimates of the treatment effect (i.e. heterogeneity or variability in results) across studies suggest true differences in underlying treatment effect.

For our GRADE assessment, we downgraded inconsistency using the following determinations:

- If visual investigation of forest plots suggests some degree of heterogeneity (supported by a formal test of heterogeneity indicating some degree of heterogeneity, for example I-squared between 50% and 75%) = - 1 (serious inconsistency)
- If visual investigation of forest plots suggests high degree of heterogeneity (supported by a formal test of heterogeneity indicating high heterogeneity, for example I-squared higher than 75%) = - 2 (very serious inconsistency)

2.6.5. Indirectness

Indirectness refers to the extent to which the results of a study can be generalized to a target population, intervention comparator, or outcome. We assessed the generalizability of review findings by considering whether the intervention, participants, settings, and methods of assessing outcomes, as reported in the review, suited the contexts for which the guidelines are intended.

For our GRADE assessment, we downgraded indirectness using the following criteria:

- If the question being addressed by the guideline panel was different from the available evidence regarding the population, intervention, comparator, outcome or regarding the characteristics of those who will deliver the intervention, we downgraded by 1 (serious doubts about directness)
- If the question being addressed by the guideline panel is markedly different from the available evidence regarding the population, intervention, comparator, outcome or regarding the characteristics of those who will deliver the intervention, we downgraded by 2 (very serious doubts about directness)

2.6.6. Imprecision

Imprecision refers to the extent to which the findings of a review are certain and likely to be replicated. Results are imprecise when studies include relatively few patients and few events and thus have wide confidence intervals around the estimate of the effect.

For our GRADE assessment, we downgraded imprecision using the following criteria:

- If (a) the overall number of individuals included in trials is low (between 200 and 100 individuals, both treatment arms) or (b) the 95% confidence interval includes both 1) no effect and 2) appreciable benefit or appreciable harm we downgraded by 1 (serious imprecision)
- If (a) the overall number of individuals included in trials is very low (less than 100 individuals, both treatment arms) and (b) the 95% confidence interval includes both 1) no effect and 2) appreciable benefit or appreciable harm we downgraded by 2 (very serious imprecision)

NOTE: For continuous outcomes “no effect” meant a SMD with a confidence interval that crosses zero; appreciable benefit or appreciable harm meant that the upper or lower confidence limit crosses an effect size of 0.5 in either direction.

2.6.7. Reporting bias (i.e. publication bias)

Publication bias is a systematic deviation in the estimate of the effect on an intervention on an outcome due to the selective publication of studies or the inability of review authors to locate or include all relevant studies that have been conducted.

For our GRADE assessment, we downgraded reporting bias using the following criteria:

- If the graphical inspection of the funnel plot suggests some asymmetry, or if any other reasons (to be recorded as footnote) suggest that reporting bias might have had an impact on the overall summary estimate (for example: unpublished grey literature was not included) we downgraded by 1 (serious reporting bias)
- If the graphical inspection of the funnel plot suggests high asymmetry, or if any other reasons (to be recorded as footnote) suggest that reporting bias might have had a high impact on the overall summary estimate (for example: unpublished grey literature was not included) we downgraded by 2 (very serious publication bias)

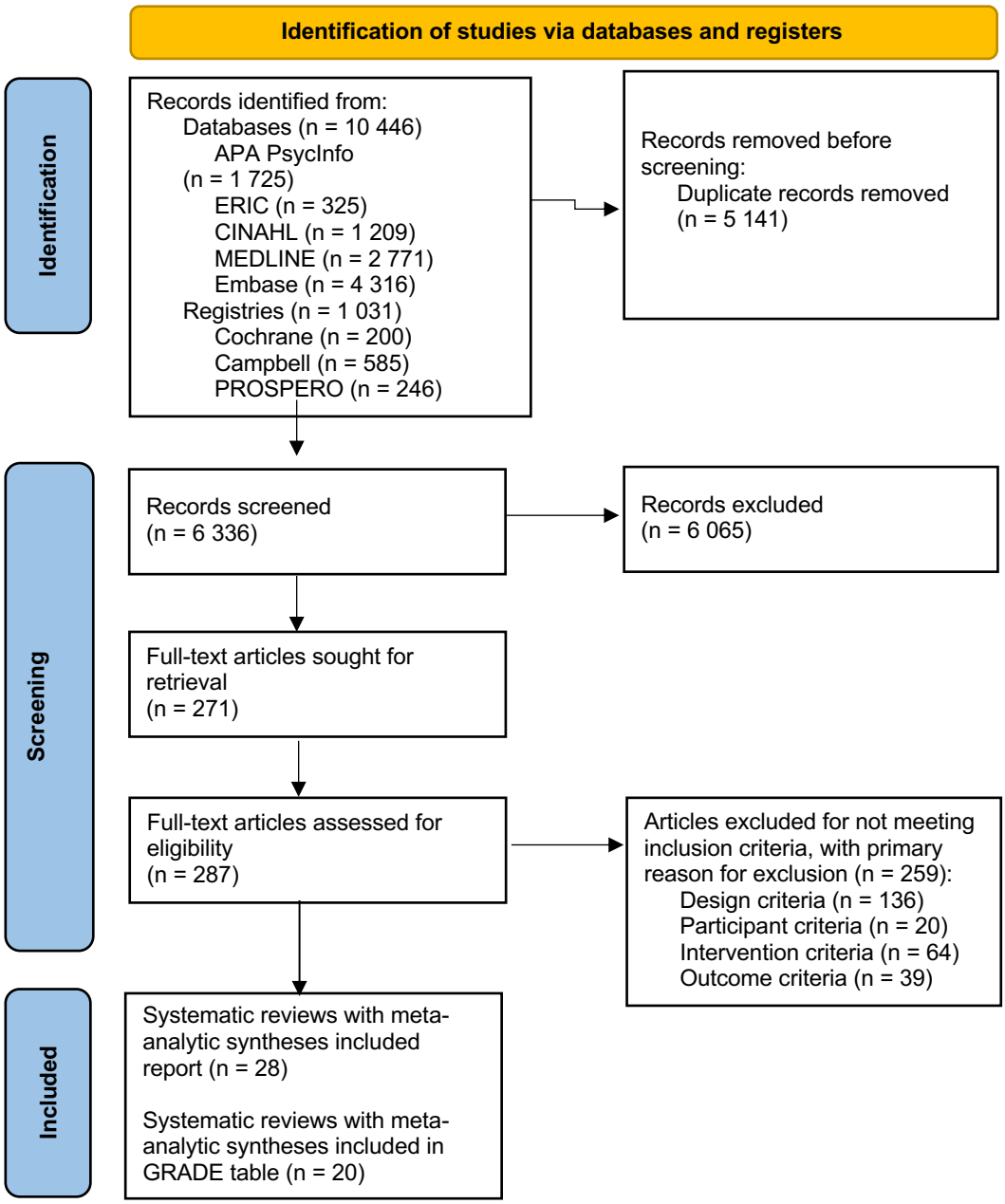
2.7. Analysis of subgroups or subsets

We did not compare effects across different subgroups given the lack of analyses of subgroups completed in the included reviews (cf. Becker & Oxman, 2011; Pollock, 2022). Possible subgroups that we wished to explore included type of intervention; inclusion of specific intervention components; use of specific training methods; intervention density (intensity) and duration; and training; and pre-treatment participant characteristics (e.g. chronological age, symptom severity, IQ, communicative ability, and level of adaptive behaviour). We also were unable to complete analyses of whether there were systematic differences in the findings between studies conducted in lower- and middle-income and high-income countries because none of the included reviews contained such an analysis.

3. Results

3.1. Systematic reviews and/or studies identified by the search process

Fig. 1. PRISMA flow diagram depicting results of the search and selection process.



3.2. List of included reviews with summary from published abstract[1] (by condition)

3.2.1. Autism Spectrum Disorder

Gates, J. A., Kang, E., & Lerner, M. D. (2017). Efficacy of group social skills interventions for youth with autism spectrum disorder: A systematic review and meta-analysis. Clinical Psychology Review, 52, 164-181. https://doi.org/10.1016/j.cpr.2017.01.006

ABSTRACT

Background: Group-based social skills interventions are widely used for treating social competence among youth with autism spectrum disorder, but their efficacy is unclear. Previous meta-analysis of the literature on well-designed trials of group-based social skills interventions is limited in size and scope, collapsing across highly heterogeneous sources (parents; youths; teachers; observers; behavioural tasks).

Objective: The current meta-analysis of randomized control trials was conducted to ascertain overall effectiveness of group-based social skills interventions and differences by reporting sources.

Results: Nineteen randomized controlled trials met inclusion criteria. Results show that overall positive aggregate effects were medium ($g = 0.51$, $P < 0.001$). Effects were large for self-report ($g = 0.92$, $P < 0.001$), medium for task-based measures ($g = 0.58$, $P < 0.001$), small for parent- and observer-report ($g = 0.47$ and 0.40, respectively, $P < 0.001$), and nonsignificant for teacher-report ($P = 0.11$). Moderation analyses of self-report revealed the effect was wholly attributable to youth reporting that they learned about skilled social behaviours (social knowledge; $g = 1.15$, $P < 0.01$), but not that they enacted them (social performance; $g = 0.28$, $P = 0.31$).

Conclusion: Social skills interventions presently appear modestly effective for youth with autism spectrum disorder, but may not generalize to school settings or self-reported social behaviour.

Huang, J., Du, C., Liu, J., & Tan, G. (2020). Meta-analysis on intervention effects of physical activities on children and adolescents with autism. International Journal of Environmental Research and Public Health, 17:1950. https://doi.org/10.3390/ijerph17061950

ABSTRACT

Background: This paper aimed to discuss the intervention effects of physical activities on children and adolescents with autism with a meta-analysis so as to serve as a reference to further relevant research on the same topic.

Method: As for research methods, by searching in CNKI (China National Knowledge Infrastructure), WanFang data, VIP Database for Chinese Technical Periodicals, PubMed, Scopus, Web of Science, and other databases, this study collected randomized controlled trials on the intervention of physical activities on children and adolescents with autism and used Review Manager 5.3 software to process and analyse the outcome indicators of the literature.

Results: As for the result, a total of 12 papers and 492 research targets were selected. The results of the meta-analysis show that physical activity had a significant positive impact on social interaction ability, communication ability, motor skills, and autism degree of autistic children as well as the social skills and communication skills of autistic adolescents. On the other hand, physical activity had no significant effect on the stereotyped behaviour of autistic children and adolescents.

Conclusion: In conclusion, physical activity intervention is beneficial to children and adolescents with autism, and continuous physical activity intervention can produce greater intervention effect.

Kreslins, A., Robertson, A. E., & Melville, C. (2015). The effectiveness of psychosocial interventions for anxiety in children and adolescents with autism spectrum disorder: A systematic review and meta-analysis. Child and Adolescent Psychiatry & Mental Health, 9:22. https://doi.org/10.1186/s13034-015-0054-7

ABSTRACT

Background: Anxiety is a common problem in children and adolescents with autism spectrum disorder.

[1] Abstract extracted from published report; formatting and removal of acronyms added for consistency

Objective: This meta-analysis aimed to systematically evaluate the evidence for the use of psychosocial interventions to manage anxiety in this population. Cognitive behavioural therapy was the primary intervention modality studied.
Method: A comprehensive systematic search and study selection process was conducted. Separate statistical analyses were carried out for clinician-, parent-, and self-reported outcome measures. Sensitivity analyses were conducted by removing any outlying studies and any studies that did not use a cognitive behavioural therapy intervention. A subgroup analysis was performed to compare individual and group delivery of treatment.
Results: Ten randomized control trials involving a total of 470 participants were included. The overall standardized mean difference was d = 1.05 (95 % CI: 0.45 - 1.65; z = 3.45, P = 0.0006) for clinician-reported outcome measures; d = 1.00 (95% CI: 0.21 - 1.80; z = 2.47, P = 0.01) for parent-reported outcome measures; and d = 0.65 (95% CI: -0.10 to 1.07; z = 1.63, P = 0.10) for self-reported outcome measures.
Conclusions: Clinician- and parent-reported outcome measures showed that psychosocial interventions were superior to waitlist and treatment-as-usual control conditions at post-treatment. However, the results of self-reported outcome measures failed to reach significance. The sensitivity analyses did not significantly change these results and the subgroup analysis indicated that individual treatment was more effective than group treatment.
Limitations: The main limitations of this review were the small number of included studies as well as the clinical and methodological variability between studies.

Sharma, S., Hucker, A., Matthews, T., Grohmann, D., & Laws, K. R. (2021). Cognitive behavioural therapy for anxiety in children and young people on the autism spectrum: A systematic review and meta-analysis. BMC Psychology, 9:151. https://doi.org/10.1186/s40359-021-00658-8

ABSTRACT
Background: Anxiety is common in youth on the autism spectrum and cognitive behavioural therapy has been adapted to address associated symptoms. The aim of the current systematic review and meta-analysis was to examine the efficacy of cognitive behavioural therapy for reducing anxiety in autistic youth.
Method: Searches of PubMed and Scopus databases were undertaken from January 1990 until December 2020. Studies were included if they consisted of randomized controlled trials using cognitive behavioural therapy to reduce anxiety in autistic youth. Separate random effects meta-analyses assessed anxiety ratings according to informant (clinician; parent; child), both at end-of-trial and at follow-up.
Results: A total of 19 randomized controlled trials met our inclusion criteria (N = 833 participants: cognitive behavioural therapy n = 487; controls n = 346). Random effects meta-analyses revealed a large effect size for clinician rated symptoms (g = 0.88, 95% CI: 0.55 - 1.12, k = 11), while those for both parent (g = 0.40, 95% CI: 0.24 - 0.56; k = 18) and child-reported anxiety (g = 0.25, 95% CI: 0.06 - 0.43; k = 13) were smaller, but significant. These benefits were not, however, maintained at follow-up. Moderator analyses showed that cognitive behavioural therapy was more efficacious for younger children (for clinician and parent ratings) and when delivered as individual therapy (for clinician ratings). Using the Cochrane Risk of Bias 2 tool, we found concerns about reporting bias across most trials.
Conclusions: The efficacy of cognitive behavioural therapy for anxiety in autistic youth was supported in the immediate intervention period. However, substantial inconsistency emerged in the magnitude of benefit depending upon who was rating symptoms (clinician, parent, or child). Follow-up analyses failed to reveal sustained benefits, though few studies have included this data. It will be important for future trials to address robustness of treatment gains overtime and to further explore inconsistency in efficacy by informant. We also recommend pre-registration of methods by trialists to address concerns with reporting bias.

Soares, E. E., Bausback, K., Beard, C. L., Higinbotham, M., Bunge, E. L., & Gengoux, G. W. (2021). Social skills training for autism spectrum disorder: A meta-analysis of in-person and technological interventions. Journal of Technology in Behavioral Science, 6(1), 166-180.
https://doi.org/10.1007/s41347-020-00177-0

ABSTRACT
Introduction: Social skills training for autism spectrum disorder has traditionally focused on face-to-face interventions. Recently, Behavioural intervention technologies have been utilized to target social skills deficits using computer-based programs, avatars, and therapeutic robots.
Objective: The present meta-analysis reviews recent evidence and compares the efficacy of 14 face-to-face social skills training and four identified behaviour intervention technologies social skills training intervention trials for youth with autism spectrum disorder.
Results: These preliminary analyses did not indicate significant differences between face-to-face social skills training and behaviour intervention technologies social skills training, with effect sizes consistently in the medium to high range (g = 0.81 and g = 0.93, respectively).
Conclusion: These findings provide initial support for the continued investigation of behavioural intervention technologies for providing social skills training to youth with autism spectrum disorders.

Wang, X., Zhao, J., Huang, S., Chen, S., Zhou, T., Li, Q., Luo, X., & Hao, Y. (2021). Cognitive behavioral therapy for autism spectrum disorders: A systematic review. Pediatrics, 147(5): e2020049880.
https://doi.org/10.1542/peds.2020-049880

ABSTRACT
Context: In several studies, authors have reported on cognitive behavioural therapy for children and adolescents with autism spectrum disorder, but inconsistent treatment effectiveness was revealed from these studies.
Objective: To evaluate the effectiveness of cognitive behavioural therapy on the symptoms of autism spectrum disorder and social-emotional problems in children or adolescents with autism spectrum disorder by using a meta-analytic approach.
Data sources: Data sources included PubMed, Embase, and the Cochrane Library.
Study selection: We selected randomized controlled trials in which authors reported effectiveness of cognitive behavioural therapy on the symptoms of autism spectrum disorder and social-emotional problems in children or adolescents with autism spectrum disorder from database inception to May 2019.
Data extraction: For each study, two authors extracted data on the first author's surname, publication year, country, sample size, mean age, cognitive behavioural therapy target, intervention, outcome measurement, follow-up duration, and investigated outcomes.
Results: Forty-five randomized controlled trials and six quasi randomized controlled trials of 2485 children and adolescents with autism spectrum disorder were selected for the final meta-analysis. There was no significant difference between cognitive behavioural therapy and control for symptoms related to autism spectrum disorder based on self-reported outcomes (standard mean difference: -0.09; 95% CI: -0.42 to 0.24; P = 0.59), whereas cognitive behavioural therapy significantly improved the symptoms related to autism spectrum disorder based on informant-reported outcomes, clinician-rated outcomes, and task-based outcomes. Moreover, the pooled standard mean differences indicated that cognitive behavioural therapy has no significant effect on symptoms of social-emotional problems based on self-reported outcomes.
Limitations: The quality of included studies was low to modest, significant heterogeneity among the included studies for all investigated outcomes was detected, and publication bias was inevitable.
Conclusions: These findings indicate that cognitive behavioural therapy may significantly improve the symptoms of autism spectrum disorder and social-emotional problems in children or adolescents with autism spectrum disorder.

Wolstencroft, J., Robinson, L., Srinivasan, R., Kerry, E., Mandy, W., & Skuse, D. (2018). A systematic review of group social skills interventions, and meta-analysis of outcomes, for children with high functioning ASD. Journal of Autism and Developmental Disorders, 48(7), 2293-2307. https://doi.org/10.1007/s10803-018-3485-1

ABSTRACT

Background: Group social skills interventions are a commonly offered treatment for children with high functioning autism spectrum disorder.

Objective: We critically evaluated group social skills intervention randomized controlled trials for those aged 6–25 years.

Method: Our meta-analysis of outcomes emphasized internal validity, thus was restricted to trials that used the parent-report social responsiveness scale or the social skills rating system.

Results: Large positive effect sizes were found for the social responsiveness scale total score, plus the social communication and restricted interests and repetitive behaviours subscales. The social skills rating system social skills subscale improved with moderate effect size. Moderator analysis of the social responsiveness scale showed that group social skills interventions that include parent-groups, and are of greater duration or intensity, obtained larger effect sizes.

Conclusions: We recommend future trials distinguish gains in children's social knowledge from social performance.

3.2.2. Attention-deficit/Hyperactivity Disorder

Bikic, A., Reichow, B., McCauley, S. A., Ibrahim, K., & Sukhodolsky, D. G. (2017). Meta-analysis of organizational skills interventions for children and adolescents with attention-deficit/hyperactivity disorder. Clinical Psychology Review, 52(1), 108-123. https://doi.org/10.1016/j.cpr.2016.12.004

ABSTRACT

Background: In addition to problems with attention and hyperactivity, children with attention-deficit/hyperactivity disorder present with poor organizational skills required for managing time and materials in academic projects. Organizational skills training has been increasingly used to address these deficits. We conducted a systematic review and meta-analysis of organizational skills training in children with attention-deficit/hyperactivity disorder.

Objectives: The objective of this study was to systematically review the evidence of the effects of organizational skills training for children with attention-deficit/hyperactivity disorder for organizational skills, attention, and academic performance.

Methods: We searched three electronic databases to locate randomized controlled trials published in English in peer-reviewed journals comparing organizational skills training with parent education, treatment-as-usual, or waitlist control conditions. Standardized mean difference effect sizes from the studies were statistically combined using a random-effects meta-analyses across six outcomes: teacher- and parent-rated organizational skills, teacher- and parent-rated inattention, teacher-rated academic performance, and grade point average. Risk of bias was assessed for randomization, allocation concealment, blinding of participants and treatment personnel, blinding of outcome assessors, incomplete outcome data, and selective outcome reporting.

Results: Twelve studies involving 1 054 children (576 treatment, 478 control) were included in the meta-analyses. Weighted mean effect sizes for teacher- and parent-rated outcome measures of organizational skills were g = 0.54 (95% CI: 0.17 - 0.91) and g = 0.83 (95% CI: 0.32 - 1.34), respectively. Weighted mean effect sizes of teacher- and parent-rated symptoms of inattention were g = 0.26 (95% CI: 0.01 - 0.52) and g = 0.56 (95% CI: 0.38 - 0.74), respectively. Weighted standardized mean effect size for teacher-rated academic performance and grade point average were g = 0.33 (95% CI: 0.14 - 0.51) and g = 0.29 (95% CI: 0.07 - 0.51), respectively.

Conclusions: Organizational skills training leads to moderate improvements in organizational skills of children with attention-deficit/hyperactivity disorder as rated by teachers and large improvements as rated by parents. More modest improvements were observed on the ratings of symptoms of inattention and academic performance.

Cerrillo-Urbina, A. J., Garcia-Hermoso, A., Sanchez-Lopez, M., Pardo-Guijarro, M. J., Santos Gomez, J. L., & Martinez-Vizcaino, V. (2015). The effects of physical activity in children with attention deficit hyperactivity disorder: A systematic review and meta-analysis of randomized control trials. Child: Care, Health, and Development, 41(6), 779-788. https://doi.org/10.1111/cch.12255

ABSTRACT

Objective: The aim of this systematic review and meta-analysis was to examine the evidence for the effectiveness of exercise interventions on attention deficit hyperactivity disorder related symptoms such as inattention, hyperactivity/impulsivity, anxiety and cognitive functions in children and adolescents.

Method: Five databases covering the period up to November 2014 (PubMed, Scopus, Embase, EBSCO [E-journal, CINAHL, SportDiscus] and The Cochrane Library) were searched. Methodological quality was assessed using the Cochrane tool of bias. Standardized mean differences (SMD) and 95% confidence intervals were calculated, and the heterogeneity of the studies was estimated using Cochran's Q-statistic.

Results: Eight randomized controlled trials (n = 249) satisfied the inclusion criteria. The studies were grouped according to the intervention programme: aerobic and yoga exercise. The meta-analysis suggests that aerobic exercise had a moderate to large effect on core symptoms such as attention (SMD = 0.84), hyperactivity (SMD = 0.56) and impulsivity (SMD = 0.56) and related symptoms such as anxiety (SMD = 0.66), executive function (SMD = 0.58) and social disorders (SMD = 0.59) in children with ADHD. Yoga exercise suggests an improvement in the core symptoms of attention-deficit/hyperactivity disorder.

Conclusions: The main cumulative evidence indicates that short-term aerobic exercise, based on several aerobic intervention formats, seems to be effective for mitigating symptoms such as attention, hyperactivity, impulsivity, anxiety, executive function and social disorders in children with attention-deficit/hyperactivity disorder.

Cortese, S., Ferrin, M., Brandeis, D., Buitelaar, J., Daley, D., Dittmann, R. W., Holtmann, M., Santosh, P., Stevenson, J., Stringaris, A., Zuddas, A., & Sonuga-Barke, E. J. S. (2015). Cognitive training for attention-deficit/hyperactivity disorder: Meta-analysis of clinical and neuropsychological outcomes from randomized controlled trials. Journal of the American Academy of Child & Adolescent Psychiatry, 54(3), 164-174.
https://doi.org/10.1016/j.jaac.2014.12.010

ABSTRACT

Objective: The authors performed meta-analyses of randomized controlled trials to examine the effects of cognitive training on attention-deficit/hyperactivity disorder symptoms, neuropsychological deficits, and academic skills in children/adolescents with attention-deficit/hyperactivity disorder.

Method: The authors searched PubMed, Ovid, Web of Science, ERIC, and CINAHAL databases through 18 May 2014. Data were aggregated using random-effects models. Studies were evaluated with the Cochrane risk of bias tool.

Results: Sixteen of 695 nonduplicate records were analysed (759 children with attention-deficit/hyperactivity disorder). When all types of training were considered together, there were significant effects on total attention-deficit/hyperactivity disorder (SMD = 0.37, 95% CI: 0.09 – 0.66) and inattentive symptoms (SMD = 0.47, 95% CI: 0.14 – 0.80) for reports by raters most proximal to the treatment setting (i.e. typically unblinded). These figures decreased substantially when the outcomes were provided by probably blinded raters (attention-deficit/hyperactivity disorder total: SMD = 0.20, 95% CI: 0.01 – 0.40; inattention: SMD = 0.32, 95% CI: 0.01 - 0.66). Effects on hyperactivity/impulsivity symptoms were not significant. There were significant effects on laboratory tests of working memory (verbal: SMD = 0.52, 95% CI: 0.24 – 0.80; visual: SMD = 0.47, 95% CI: 0.23 – 0.70) and parent ratings of executive function (SMD = 0.35, 95% CI: 0.08 – 0.61). Effects on academic performance were not statistically significant. There were no effects of working memory training, specifically on attention-deficit/hyperactivity disorder symptoms. Interventions targeting multiple neuropsychological deficits had large effects on attention-deficit/hyperactivity disorder symptoms rated by most proximal assessors (SMD = 0.79, 95% CI: 0.46 – 1.12).

Conclusion: Despite improving working memory performance, cognitive training had limited effects on attention-deficit/hyperactivity disorder symptoms according to assessments based on blinded measures. Approaches targeting multiple neuropsychological processes may optimize the transfer of effects from cognitive deficits to clinical symptoms.

Storebø, O. J., Andersen, M. E., Skoog, M., Hansen, S. J., Simonsen, E., Pedersen, N., Tendal, B., Callesen, H. E., Faltinsen, E., & Gluud, C. (2019). Social skills training for attention deficit hyperactivity disorder (ADHD) in children aged 5 to 18 years. Cochrane Database of Systematic Reviews 2019, Issue 6. Art. No.: CD008223. https://doi.org/10.1002/14651858.CD008223.pub3

ABSTRACT

Background: Attention deficit hyperactivity disorder in children is associated with hyperactivity and impulsivity, attention problems, and difficulties with social interactions. Pharmacological treatment may alleviate the symptoms of attention-deficit/hyperactivity disorder but this rarely solves difficulties with social interactions. Children with attention-deficit/hyperactivity disorder may benefit from interventions designed to improve their social skills. We examined the benefits and harms of social skills training on social skills, emotional competencies, general behaviour, attention-deficit/hyperactivity disorder symptoms, performance in school of children with attention-deficit/hyperactivity disorder, and adverse events.

Objectives: To assess the beneficial and harmful effects of social skills training in children and adolescents with attention-deficit/hyperactivity disorder.

Search methods: In July 2018, we searched CENTRAL, MEDLINE, Embase, PsycInfo, four other databases and two trials registers. We also searched online conference abstracts, and contacted experts in the field for information about unpublished or ongoing randomized clinical trials. We did not limit our searches by language, year of publication, or type or status of publication, and we sought translation of the relevant sections of non-English language articles.

Selection criteria: Randomized clinical trials investigating social skills training versus either no intervention or waiting-list control, with or without pharmacological treatment of both comparison groups of children and adolescents with attention-deficit/hyperactivity disorder.

Data collection and analysis: We conducted the review in accordance with the Cochrane Handbook for Systematic Reviews of Intervention. We performed the analyses using Review Manager 5 software and Trial Sequential Analysis. We assessed bias according to domains for systematic errors. We assessed the certainty of the evidence with the GRADE approach.

Main results: We included 25 randomized clinical trials described in 45 reports. The trials included a total of 2 690 participants aged between five and 17 years. In 17 trials, participants were also diagnosed with various comorbidities. The social skills interventions were described as: 1) social skills training, 2) cognitive behavioural therapy, 3) multimodal behavioural/ psychosocial therapy, 4) child life and attention skills treatment, 5) life skills training, 6) the "challenging horizon program", 7) verbal self-instruction, 8) meta-cognitive training, 9) behavioural therapy, 10) behavioural and social skills treatment, and 11) psychosocial treatment. The control interventions were no intervention or waiting list. The duration of the interventions ranged from five weeks to two years. We considered the content of the social skills interventions to be comparable and based on a cognitive-behavioural model. Most of the trials compared child social skills training or parent training combined with medication versus medication alone. Some of the experimental interventions also included teacher consultations. More than half of the trials were at high risk of bias for generation of the allocation sequence and allocation concealment. No trial reported on blinding of participants and personnel. Most of the trials did not report on differences between groups in medication for comorbid disorders. We used all eligible trials in the meta-analyses, but downgraded the certainty of the evidence to low or very low. We found no clinically relevant treatment effect of social skills interventions on the primary outcome measures: teacher-rated social skills at end of treatment (SMD = 0.11, 95% CI: 0.00 - 0.22; 11 trials, 1 271 participants; I^2 = 0%; P = 0.05); teacher-rated emotional competencies at end of treatment (SMD −0.02, 95% CI: −0.72 to 0.68; two trials, 129 participants; I^2 = 74%; P = 0.96); or on teacher-rated general behaviour (SMD −0.06 (negative value better), 95% CI: −0.19 to 0.06; eight trials, 1 002 participants; I^2 = 0%; P = 0.33). The effect on the primary outcome, teacher-rated social skills at end of

treatment, corresponds to a mean difference of 1.22 points on the Social Skills Rating System scale (95% CI: 0.09 - 2.36). The minimal clinically relevant difference (10%) on the Social Skills Rating System is 10.0 points (range 0 to 102 points on Social Skills Rating System). We found evidence in favour of social skills training on teacher-rated core attention-deficit/hyperactivity disorder symptoms at end of treatment for all eligible trials (SMD −0.26, 95% CI: −0.47 to −0.05; 14 trials, 1 379 participants; I^2= 69%; P = 0.02), but the finding is questionable due to lack of support from sensitivity analyses, high risk of bias, lack of clinical significance, high heterogeneity, and low certainty. The studies did not report any serious or non-serious adverse events.
Authors' conclusions: The review suggests that there is little evidence to support or refute social skills training for children and adolescents with attention-deficit/hyperactivity disorder. We may need more trials that are at low risk of bias and a sufficient number of participants to determine the efficacy of social skills training versus no training for attention-deficit/hyperactivity disorder. The evidence base regarding adolescents is especially weak.

Sun, W., Yu, M., & Zhou, X. (2022). Effects of physical exercise on attention deficit and other major symptoms in children with ADHD: A meta-analysis. Psychiatry Research, 311: 114509. https://doi.org/10.1016/j.psychres.2022.114509
ABSTRACT
Background: To explore the effects of physical exercise intervention on the cardinal symptoms, motor skills and executive function among children with attention-deficit/hyperactivity disorder.
Method: Literature searches for randomized controlled trials were performed in PubMed, The Cochrane Library, Web of Science, Embase, CNKI, CBM, VIP and Wanfang databases from the time of database construction to 28 March 2021. Screening was conducted based on inclusion and exclusion criteria. The Cochrane bias risk assessment tools were used to evaluate methodological quality. Relevant data were analysed with RevMan5.3.5 software, and Stata16.0 was used for publication bias tests.
Results: A total of 15 randomized controlled trials with 734 subjects were included. The meta-analysis showed that physical exercise can improve the attention of attention-deficit/hyperactivity disorder children (standardized mean difference [SMD] = 0.60, 95% CI: 0.11 - 1.10, P < 0.01), executive function (SMD = 1.22, 95% CI 0.61 to 1.82, p < 0.01), and motor skills (SMD = 0.67, 95% CI: 0.22 - 1.12, P < 0.01). There were no significant effects on hyperactivity (SMD = 0.06, 95% CI: -0.26 - 0.37, P = 0.72), depression (SMD = 0.72, 95% CI: -0.11 to 1.55, P = 0.09), social problems (SMD = 0.27, 95% CI: 0.09 to -0.64, P = 0.14), or aggressive behaviour (SMD = 0.24, 95% CI: -0.21 to 0.69, P = 0.30). Intervention duration and frequency might be the source of heterogeneity.
Conclusion: Physical exercise can help alleviate the symptoms of attention-deficit/hyperactivity disorder in children. Specifically, it can improve attention, executive function, and motor skills.

3.2.3. Intellectual Disorders

Reichow, B., Lemons, C. L., Maggin, D., & Hill, D. R. (2019). Beginning reading interventions for children and adolescents with intellectual disability. Cochrane Database of Systematic Reviews 2019, Issue 12. Art. No. CD011359. https://doi.org/10.1002/14651858.CD011359.pub2
ABSTRACT
Background: Historically, students with intellectual disability were not expected to learn to read, and thus were excluded from reading instruction. Over the past decades, societal expectations for this group of learners have changed in that children and adolescents with intellectual disability are now expected to be provided with, and benefit from, literacy instruction. This shift in societal expectations has also led to an increase in research examining effective interventions for increasing beginning reading skills for students with intellectual disability.
Objectives: To assess the effectiveness of interventions for teaching beginning reading skills to children and adolescents with intellectual disability.
Search methods: We searched the following electronic databases up to October 2019: CENTRAL; MEDLINE, including Epub Ahead of Print and In-Process and Other Non-Indexed Citations, Embase, 13

other databases, and two trials registers. We contacted authors of included studies, examined reference lists, and used Google Scholar to search for additional studies.
Selection criteria: We included randomized controlled trials (including trials that use quasi-random methods of allocation such as date of birth), involving children and adolescents with intellectual disability (defined as an intelligence quotient (IQ) two standard deviations or more below the population mean) between the ages of 4 and 21 years, that evaluated the efficacy of a beginning reading intervention compared to a control intervention, including no treatment control, wait-list control, treatment as usual, attention control, or alternate non-reading instruction control.
Data collection and analysis: Two review authors independently screened titles and abstracts yielded by the search against the inclusion criteria, and extracted data from each trial using a piloted data extraction form to collect information about the population, intervention, randomization methods, blinding, sample size, outcome measures, follow-up duration, attrition and handling of missing data, and methods of analysis. When data were missing, one review author contacted the study authors to request additional information. Two review authors assessed the risk of bias of each included study and rated the quality of the evidence using the GRADE approach (a systematic method for rating the certainty of evidence in meta-analyses). We conducted random-effect meta-analyses, with inverse-variance weighting to combine effect sizes for each of our primary and secondary outcomes. We presented effect sizes as standardized mean differences (SMD) with 95% confidence intervals (CI).
Main results: We identified seven studies involving 352 children and adolescents with intellectual disabilities that met the inclusion criteria. All studies provided the intervention in school settings. Four studies were conducted in the United States, one in Canada, and two in the United Kingdom. Three studies were funded by grants from the US Department of Education, Institute of Education Sciences; one study by the Canadian Language and Literacy Research Network and the Nova Scotia Health Research Foundation; and three studies did not indicate a funding source. We identified some concerns with risk of bias, mainly due to the difficulty of blinding of participants and personnel, and the lack of blinding of outcome assessors. Meta-analyses of the data demonstrated small-to-moderate effects of beginning reading interventions delivered to children and adolescents with intellectual disability across four dependent variables. We found medium effect sizes in favour of the beginning reading interventions for the primary outcomes of phonologic awareness (SMD 0.55, 95% CI: 0.23 - 0.86; 4 studies, 178 participants; moderate-quality evidence), word reading (SMD 0.54, 95% CI: 0.05 - 1.03; 5 studies, 220 participants; moderate-quality evidence), and decoding (SMD 0.40, 95% CI: 0.12 - 0.67; 5 studies, 230 participants; low-quality evidence). The studies reported no adverse events. We also found a moderate effect for the secondary outcomes of oral read ng fluency (SMD 0.65, 95% CI: – 0.12 to 1.42; 2 studies, 84 participants; low-quality evidence) and language skills (SMD 0.28, 95% CI: 0.03 - 0.54; 3 studies, 222 participants; moderate-quality evidence).
Authors' conclusions: Results from this review provide evidence that beginning reading interventions that include elements of phonologic awareness, letter sound instruction, and decoding, delivered to children and adolescents with intellectual disability, are associated with small-to-moderate improvements in phonologic awareness, word reading, decoding, expressive and receptive language, and oral reading fluency. These findings are aligned with previously conducted studies that examined the effects of reading interventions for people without intellectual disability.

3.2.4. Speech Disorders

Brignell, A., Krahe, M., Downes, M., Kefalianos, E., Reilly, S., & Morgan, A. (2021). Interventions for children and adolescence who stutter: A systematic review, meta-analysis, and evidence map. Journal of Fluency Disorders, 70, 105843. https://doi.org/10.1016/j.jfludis.2021.105843
ABSTRACT:
Purpose: This systematic review critically appraises and maps the evidence for stuttering interventions in childhood and adolescence. We examine the effectiveness of speech-focused treatments, the efficacy of alternative treatment delivery methods and identify gaps in the research evidence.
Methods: Nine electronic databases and three clinical trial registries were searched for systematic reviews, randomized controlled trials and studies that applied an intervention with children (2–18

years) who stutter. Pharmacological interventions were excluded. Primary outcomes were a measure of stuttering severity and quality assessments were conducted on all included studies.
Results: Eight randomized controlled trials met inclusion criteria and were analysed. Intervention approaches included direct (i.e. Lidcombe Program) and indirect treatments (e.g. Demands and Capacities Model). All studies had moderate risk of bias. Treatment delivery methods included individual face-to-face, telehealth and group-based therapy. Both Lidcombe Program and Demands and Capacities Model approaches were effective in reducing stuttering in preschool aged children. Lidcombe Program had the highest level of evidence (pooled effect size = -3.80, CI: -7.30 to -0.30 for Lidcombe Program). There was no high-level evidence for interventions with school-aged children or adolescents. Alternative methods of delivery were as effective as individual face-to-face intervention.
Conclusion: The findings of this systematic review and evidence mapping are useful for clinicians, researchers and service providers seeking to understand the existing research to support the advancement of interventions for children and adolescence who stutter. Findings could be used to inform further research and support clinical decision-making.

Rinaldi, S., Caselli, M. C., Cofelice, V., D'Amico, S., de Cagno, A. G., Della Corte, G., Di Martino, M. V., Di Costanzo, B., Levorato, M. C., Penge, R., Rossetto, T., Sansavini, A., Vecchi, S., & Zoccolotti, P. (2021). Efficacy of the treatment of developmental language disorder: A systematic review. Brain Sciences, 11: 407.
https://doi.org/10.3390/brainsci11030407
ABSTRACT
Background: Language disorder is the most frequent developmental disorder in childhood and it has a significant negative impact on children's development. The goal of the present review was to systematically analyse the effectiveness of interventions in children with developmental language disorder from an evidence-based perspective.
Method: We considered systematic reviews, meta-analyses of randomized controlled trials, control group cohort studies on any type of intervention aimed at improving children's skills in the phono-articulatory, phonological, semantic-lexical, and morpho-syntactic fields in preschool and primary school children (up to eight years of age) that were diagnosed with developmental language disorder. We identified 27 full-length studies, 26 randomized controlled trials and one review.
Results: Early intensive intervention in three- and four-year-old children has a positive effect on phonological expressive and receptive skills and acquisitions are maintained in the medium term. Less evidence is available on the treatment of expressive vocabulary (and no evidence on receptive vocabulary). Intervention on morphological and syntactic skills has effective results on expressive (but not receptive) skills; however, a number of inconsistent results have also been reported. Only one study reports a positive effect of treatment on inferential narrative skills. Limited evidence is also available on the treatment of meta-phonological skills. More studies investigated the effectiveness of interventions on general language skills, which now appears as a promising area of investigation, even though results are not all consistent. **Conclusions:** The effectiveness of interventions over expressive and receptive phonological skills, morpho-syntactic skills, as well as inferential skills in narrative context underscores the importance that these trainings be implemented in children with developmental language disorder.

3.2.5. Developmental Learning Disorders

Ciullo, S., Collins, A., Wisinger, D. R., McKenna, J. W., Lo, Y. L., & Osman, D. (2020). Students with learning disabilities in the social studies: A meta-analysis of intervention research. Exceptional Children, 86(4), 393-412.
https://doi.org/10.1177/0014402919893932
ABSTRACT
Background: This meta-analysis synthesized over 40 years of research (k = 42 studies) in the social studies for students with learning disabilities.
Method: We analysed the various mechanisms that researchers have used to improve outcomes in the social studies by conducting a subgroup investigation of interventions targeting the following

instructional categories: (a) content acquisition, (b) general literacy in social studies, (c) alternative or digitized text, and (d) historical reasoning. The subgroup meta-analyses resulted in considerable variability across study and intervention components. Meta-analysis robust variance estimation procedures were used to aggregate standardized mean difference effect sizes of treatment and comparison groups.
Conclusions: Implications for future research and suggestions for classroom instruction are provided.

Haberstroh, S., & Schulte-Korne, G. (2019). The diagnosis and treatment of dyscalculia. Deutsches Ärzteblatt International, 116(7), 107-114.
https://doi.org/10.3238/arztebl.2019.0107
ABSTRACT
Background: 3–7% of all children, adolescents, and adults suffer from dyscalculia. Severe, persistent difficulty performing arithmetical calculations leads to marked impairment in school, at work, and in everyday life and elevates the risk of comorbid
mental disorders. The state of the evidence underlying various methods of diagnosing and treating this condition is unclear.
Method: Systematic literature searches were carried out from April 2015 to June 2016 in the PsycInfo, PSYNDEX, MEDLINE, ProQuest, ERIC, Cochrane Library, ICTRP, and MathEduc databases. The main search terms on dyscalculia were the German terms “Rechenstörung,” “Rechenschwäche,” and “Dyskalkulie” and the English terms “dyscalculia,” “math disorder, and “math disability.” The data from the retrieved studies were evaluated in a meta-analysis, and corresponding recommendations on the diagnosis and treatment of dyscalculia were jointly issued by the 20 societies and associations that participated in the creation of this guideline.
Results: The diagnosis of dyscalculia should only be made if the person in question displays below-average mathematical performance when seen in the context of relevant information from the individual history, test findings, clinical examination, and further psychosocial assessment. The treatment should be directed toward the individual mathematical problem areas. The mean effect size found across all intervention trials was 0.52 (95% CI: 0.42 - 0.62).
Conclusions: Treatment should be initiated early on in the primary-school years and carried out by trained specialists in an individual setting; comorbid symptoms and disorders should also receive attention. Persons with dyscalculia are at elevated risk of having dyslexia as well (odds ratio [OR]: 12.25); the same holds for attention deficit/hyperactivity disorder and for other mental disorders, both internalizing (such as anxiety and depression) and externalizing (e.g. disorders characterized by aggression and rule-breaking).

Jitendra, A. K., Lein, A. E., Im, S. H., Alghamdi, A. A., Hefte, S. B., & Mouanoutoua, J. (2018). Mathematical interventions for secondary students with learning disabilities and mathematics difficulties: A meta-analysis. Exceptional Children, 84(2), 177-196.
https://doi.org/10.1177/0014402917737467
ABSTRACT
Background: This meta-analysis is the first to provide a quantitative synthesis of empirical evaluations of mathematical intervention programs implemented in secondary schools for students with learning disabilities and mathematics difficulties. Included studies used a treatment-control group design.
Results: A total of 19 experimental and quasi-experimental studies containing 20 independent samples met study inclusion criteria. Results of a random effects model analysis indicated that mathematical interventions influence mathematics outcomes (g = 0.37, 95% CI: 0.18 - 0.56) for students with learning disabilities and mathematics difficulties. In addition, instructional time moderated the relation between mathematics interventions and student learning.
Conclusions: Limitations of the study, future directions for research, and implications for practice are discussed.

Peterson, A. K., Fox, C. B., & Israelsen, M. (2020). A systematic review of academic discourse interventions for school-aged children with language-related learning disabilities. Language, Speech, and Hearing Services in Schools, 51(3), 866-881.
https://doi.org/10.1044/2020_LSHSS-19-00039
ABSTRACT
Purpose: This systematic review synthesized a set of peer-reviewed studies published between 1985 and 2019 and addressed the effectiveness of existing narrative and expository discourse interventions for late elementary– and middle school–aged students with language-related learning disabilities.
Method: A methodical search of the literature for interventions targeting expository or narrative discourse structure for students aged 9–14 years with group experimental designs identified 33 studies, seven of which met specific criteria to be included in this review.
Results: An 8-point critical appraisal scale was applied to analyse the quality of the study design, and effect sizes were calculated for six of the seven studies; equivocal to small effects of far-transfer outcomes (i.e. generalizability to other settings) and equivocal to moderate near-transfer outcomes (i.e. within the treatment setting) were identified. The most effective intervention studies provided explicit instruction of expository texts with visual supports and student-generated learning materials (e.g. notes or graphic organizers) with moderate dosage (i.e. 180–300 min across 6–8 weeks) in a one-on-one or paired group setting. Greater intervention effects were also seen in children with reading and/or language disorders, compared to children with overall academic performance difficulties.
Conclusions: A number of expository discourse interventions showed promise for student use of learned skills within the treatment setting (i.e. near-transfer outcomes) but had limited generalization of skills (i.e. far-transfer outcomes).

3.2.6. Developmental Coordination Disorder

Miyahara, M., Hillier, S. L., Pridham, L., & Nakagawa, S. (2017). Task-oriented interventions for children with developmental co-ordination disorder. Cochrane Database of Systematic Reviews 2017, Issue 7. Art. No.: CD010914.
https://doi.org/10.1002/14651858.CD010914.pub2
ABSTRACT
Background: Developmental co-ordination disorder is a common childhood disorder, which can persist into adolescence and adulthood. Children with developmental co-ordination disorder have difficulties in performing the essential motor tasks required for self-care, academic, social and recreational activities.
Objectives: To assess the effectiveness of task-oriented interventions on movement performance, psychosocial functions, activity, and participation for children with developmental co-ordination disorder and to examine differential intervention effects as a factor of age, sex, severity of developmental co-ordination disorder, intervention intensity, and type of intervention.
Search methods: In March 2017, we searched the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, Embase, 13 other databases, and five trials registers. We also searched reference lists, and contacted members of the mailing list of the International Conference on Developmental Co-ordination Disorder to identify additional studies.
Selection criteria: We included all randomized controlled trials and quasi-randomized controlled trials that compared the task-oriented intervention with either an inactive control intervention or an active control intervention in children and adolescents aged four to 18 years with a diagnosis of developmental co-ordination disorder. Types of outcome measures included changes in motor function, as assessed by standardized performance outcome tests and questionnaires; adverse events; and measures of participation.
Data collection and analysis: All review authors participated in study selection, data extraction, and assessments of risk of bias and quality, and two review authors
independently performed all tasks. Specifically, two review authors independently screened titles and abstracts to eliminate irrelevant studies, extracted data from the included studies, assessed risk of bias, and rated the quality of the evidence using the GRADE approach. In cases of ambiguity or information missing from the paper, one review author contacted trial authors.

Main results: This review included 15 studies (eight randomized controlled trials and seven quasi-randomized controlled trials).
Study characteristics: The trials included 649 participants of both sexes, ranging in age from five to 12 years. The participants were from Australia, Canada, China, Sweden, Taiwan, and the United Kingdom. Trials were conducted in hospital settings; at a university-based clinic, laboratory, or centre; in community centres; at home or school, or both at home and school. The durations of task-oriented interventions were mostly short term (less than six months), with the total number of sessions ranging from five to 50. The length of each session ranged from 30 to 90 minutes, and the frequencies ranged from once to seven times per week. We judged the risk of bias as moderate to high across the studies. Some elements were impossible to achieve (such as blinding of administering personnel or participants).
Key results: primary outcomes - A meta-analysis of two randomized controlled trials and four quasi-randomized controlled trials found in favour of task-oriented interventions for improved motor performance compared to no intervention (mean difference (MD) 3.63, 95% CI: 1.39 - 5.88; P = 0.002; I^2 = 43%; 6 trials, 169 children; very low-quality evidence).
A meta-analysis of two randomized controlled trials found no effect of task-oriented interventions for improved motor performance compared to no intervention (MD 2.34, 95% CI: -2.38 to 7.50; P = 0.38; I^2 = 42%; 2 trials, 51 children; low-quality evidence). Two studies reported no adverse effects or events. Through personal correspondence, the authors of nine studies indicated that no injuries had occurred. Secondary outcomes - Due to the limited number of studies with complete and consistent data, we were unable to perform any meta-analyses on our secondary measures or any subgroup analysis on age, sex, severity of developmental co-ordination disorder, and intervention intensity.
Authors' conclusions: We have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect. The conclusions drawn from previous reviews, which unanimously reported beneficial effects of intervention, are inconsistent with our conclusions. This review highlights the need for carefully designed and executed randomized controlled trials to investigate the effect of interventions for children with developmental co-ordination disorder.

3.2.7. Cerebral Palsy

Abdelhaleem, N., El Wahab, M. S. A., & Elshennawy, S. (2022). Effect of virtual reality on motor coordination in children with cerebral palsy: A systematic review and meta-analysis of randomized controlled trials. Egyptian Journal of Medical Human Genetics, 23: 71.
https://doi.org/10.1186/s43042-022-00258-0
ABSTRACT
Background: Improving motor coordination is an important prerequisite for the functional development of children with cerebral palsy. Virtual reality may be efficient, interactive, adjustable and motivating physiotherapy choice for children with deficient coordination. This review aimed to identify, evaluate and formulate all the evidence concerning the efficacy of virtual reality on motor coordination in children with cerebral palsy and to compare the Physiotherapy Evidence Database (PEDro) with Cochrane Risk of Bias.
Method: Five databases (PubMed, Cochrane Central Register of Controlled Trials, Web of Science, Science Direct and google scholar) were systemically searched from inception up to 1 January 2019. Studies included virtual reality intervention for children with cerebral palsy with motor incoordination. Studies methodological quality was assessed by Cochrane Risk of Bias and PEDro scale. Nineteen studies met the prespecified eligibility criteria.
Results: There was a large effect size (SMD = 0.75) on fine motor coordination. However, there was a non-significant, small beneficial effect (SMD = 0.15) on gross motor coordination. The association between the overall Cochrane Risk of Bias and PEDro scores was fair (r = 0.28, P = 0.248). There was a slight agreement between overall and moderate categories PEDro scores and Cochrane Risk of Bias (κ = 0.02) and κ = 0.10), respectively. However, high and low categories were moderately agreed with Cochrane Risk of Bias (κ = 0.43) and (κ = 0.46).
Conclusion: Virtual reality seems to be effective for improving fine motor coordination with questionable effect on gross motor coordination. PEDro scale is fairly correlated with Cochrane Risk of

Bias, so development and validation of a more compatible quality assessment tools specific to physiotherapy trials are needed.

Chen, Y., Fanchlang, H. D., & Howard, A. (2018). Effectiveness of virtual reality in children with cerebral palsy: A systematic review and meta-analysis of randomized controlled trials. Physical Therapy, 98(1), 63-77. https://doi.org/10.1093/ptj/pzx107

ABSTRACT

Background. Researchers recently investigated the effectiveness of virtual reality in helping children with cerebral palsy to improve motor function. A systematic review of randomized controlled trials using a meta-analytic method to examine the effectiveness of virtual reality in children with cerebral palsy was thus needed.

Purpose. The purpose of this study was to update the current evidence about virtual reality by systematically examining the research literature.

Data Sources. A systematic literature search of PubMed, CINAHL, Cochrane Central Register of Controlled Trials, ERIC, PsycInfo, and Web of Science up to December 2016 was conducted.

Study Selection. Studies with a randomized controlled trial design, children with cerebral palsy, comparisons of virtual reality with other interventions, and movement-related outcomes were included.

Data Extraction. A template was created to systematically code the demographic, methodological, and miscellaneous variables of each randomized controlled trial. The Physiotherapy Evidence Database (PEDro) scale was used to evaluate the study quality. Effect size was computed and combined using meta-analysis software. Moderator analyses were also used to explain the heterogeneity of the effect sizes in all randomized controlled trials.

Results and Data Synthesis: The literature search yielded 19 randomized controlled trials studies with fair to good methodological quality. Overall, virtual reality provided a large effect size (d = 0.861) when compared with other interventions. A large effect of virtual reality on arm function (d = 0.835) and postural control (d = 1.003) and a medium effect on ambulation (d = 0.755) were also found. Only the virtual reality type affected the overall virtual reality effect: an engineer-built system was more effective than a commercial system.

Limitations: The randomized controlled trials included in this study were of fair to good quality, had a high level of heterogeneity and small sample sizes, and used various intervention protocols.

Conclusions: When compared with other interventions, virtual reality seems to be an effective intervention for improving motor function in children with cerebral palsy.

Hsu, C. W., Kang, Y. N., & Tseng, S. H. (2019). Effects of therapeutic exercise intensity on cerebral palsy outcomes: A systematic review with meta-regression of randomized clinical trials. Frontiers in Neurology, 10: 657. https://doi.org/10.3389/fneur.2019.00657

ABSTRACT

Background: Intensive physical therapy or exercise has been associated with favourable cerebral palsy outcomes, but few studies have investigated the effects of exercise intensity on the improvement in cerebral palsy outcomes. In this study, we assessed the effects of intensive exercise-based therapy on improvement in gross motor function in children with cerebral palsy.

Method: We searched three databases for randomized clinical trials evaluating the effects of therapeutic exercise training by using Gross Motor Function Measurement 66 and 88 among children with cerebral palsy. Studies that used interventions in addition to therapeutic exercise were excluded from the present meta-analysis. Exercise intensity was defined using the number of training hours per day and duration of intervention (in weeks). The effects of the number of daily training hours and program duration on Gross Motor Function Measurement improvement were evaluated using meta-regression.

Results: The comprehensive search returned 270 references, and 13 of 270 references met our eligibility criteria. The 13 trials recruited 412 children with cerebral palsy. These trials measured motor improvements by using Gross Motor Function Measurement-66 (n = 8) and Gross Motor Function Measurement-88 (n = 5). The Gross Motor Function Measurement scores in the children who received

the therapeutic intervention did not show significantly greater improvement than those of the children who received standard care. Meta-regression analysis revealed that the improvement in Gross Motor Function Measurement scores was positively associated with the number of daily training hours (point estimate = 0.549; P = 0.031) and program duration (point estimate = 0.067; P = 0.075).
Conclusions: Intensive physical exercise improved cerebral palsy outcomes in the intervention and standard therapy groups. The duration of therapeutic intervention improved cerebral palsy outcomes among the children who received the therapeutic intervention, while an increase in the number of daily training hours improved in cerebral palsy outcomes in the children who received standard therapy.

Liang, X., Tan, Z., Yun, G., Cao, J., Wang, J., Liu, Q., & Chen, T. (2021). Effectiveness of exercise interventions for children with cerebral palsy: A systematic review and meta-analysis of randomized controlled trials. Journal of Rehabilitative Medicine, 53(4):jrm00176.
https://doi.org/10.2340/16501977-2772
ABSTRACT
Objective: The results of previous research into exercise interventions for children with cerebral palsy are inconsistent. The aim of this study is to assess the effectiveness of such exercise interventions.
Design: Systematic review and meta-analysis.
Method: Systematic searches of the PubMed, Embase and Cochrane Library databases for randomized controlled trials involving exercise interventions for children with cerebral palsy, from inception to January 2020, were performed. Pooled weighted mean differences (WMDs) with 95% confidence intervals (95% CI) for gross motor function, gait speed, and muscle strength were calculated using random-effects models.
Results: A final total of 27 trials, including 834 children with cerebral palsy, were selected for quantitative analysis. Exercise interventions had no significant effect on the level of gross motor function (WMD = 1.19; 95% CI: -1.07 to 3.46; P = 0.302). However, exercise interventions were associated with higher levels of gait speed (WMD = 0.05; 95% CI: 0.00 - 0.10; P = 0.032) and muscle strength (WMD = 0.92; 95% CI: 0.19 - 1.64; P = 0.013).
Conclusion: These results suggest that exercise interventions may have beneficial effects on gait speed and muscle strength, but no significant effect on gross motor function in children with cerebral palsy.

Liu, W., Hu, Y., Li, J., & Chang, J. (2022). Effect of virtual reality on balance function in children with cerebral palsy: A systematic review and meta-analysis. Frontiers in Public Health, 10: 865474.
https://doi.org/10.3389/fpubh.2022.865474
ABSTRACT
Background: Virtual reality therapy is popular in treating children with cerebral palsy as a new technology for rehabilitation. Nevertheless, no substantial evidence supporting virtual reality therapy promotion has been developed to date. This study aimed to investigate the effects of virtual reality therapy on balance in children with cerebral palsy.
Method: We conducted a systematic search in PubMed and Web of Science (updated to 30 December 2021). The systematic review and meta-analysis included all randomized controlled trials that included children with cerebral palsy.
Results: A total of 18 randomized controlled trials studies were eligible for inclusion in the systematic review, and meta-analysis was performed on 16 of them. Results showed that the virtual reality intervention was beneficial for balance (SMD = 0.47 [95% CI: 0.28 - 0.66]).
Conclusions: We concluded that virtual reality therapy interventions for children with cerebral palsy have positive effects. However, cautious implementation is needed in clinical applications.

Ren, Z., & Wu, J. (2019). The effect of virtual reality games on the gross motor skills of children with cerebral palsy: A meta-analysis of randomized controlled trials. International Journal of Environmental Research and Public Health, 16: 3885.
https://doi.org/10.3390/ijerph16203885
ABSTRACT

Background: This review aimed to systematically evaluate the rehabilitative effect of virtual reality games for gross motor skills of children with cerebral palsy, and to give scientific grounds for the formulation of rehabilitation therapy for these children.
Method: The literature in Chinese databases (CNKI and Wanfang Data) as well as the databases of other countries (Web of Science, PubMed, EBSCOhost, Informit, Scopus, Science Direct and ProQuest) from the establishment dates of these databases to 3 June 2019 was retrieved in order to collect randomized controlled trials with regard to the intervention effect of virtual reality games and traditional therapy on gross motor skills of children with cerebral palsy, and the literature was screened as per inclusion and exclusion criteria. The PEDro scale was then used to evaluate the methodological quality of the included literature, and the software Review Manager 5.3 was employed to analyse the combined effect size.
Results: As a result, 7 randomized controlled trials and 234 children with cerebral palsy were included. Meta-analysis showed that virtual reality games could improve gross motor skills of children with cerebral palsy. Combined effect size of gross motor skills SMD = 0.37 (95% CI: 0.06 - 0.68, P = 0.02)].
Conclusions: In conclusion, the virtual reality games intervention program can enhance gross motor skills of children with cerebral palsy to some extent. In view of the limitations regarding methodologies and the quality and quantity of the literature in this research, more quality randomized controlled trials are needed so as to draw convincing conclusions of effect of virtual reality games intervention on gross motor skill development of children with cerebral palsy in future studies.

Wu, J., Loprinzi, P. D., & Ren, Z. (2019). The rehabilitative effects of virtual reality games on balance performance among children with cerebral palsy: A meta-analysis of randomized controlled trials. International Journal of Environmental Research and Public Health, 16: 4161. https://doi.org/10.3390/ijerph16214161
ABSTRACT
Background: This research aims to evaluate the effect of virtual reality games on balance recovery of children with cerebral palsy by quantitatively synthesizing the existing literature, and to further determine the impact of virtual reality game intervention (the duration of each intervention, intervention frequency, intervention cycle, and total intervention time) on the balance recovery of children with cerebral palsy.
Method: Relevant literature up until 3 August 2019 was retrieved from Chinese databases (CNKI and Wanfang Data) and the databases in other languages (Web of Science, PubMed, EBSCOhost, Informit, Scopus, Science Direct, and ProQuest), and bias analysis was conducted with the PEDro scalein this research. Randomized controlled trials were selected and underwent meta-analysis, and combined effect size was calculated with a random effects model.
Results: The results showed that virtual reality games may improve the balance of children with cerebral palsy (g = 0.29; 95% CI: 0.10 - 0.48), and no significant influence of the intervention on balance of children with cerebral palsy was shown in the subgroup analysis.
Conclusion: Virtual reality games played a positive role in the improvement of balance of children with cerebral palsy, but these results should be viewed with caution owing to current methodological defects (difference in measurement, heterogeneity of control groups, intervention combined with other treatments, etc.).

3.2.8. Neurodevelopmental Disorders (combined)

Ahn, S. N., & Hwang, S. (2018). Cognitive rehabilitation of adaptive behavior in children with neurodevelopmental disorders: A meta-analysis. Occupational Therapy International, 2018, 5029571. https://doi.org/10.1155/2018/5029571
ABSTRACT
Objectives. Negative behavioural problems often occur following the onset of neurodevelopmental disorders and have an overall impact on the affected children, specifically in terms of their social developmental level. In children, social development behaviour has been shown to spontaneously mature over time with the cognitive therapy intervention effects.

Objective: This study performed a meta-analysis to provide a statistical synopsis of the available evidence of social development behavioural changes following cognitive therapy in children with neurodevelopmental disorders.
Method. Data was collected from two online search engines, including EBSCOhost and PubMed, from 1 January 2006, to 31 August 2016, using the terms "cognition," "cognitive function," and "disease including neurodevelopmental disorder" with DSM-5. Two assessors searched the literature using independent inclusion criteria and evaluated the quality of results using the Jadad score. Six articles were chosen using the Comprehensive Meta-Analysis program (version 2.0).
Results. Six articles reporting randomized controlled trial studies were included. The effective scores for improving adaptive behaviour following cognitive therapy in children with neurodevelopmental disorder were 0.64. The effective score of adaptive behaviour was significant in this study ($p < 0.05$). The results showed no significant statistical heterogeneity and publication bias.
Conclusions. The findings of the meta-analysis suggest that cognitive interventions are effective at improving adaptive behaviour associated with neurodevelopmental disorders.

3.3. Reviews included in GRADE tables/footnotes by condition and outcome domain (see Table 1)

3.3.1. Effects of psychosocial interventions for children and adolescents with ASD to age 24-years on developmental outcomes

Huang, J., Du, C., Liu, J., & Tan, G. (2020). Meta-analysis on intervention effects of physical activities on children and adolescents with autism. International Journal of Environmental Research and Public Health, 17:1950. https://doi.org/10.3390/ijerph17061950

Soares, E. E., Bausback, K., Beard, C. L., Higinbotham, M., Bunge, E. L., & Gengoux, G. W. (2021). Social skills training for autism spectrum disorder: A meta-analysis of in-person and technological interventions. Journal of Technology in Behavioral Science, 6(1), 166-180. https://doi.org/10.1007/s41347-020-00177-0

Wang, X., Zhao, J., Huang, S., Chen, S., Zhou, T., Li, Q., Luo, X., & Hao, Y. (2021). Cognitive behavioral therapy for autism spectrum disorders: A systematic review. Pediatrics, 147(5): e2020049880. https://doi.org/10.1542/peds.2020-049880

3.3.2. Effects of psychosocial interventions for children and adolescents with ASD to age 24-years on health and well-being

Sharma, S., Hucker, A., Matthews, T., Grohmann, D., & Laws, K. R. (2021). Cognitive behavioral therapy for anxiety in children and young people on the autism spectrum: A systematic review and meta-analysis. BMC Psychology, 9:151. https://doi.org/10.1186/s40359-021-00658-8

3.3.3. Effects of psychosocial interventions for children and adolescents with ASD to age 24-years on functional outcomes

Wolstencroft, J., Robinson, L., Srinivasan, R., Kerry, E., Mandy, W., & Skuse, D. (2018). A systematic review of group social skills interventions, and meta-analysis of outcomes, for children with high functioning ASD. Journal of Autism and Developmental Disorders, 48(7), 2293-2307. https://doi.org/10.1007/s10803-018-3485-1

3.3.4. Effects of psychosocial interventions for children and adolescents with ADHD to age 24-years on developmental outcomes

Storebø, O. J., Andersen, M. E., Skoog, M., Hansen, S. J., Simonsen, E., Pedersen, N., Tendal, B., Callesen, H. E., Faltinsen, E., & Gluud, C. (2019). Social skills training for attention deficit hyperactivity disorder (ADHD) in children aged 5 to 18 years. Cochrane Database of Systematic Reviews 2019, Issue 6. Art. No.: CD008223. https://doi.org/10.1002/14651858.CD008223.pub3

Sun, W., Yu, M., & Zhou, X. (2022). Effects of physical exercise on attention deficit and other major symptoms in children with ADHD: A meta-analysis. Psychiatry Research, 311: 114509. https://doi.org/10.1016/j.psychres.2022.114509

3.3.5. Effects of psychosocial interventions for children and adolescents with ADHD to age 24-years on health and well-being

Cerrillo-Urbina, A. J., Garcia-Hermoso, A., Sanchez-Lopez, M., Pardo-Guijarro, M. J., Santos Gomez, J. L., & Martinez-Vizcaino, V. (2015). The effects of physical activity in children with attention deficit hyperactivity disorder: A systematic review and meta-analysis of randomized control trials. Child: Care, Health, and Development, 41(6), 779-788. https://doi.org/10.1111/cch.12255

3.3.6. Effects of psychosocial interventions for children and adolescents with ADHD to age 24-years on functional outcomes

Bikic, A., Reichow, B., McCauley, S. A., Ibrahim, K., & Sukhodolsky, D. G. (2017). Meta-analysis of organizational skills interventions for children and adolescents with attention-deficit/hyperactivity disorder. Clinical Psychology Review, 52(1), 108-123. https://doi.org/10.1016/j.cpr.2016.12.004

Cortese, S., Ferrin, M., Brandeis, D., Buitelaar, J., Daley, D., Dittmann, R. W., Holtmann, M., Santosh, P., Stevenson, J., Stringaris, A., Zuddas, A., & Sonuga-Barke, E. J. S. (2015). Cognitive training for attention-deficit/hyperactivity disorder: Meta-analysis of clinical and neuropsychological outcomes from randomized controlled trials. Journal of the American Academy of Child & Adolescent Psychiatry, 54(3), 164-174. https://doi.org/10.1016/j.jaac.2014.12.010

Storebø, O. J., Andersen, M. E., Skoog, M., Hansen, S. J., Simonsen, E., Pedersen, N., Tendal, B., Callesen, H. E., Faltinsen, E., & Gluud, C. (2019). Social skills training for attention deficit hyperactivity disorder (ADHD) in children aged 5 to 18 years. Cochrane Database of Systematic Reviews 2019, Issue 6. Art. No.: CD008223. https://doi.org/10.1002/14651858.CD008223.pub3

Sun, W., Yu, M., & Zhou, X. (2022). Effects of physical exercise on attention deficit and other major symptoms in children with ADHD: A meta-analysis. Psychiatry Research, 311: 114509. https://doi.org/10.1016/j.psychres.2022.114509

3.3.7. Effects of psychosocial interventions for children and adolescents with ADHD to age 24-years on satisfaction with care

Storebø, O. J., Andersen, M. E., Skoog, M., Hansen, S. J., Simonsen, E., Pedersen, N., Tendal, B., Callesen, H. E., Faltinsen, E., & Gluud, C. (2019). Social skills training for attention deficit hyperactivity disorder (ADHD) in children aged 5 to 18 years. Cochrane Database of Systematic Reviews 2019, Issue 6. Art. No.: CD008223. https://doi.org/10.1002/14651858.CD008223.pub3

3.3.8. Effects of psychosocial interventions for children and adolescents with ADHD to 24-years on adverse events

Storebø, O. J., Andersen, M. E., Skoog, M., Hansen, S. J., Simonsen, E., Pedersen, N., Tendal, B., Callesen, H. E., Faltinsen, E., & Gluud, C. (2019). Social skills training for attention deficit hyperactivity disorder (ADHD) in children aged 5 to 18 years. Cochrane Database of Systematic Reviews 2019, Issue 6. Art. No.: CD008223. https://doi.org/10.1002/14651858.CD008223.pub3

3.3.9. Effects of psychosocial interventions for children and adolescents with intellectual disorders to 24-years on developmental outcomes

Reichow, B., Lemons, C. L., Maggin, D., & Hill, D. R. (2019). Beginning reading interventions for children and adolescents with intellectual disability. Cochrane Database of Systematic Reviews 2019, Issue 12. Art. No. CD011359. https://doi.org/10.1002/14651858.CD011359.pub2

3.3.10. Effects of psychosocial interventions for children and adolescents with intellectual disorders to 24-years on functional outcomes

Reichow, B., Lemons, C. L., Maggin, D., & Hill, D. R. (2019). Beginning reading interventions for children and adolescents with intellectual disability. Cochrane Database of Systematic Reviews 2019, Issue 12. Art. No. CD011359. https://doi.org/10.1002/14651858.CD011359.pub2

3.3.11. Effects of psychosocial interventions for children and adolescents with speech disorders to 24-years on developmental outcomes

Rinaldi, S., Caselli, M. C., Cofelice, V., D'Amico, S., de Cagno, A. G., Della Corte, G., Di Martino, M. V., Di Costanzo, B., Levorato, M. C., Penge, R., Rossetto, T., Sansavini, A., Vecchi, S., & Zoccolotti, P. (2021). Efficacy of the treatment of developmental language disorder: A systematic review. Brain Sciences, 11: 407. https://doi.org/10.3390/brainsci11030407

3.3.12. Effects of psychosocial interventions for children and adolescents with speech disorders to 24-years on functional outcomes

Brignell, A., Krahe, M., Downes, M., Kefalianos, E., Reilly, S., & Morgan, A. (2021). Interventions for children and adolescence who stutter: A systematic review, meta-analysis, and evidence map. Journal of Fluency Disorders, 70, 105843. https://doi.org/10.1016/j.jfludis.2021.105843

Rinaldi, S., Caselli, M. C., Cofelice, V., D'Amico, S., de Cagno, A. G., Della Corte, G., Di Martino, M. V., Di Costanzo, B., Levorato, M. C., Penge, R., Rossetto, T., Sansavini, A., Vecchi, S., & Zoccolotti, P. (2021). Efficacy of the treatment of developmental language disorder: A systematic review. Brain Sciences, 11: 407.
https://doi.org/10.3390/brainsci11030407

3.3.13. Effects of psychosocial interventions for children and adolescents with developmental learning disorders to 24-years on functional outcomes

Ciullo, S., Collins, A., Wisinger, D. R., McKenna, J. W., Lo, Y. L., & Osman, D. (2020). Students with learning disabilities in the social studies: A meta-analysis of intervention research. Exceptional Children, 86(4), 393-412. https://doi.org/10.1177/0014402919893932

Jitendra, A. K., Lein, A. E., Im, S. H., Alghamdi, A. A., Hefte, S. B., & Mouanoutoua, J. (2018). Mathematical interventions for secondary students with learning disabilities and mathematics difficulties: A meta-analysis. Exceptional Children, 84(2), 177-196.
https://doi.org/10.1177/0014402917737467

3.3.14. Effects of psychosocial interventions for children and adolescents with developmental coordination disorder to 24-years on developmental outcomes

Miyahara, M., Hillier, S. L., Pridham, L., & Nakagawa, S. (2017). Task-oriented interventions for children with developmental co-ordination disorder. Cochrane Database of Systematic Reviews 2017, Issue 7. Art. No.: CD010914.
https://doi.org/10.1002/14651858.CD010914.pub2

3.3.15. Effects of psychosocial interventions for children and adolescents with developmental coordination disorder to 24-years on adverse events

Miyahara, M., Hillier, S. L., Pridham, L., & Nakagawa, S. (2017). Task-oriented interventions for children with developmental co-ordination disorder. Cochrane Database of Systematic Reviews 2017, Issue 7. Art. No.: CD010914.
https://doi.org/10.1002/14651858.CD010914.pub2

3.3.16. Effects of psychosocial interventions for children and adolescents with cerebral palsy to 24-years on developmental outcomes

Abdelhaleem, N., El Wahab, M. S. A., & Elshennawy, S. (2022). Effect of virtual reality on motor coordination in children with cerebral palsy: A systematic review and meta-analysis of randomized controlled trials. Egyptian Journal of Medical Human Genetics, 23: 71. https://doi.org/10.1186/s43042-022-00258-0

Liang, X., Tan, Z., Yun, G., Cao, J., Wang, J., Liu, Q., & Chen, T. (2021). Effectiveness of exercise interventions for children with cerebral palsy: A systematic review and meta-analysis of randomized controlled trials. Journal of Rehabilitative Medicine, 53(4):jrm00176. https://doi.org/10.2340/16501977-2772

3.3.17. Effects of psychosocial interventions for children and adolescents with cerebral palsy to 24-years on functional outcomes

Chen, Y., Fanchlang, H. D., & Howard, A. (2018). Effectiveness of virtual reality in children with cerebral palsy: A systematic review and meta-analysis of randomized controlled trials. Physical Therapy, 98(1), 63-77. https://doi.org/10.1093/ptj/pzx107

Liang, X., Tan, Z., Yun, G., Cao, J., Wang, J., Liu, Q., & Chen, T. (2021). Effectiveness of exercise interventions for children with cerebral palsy: A systematic review and meta-analysis of randomized controlled trials. Journal of Rehabilitative Medicine, 53(4):jrm00176. https://doi.org/10.2340/16501977-2772

3.3.18. Effects of psychosocial interventions for children and adolescents with neurodevelopmental disorders (combined) to 24-years on functional outcomes

Ahn, S. N., & Hwang, S. (2018). Cognitive rehabilitation of adaptive behavior in children with neurodevelopmental disorders: A meta-analysis. Occupational Therapy International, 2018, 5029571. https://doi.org/10.1155/2018/5029571

3.4. Excluded from GRADE tables by condition and outcome domain, with reason

3.4.1. Effects of psychosocial interventions for children and adolescents with ASD to 24-years on developmental outcomes

Gates, J. A., Kang, E., & Lerner, M. D. (2017). Efficacy of group social skills interventions for youth with autism spectrum disorder: A systematic review and meta-analysis. Clinical Psychology Review, 52, 164-181.

Wolstencroft, J., Robinson, L., Srinivasan, R., Kerry, E., Mandy, W., & Skuse, D. (2018). A systematic review of group social skills interventions, and meta-analysis of outcomes, for children with high functioning ASD. Journal of Autism and Developmental Disorders, 48(7), 2293-2307. https://doi.org/10.1007/s10803-018-3485-1

We did not include the Gates et al. (2017) or Wolstencroft et al. (2018) reviews in the GRADE tables for the child development outcome (social-emotional skills) due to significant overlap in the included primary studies with the Soares et al. (2021) systematic reviews. We chose to include the Soares et al. review in the GRADE table because the Soares et al. review was more recent. There was also significant overlap between the primary studies included in the Gates et al. (2017) and Wolstencroft et al. (2018) reviews.

3.4.2. Effects of psychosocial interventions for children and adolescents with ASD to 24-years on functional outcomes

Kreslins, A., Robertson, A. E., & Melville, C. (2015). The effectiveness of psychosocial interventions for anxiety in children and adolescents with autism spectrum disorder: A systematic review and meta-analysis. Child and Adolescent Psychiatry & Mental Health, 9:22. https://doi.org/10.1186/s13034-015-0054-7

Wang, X., Zhao, J., Huang, S., Chen, S., Zhou, T., Li, Q., Luo, X., & Hao, Y. (2021). Cognitive behavioral therapy for autism spectrum disorders: A systematic review. Pediatrics, 147(5): e2020049880. https://doi.org/10.1542/peds.2020-049880

We included the Sharma et al. (2021) review because the review was more current than the Kreslins et al. (2015) and Wang et al. (2021) reviews; Sharma et al. included studies through December of 2020. Both Kreslins et al. (2015) and Wang et al. (2021) reviews had significant overlap (i.e. > 50% of included studies) with the Sharma et al. (2021) review.

3.4.3. Effects of psychosocial interventions for children and adolescents with ADHD to 24-years on functional outcomes

Cerrillo-Urbina, A. J., Garcia-Hermoso, A., Sanchez-Lopez, M., Pardo-Guijarro, M. J., Santos Gomez, J. L., & Martinez-Vizcaino, V. (2015). The effects of physical activity in children with attention deficit hyperactivity disorder: A systematic review and meta-analysis of randomized control trials. Child: Care, Health, and Development, 41(6), 779-788. https://doi.org/10.1111/cch.12255

We included evidence from Sun et al. (2022) on the effects of exercise on functional outcomes for individuals with ADHD over Cerrillo-Urbina et al. (2015) because the evidence from Sun et al. was more recent.

3.4.4. Effects of psychosocial interventions for children and adolescents with developmental learning disorders to 24-years on functional outcomes

Haberstroh, S., & Schulte-Korne, G. (2019). The diagnosis and treatment of dyscalculia. Deutsches Ärzteblatt International, 116(7), 107-114. https://doi.org/10.3238/arztebl.2019.0107

Peterson, A. K., Fox, C. B., & Israelsen, M. (2020). A systematic review of academic discourse interventions for school-aged children with language-related learning disabilities. Language, Speech, and Hearing Services in Schools, 51(3), 866-881. https://doi.org/10.1044/2020_LSHSS-19-00039

We included the results from Jitendra et al. (2018) over the Haberstroh & Schulte-Korne (2019) review because the review was more comprehensive and included more primary studies. We included the results of Ciullo et al. (2020) over the results from Peterson et al. (2020) because the Ciullo et al. review included meta-analytic findings for similar outcomes reported in Peterson et al.

3.4.5. Effects of psychosocial interventions for children and adolescents with cerebral palsy to 24-years on developmental outcomes

Hsu, C. W., Kang, Y. N., & Tseng, S. H. (2019). Effects of therapeutic exercise intensity on cerebral palsy outcomes: A systematic review with meta-regression of randomized clinical trials. Frontiers in Neurology, 10: 657. https://doi.org/10.3389/fneur.2019.00657

Ren, Z., & Wu, J. (2019). The effect of virtual reality games on the gross motor skills of children with cerebral palsy: A meta-analysis of randomized controlled trials. International Journal of Environmental Research and Public Health, 16: 3885. https://doi.org/10.3390/ijerph16203885

We included the Liang et al. (2021) review of exercise on child developmental outcomes for individuals with cerebral palsy instead of the review by Hsu et al. (2019) because the Liang et al. review contained more recent evidence. Hsu et al. (2019) did provide a moderator analysis of intervention duration (number of hours and number of weeks of treatment) showing greater intensity had a statistically significant relation to better gross motor development.

We included the Abdelhaleem et al. (2022) review of virtual reality interventions on child development for individuals with cerebral palsy instead of the review by Ren & Wu (2019) because the Abdelhaleem et al. review contained more recent evidence.

3.4.6. Effects of psychosocial interventions for children and adolescents with cerebral palsy to 24-years on functional outcomes

Liu, W., Hu, Y., Li, J., & Chang, J. (2022). Effect of virtual reality on balance function in children with cerebral palsy: A systematic review and meta-analysis. Frontiers in Public Health, 10: 865474. https://doi.org/10.3389/fpubh.2022.865474

Wu, J., Loprinzi, P. D., & Ren, Z. (2019). The rehabilitative effects of virtual reality games on balance performance among children with cerebral palsy: A meta-analysis of randomized controlled trials. International Journal of Environmental Research and Public Health, 16: 4161. https://doi.org/10.3390/ijerph16214161

We included the Chen et al. (2018) review of virtual reality interventions on functional outcomes for individuals with cerebral palsy instead of the reviews by Liu et al. (2021) and Wu et al. (2019) because the Chen et al. review contained evidence across a greater number of functional outcomes (i.e. the Liu et al. and Wu et al. reviews only contained a meta-analysis of one functional outcome, i.e. children's balance or postural control)

Table 1. What is the effectiveness of psychosocial interventions for children with neurodevelopmental disorders for children and adolescents to age 24-years?

Serial Number	Intervention/ Comparison	Outcomes	Systematic reviews (Name, Year)	Justification/Explanation for systematic review
1	Cognitive behavioural therapy versus no treatment control or treatment as usual for children and adolescents with ASD	Developmental	Wang et al. (2021)	The Wang et al. review is prioritized and included in the GRADE table for child development because it is the most current and comprehensive systematic review and meta-analysis of the effects of cognitive behavioural therapy compared to no treatment or treatment as usual for children and adolescents with ASD. Findings and synthesis from the Wang et al. review was prioritized over estimates for the developmental outcome category from Gates et al. (2017) and Wolstencroft et al. (2018) because the Wang et al. review was more comprehensive and synthesized more current primary evidence.
2		Health and well-being	Sharma et al. (2021)	The Sharma et al. review is prioritized and included in the GRADE table for the health and well-being outcome category because it is the most current systematic review and meta-analysis of the effects of cognitive behavioural therapy compared to no treatment or treatment as usual for children and adolescents with ASD. Findings and synthesis from the Sharma et al. review was prioritized over estimates for the well-being outcomes from Kreslins et al. (2015) and Wang et al. (2021) because the Sharma et al. review synthesized more current primary evidence.
3		Functioning	No review identified	N/A
4		Participation	No review identified	N/A
5		Caregiver well-being	No review identified	N/A
6		Satisfaction with care	No review identified	N/A
7		Adverse events	No review identified	N/A

Serial Number	Intervention/ Comparison	Outcomes	Systematic reviews (Name, Year)	Justification/Explanation for systematic review
1	Social skills training versus no treatment control or treatment as usual for children and adolescents with ASD	Developmental	Soares et al. (2021)	The Soares et al. review is prioritized and included in the GRADE table for child development because it is the most current and comprehensive systematic review and meta-analysis of the effects of social skills training compared to no treatment or treatment as usual for children and adolescents with ASD. Findings and synthesis from the Soares et al. review was prioritized over estimates for the developmental outcome category from Gates et al. (2017) and Wolstencroft et al. (2018) because the Soares et al. review was more comprehensive and synthesized more current primary evidence.
2		Health and well-being	No review identified	N/A
3		Functioning	Wolstencroft et al. (2018)	The Wolstencroft et al. review was the only systematic review and meta-analysis on the effects of social skills group training compared to no treatment or treatment as usual for children and adolescents with ASD for a functional outcome (i.e. problem behaviour).
4		Participation	No review identified	N/A
5		Caregiver well-being	No review identified	N/A
6		Satisfaction with care	No review identified	N/A
7		Adverse events	No review identified	N/A
1	Exercise versus no treatment control or treatment as usual for children and adolescents with ASD	Developmental	Huang et al. (2020)	The Huang et al. review was the only systematic review and meta-analysis on the effects of exercise compared to no treatment or treatment as usual for children and adolescents with ASD on

Serial Number	Intervention/ Comparison	Outcomes	Systematic reviews (Name, Year)	Justification/Explanation for systematic review
				child development (i.e. communication skills, social skills, motor skills).
2		Health and well-being	No review identified	N/A
3		Functioning	No review identified	N/A
4		Participation	No review identified	N/A
5		Caregiver well-being	No review identified	N/A
6		Satisfaction with care	No review identified	N/A
7		Adverse events	No review identified	N/A
1	Social skills training versus no treatment control or treatment as usual for children and adolescents with ADHD	Developmental	Storebø et al. (2019)	The Storebø et al. review was the only systematic review and meta-analysis on the effects of social skills group training compared to no treatment or treatment as usual for children and adolescents with ASD child development (i.e. social skills).
2		Health and well-being	No review identified	N/A
3		Functioning	Storebø et al. (2019)	The Storebø et al. review provides the most recent and comprehensive systematic review and meta-analysis of the effects of social skills groups compared to no treatment or treatment as usual on functional outcomes (i.e. core ADHD symptoms, problem behaviour, and academic performance) for children and adolescents with ADHD.
4		Participation	No review identified	N/A
5		Caregiver well-being	No review identified	N/A
6		Satisfaction with care	Storebø et al. (2019)	The Storebø et al. review was the only systematic review and meta-analysis on the effects of social skills group training compared to no treatment or treatment as usual for children and adolescents

Serial Number	Intervention/ Comparison	Outcomes	Systematic reviews (Name, Year)	Justification/Explanation for systematic review
				with ADHD for the outcome of satisfaction with care.
7		Adverse events	Storebø et al. (2019)	The Storebø et al. review was the only systematic review and meta-analysis on the effects of social skills group training compared to no treatment or treatment as usual for children and adolescents with ADHD for the outcome of adverse events.
1	Cognitive rehabilitation versus no treatment control or treatment as usual for children and adolescents with ADHD	Developmental	No review identified	N/A
2		Health and well-being	No review identified	N/A
3		Functioning	Cortese et al. (2015)	The Cortese et al. review is the most current systematic review and meta-analysis of the effects of cognitive training compared to no treatment or treatment as usual on functional outcomes (i.e. ADHD symptoms [inattention], cognitive functioning [executive functioning and working memory], and academic performance) for children and adolescents with ADHD.
4		Participation	No review identified	N/A
5		Caregiver well-being	No review identified	N/A
6		Satisfaction with care	No review identified	N/A
7		Adverse events	No review identified	N/A
1	Organizational skills training versus no treatment control or treatment as usual for children and adolescents with ADHD	Developmental	No review identified	N/A
2		Health and well-being	No review identified	N/A
3		Functioning	Bikic et al. (2018)	The Bikic et al. review is the most current systematic review and meta-analysis of the effects of organizational skills training compared to no treatment or treatment as usual on functional outcomes (i.e. ADHD symptoms

Serial Number	Intervention/ Comparison	Outcomes	Systematic reviews (Name, Year)	Justification/Explanation for systematic review
				[inattention] and academic performance) for children and adolescents with ADHD.
4		Participation	No review identified	N/A
5		Caregiver well-being	No review identified	N/A
6		Satisfaction with care	No review identified	N/A
7		Adverse events	No review identified	N/A
1	Exercise versus no treatment control or treatment as usual for children and adolescents with ADHD	Developmental	Sun et al. (2022)	The Sun et al. review was the only systematic review and meta-analysis on the effects of exercise compared to no treatment or treatment as usual for children and adolescents with ADHD for child development (i.e. motor skills).
2		Health and well-being	Cerrillo-Urbina et al. (2015)	The Cerrillo-Urbina et al. review was the only systematic review and meta-analysis on the effects of exercise compared to no treatment or treatment as usual for children and adolescents with ADHD for children's health and well-being (i.e. anxiety).
3		Functioning	Sun et al. (2022)	The Sun et al. review is prioritized and included in the GRADE table for functional outcomes because it is the most current and comprehensive systematic review and meta-analysis of the effects of exercise compared to no treatment or treatment as usual for children and adolescents with ADHD. Findings and synthesis from the Soares et al. review was prioritized over estimates for functional outcomes from Cerrillo-Urbina et al. (2015) because the Sun et al. review synthesized more current primary evidence.

Serial Number	Intervention/ Comparison	Outcomes	Systematic reviews (Name, Year)	Justification/Explanation for systematic review
4		Participation	No review identified	N/A
5		Caregiver well-being	No review identified	N/A
6		Satisfaction with care	No review identified	N/A
7		Adverse events	No review identified	N/A
1	Beginning reading interventions versus no treatment control or treatment as usual for children and adolescents with intellectual disorders	Developmental	Reichow et al. (2018)	The Reichow et al. review was the only systematic review and meta-analysis on the effects of beginning reading interventions compared to no treatment or treatment as usual for children and adolescents with intellectual disorders for child development (i.e. communication and language).
2		Health and well-being	No review identified	N/A
3		Functioning	Reichow et al. (2018)	The Reichow et al. review was the only systematic review and meta-analysis on the effects of beginning reading interventions compared to no treatment or treatment as usual for children and adolescents with intellectual disorders for a functional outcomes (i.e. academic performance).
4		Participation	No review identified	N/A
5		Caregiver well-being	No review identified	N/A
6		Satisfaction with care	No review identified	N/A
7		Adverse events	No review identified	N/A
1	Psychosocial interventions versus no treatment control or treatment as usual for children and adolescents with speech disorders	Developmental	Rinaldi et al. (2021)	The Rinaldi et al. review was the only systematic review on the effects of interventions for speech disorders compared to no treatment or treatment as usual for children and adolescents with speech disorders for developmental outcomes.

Serial Number	Intervention/ Comparison	Outcomes	Systematic reviews (Name, Year)	Justification/Explanation for systematic review
2		Health and well-being	No review identified	N/A
3		Functioning	Rinaldi et al. (2021)	The Brignell et al. review is included in the GRADE table for functional outcomes because it meta-analytic results of a functional outcome for children with a speech disorder.
4		Participation	No review identified	N/A
5		Caregiver well-being	No review identified	N/A
6		Satisfaction with care	No review identified	N/A
7		Adverse events	No review identified	N/A
1	Psychosocial interventions versus no treatment control or treatment as usual for children and adolescents with developmental learning disorders	Developmental	No review identified	N/A
2		Health and well-being	No review identified	N/A
3		Functioning	Ciullo et al. (2020) Jitendra et al. (2018)	The Ciullo et al. and Jitendra et al. reviews were prioritized over the Haberstroh & Schulte-Korne and Peterson et al. reviews and included in the GRADE table for functional outcomes because they included the most comprehensive meta-analytic analysis of functional outcomes for children and adolescents with developmental learning disorders.
4		Participation	No review identified	N/A
5		Caregiver well-being	No review identified	N/A
6		Satisfaction with care	No review identified	N/A
7		Adverse events	No review identified	N/A
1	Psychosocial interventions versus no treatment control or treatment as usual for children and adolescents with developmental coordination disorders	Developmental	Miyahara et al. (2017)	The Miyahara et al. review was the only systematic review and meta-analysis on the effects of task-oriented interventions compared to no treatment or treatment as usual for children and adolescents with

Serial Number	Intervention/ Comparison	Outcomes	Systematic reviews (Name, Year)	Justification/Explanation for systematic review
				developmental coordination disorder for child development.
2		Health and well-being	No review identified	N/A
3		Functioning	No review identified	N/A
4		Participation	No review identified	N/A
5		Caregiver well-being	No review identified	N/A
6		Satisfaction with care	No review identified	N/A
7		Adverse events	Miyahara et al. (2017)	The Miyahara et al. review was the only systematic review and meta-analysis on the effects of task-oriented interventions compared to no treatment or treatment as usual for children and adolescents with developmental coordination disorder for adverse events.
1	Exercise interventions versus no treatment control or treatment as usual for children and adolescents with cerebral palsy	Developmental	Liang et al. (2021)	The Liang et al. review is prioritized and included in the GRADE table for developmental outcomes because it is the most current and comprehensive systematic review and meta-analysis of the effects of exercise compared to no treatment or treatment as usual for children and adolescents with cerebral palsy.
2		Health and well-being	No review identified	N/A
3		Functioning	Liang et al. (2021)	The Liang et al. review is prioritized and included in the GRADE table for functional outcomes because it is the most comprehensive systematic review and meta-analysis of the effects of exercise compared to no treatment or treatment as usual for children and adolescents with cerebral palsy.
4		Participation	No review identified	N/A

Serial Number	Intervention/ Comparison	Outcomes	Systematic reviews (Name, Year)	Justification/Explanation for systematic review
5		Caregiver well-being	No review identified	N/A
6		Satisfaction with care	No review identified	N/A
7		Adverse events	No review identified	N/A
1	Virtual reality for exercise interventions versus no treatment control or treatment as usual for children and adolescents with cerebral palsy	Developmental	Abdelhaleem et al. (2022)	The Abdelhaleem et al. review is prioritized and included in the GRADE table for developmental outcomes because it is the most current and comprehensive systematic review and meta-analysis of the effects of virtual reality exercise interventions compared to no treatment or treatment as usual for children and adolescents with cerebral palsy.
2		Health and well-being	No review identified	N/A
3		Functioning	Chen et al. (2018)	The Chen et al. review is prioritized and included in the GRADE table for functional outcomes because it contained more comprehensive coverage of outcomes for the meta-analytic analyses of the effects of virtual reality exercise interventions compared to no treatment or treatment as usual for children and adolescents with cerebral palsy.
4		Participation	No review identified	N/A
5		Caregiver well-being	No review identified	N/A
6		Satisfaction with care	No review identified	N/A
7		Adverse events	No review identified	N/A
1	Psychosocial interventions versus no treatment control or treatment as usual for children and adolescents with neuro-developmental disorders	Developmental	No review identified	N/A
2		Health and well-being	No review identified	N/A
3		Functioning	Ahn & Hwang (2018)	The Ahn & Hwang review was the only systematic review and meta-analysis on the effects of cognitive rehabilitation

Serial Number	Intervention/ Comparison	Outcomes	Systematic reviews (Name, Year)	Justification/Explanation for systematic review
				compared to no treatment or treatment as usual for children and adolescents with neurodevelopmetnal disorders for a functional outcome (i.e. adaptive behaviour).
4		Participation	No review identified	N/A
5		Caregiver well-being	No review identified	N/A
6		Satisfaction with care	No review identified	N/A
7		Adverse events	No review identified	N/A

3.5. Narrative description of synthesis findings that contributed to GRADE analysis

3.5.1. Effects of psychosocial interventions for children with ASD on developmental outcomes – Social skills and social-emotional development

Soares and colleagues (2021) conducted a systematic review with meta-analysis to examine the effects of social skills training for children and adolescents with ASD on social-emotional outcomes. The review included two categories of social skills training – face-to-face social skills training and behavioural intervention technologies; we focused on the face-to-face findings for this report. Their systematic review and meta-analysis included 18 RCTs (14 face-to-face social skills training) with 1 266 participants. The meta-analysis of the 14 face-to-face studies showed social-emotional skills for the treatment group had a statistically significant effect (g = 0.81 (95% CI: 0.53 - 1.08)).

Wang and colleagues (2021) conducted a systematic review with meta-analysis to examine the effects of cognitive behavioural therapy for children and adolescents with autism spectrum disorder on symptoms related to autism spectrum disorder (i.e. social-emotional skills). The systematic review and meta-analysis included 51 RCTs with 2 485 participants. The meta-analysis of informant reported social-emotional skills included 23 studies and showed a statistically significant effect favouring treatment (g = 0.57 (95% CI: 0.24 - 0.90)). The authors also conducted meta-analyses for self-reported social-emotional skills (g = 0.09 (95% CI: -0.24 to 0.43)) and clinician-reported social-emotional skills (g = 0.75 (95% CI: 0.10 - 1.41)).

Huang and colleagues (2020) conducted a systematic review with meta-analysis on the effects of physical activities (exercise) on children and adolescents with autism spectrum disorder. The review included 12 RCTs with 492 participants. The meta-analyses of developmental outcomes show statistically significant benefits for communication skills (d = 0.29 (95% CI: 0.04 - 0.55)) and social skills (d = 0.58 (95% CI: 0.29 - 0.87)) but not for motor skills (d = 0.17 (95% CI: -1.11 to 1.46)).

3.5.2. Effects of psychosocial interventions for children with ASD on health and well-being – Anxiety

Sharma and colleagues (2021) conducted a systematic review with meta-analysis to examine the effects of cognitive behavioural therapy for children and adolescents with ASD on clinician-, parent-, and child-rated measures of anxiety. The systematic review and meta-analysis included 19 RCTs with 833 participants. The meta-analysis of these studies showed a statistically significant effect favouring treatment for clinician-rated symptoms of anxiety (g = 0.88 (95% CI: 0.55 - 1.12)), parent-rated symptoms of anxiety (g = 0.40 (95% CI: 0.24 - 0.56)), and child-rated (i.e. self-report) symptoms of anxiety (g = 0.25 (95% CI: 0.06 - 0.43)).

3.5.3. Effects of psychosocial interventions for children and adolescents with ASD on functional outcomes – Problem behaviour

Wolstencroft and colleagues (2018) evaluated RCTs of group social skills interventions for children and adolescents with autism spectrum disorder aged 6–25 years. Their systematic review included 10 studies involving 352 participants. They examined the problem behaviour scale scores of the Social Skills Rating Scale for three studies finding no statistically significant effect of intervention (g = 0.55 (95% CI: -0.03 to 1.13)).

3.5.4. Effects of psychosocial interventions for children and adolescents with ASD on functional outcomes – autism symptoms

Huang and colleagues (2020) conducted a systematic review with meta-analysis on the effects of physical activities (exercise) on children and adolescents with autism spectrum disorder. The review included 12 RCTs with 492 participants. Four studies with 194 participants were included in the meta-analyses of autism symptomatology, which showed statistically significant benefits for the intervention group (d = 1.14 (95% CI: 0.25 - 2.02)).

3.5.5. Effects of psychosocial interventions for children and adolescents with ADHD on developmental outcomes – Social skills and social-emotional development

Storebø and colleagues (2019) conducted a systematic review with meta-analysis to examine the effects of social skills groups for children and adolescents with attention-deficit/hyperactivity disorder on teacher-rated measures of social skills. The systematic review and meta-analysis included 25 RCTs with 2 690 participants; 11 studies with 1 271 participants were included in the meta-analysis of teacher-rated social skills. The meta-analysis of these studies showed a small but statistically significant effect favouring treatment for teacher-rated social skills (g = 0.11 (95% CI: 0.00 - 0.22)). The systematic review and meta-analysis also reported statistical syntheses of 15 studies with 1609 participants reporting parent-rated social skills, showing a small but statistically significant finding favouring treatment (g = 0.19 (95% CI: 0.06 - 0.32)).

Sun and colleagues (2022) conducted a systematic review and meta-analysis of physical exercise interventions for children with attention-deficit/hyperactivity disorder. The review included 15 RCTs with 734 participants. The meta-analysis of motor skills included four studies with 191 participants showing a statistically significant difference in favour of the intervention group (d = 0.67 (95% CI: 0.22 - 1.12)).

3.5.6. Effects of psychosocial interventions for children with ADHD on health and well-being – Anxiety

Cerrillo-Urbina and colleagues (2015) conducted a systematic review with meta-analysis on the effects of exercise for children with attention-deficit/hyperactivity disorder. The review included eight RCTs with 249 participants. The meta-analysis of anxiety included two studies with 65 participants, showing a statistically significant difference in favour of the intervention (d = 0.66 (95% CI: 0.13 - 1.18)).

3.5.7. Effects of psychosocial interventions for children and adolescents with ADHD on functional outcomes – Core symptoms of ADHD (i.e. attention/inattention)

Bikic and colleagues (2017) conducted a systematic review of randomized trials that explored the effects of the organizational skills training for children and adolescents with attention-deficit/hyperactivity disorder. Twelve RCTs involving 1 054 participants were included in the systematic review. Ten studies examined parent-reported attention, with a statistically significant finding favouring the treatment group (g = 0.56 (95% CI: 0.38 - 0.74)). Six studies examined teacher-rated attention, which was showed a statistically significant finding favouring the treatment group (g = 0.26 (95% CI: 0.01 - 0.52)).

Cortese and colleagues (2015) conducted a systematic review with meta-analysis to examine the effects of cognitive training for children and adolescents with attention-deficit/hyperactivity disorder on multiple outcomes including executive the neuropsychological outcome of inattention, meeting our inclusion as an outcome of child functioning for this overview of reviews. The systematic review and meta-analysis included 16 RCTs, with 11 RCTs with 621 participants contributing to the estimate of the effects of cognitive training on inattention. The meta-analysis of these studies showed a statistically significant effect favouring treatment for inattention (g = 0.47 (95% CI: 0.14 - 0.80)).

Storebø and colleagues (2019) conducted a systematic review with meta-analysis to examine the effects of social skills groups for children and adolescents with attention-deficit/hyperactivity disorder on core symptoms of attention-deficit/hyperactivity disorder. The meta-analysis of core symptoms included 25 RCTs with 2 690 participants. The meta-analysis of 14 studies with 1 379 participants and 11 studies with 1206 participants, for teacher-report and parent-report, respectively, showed statistically significant effects favouring treatment, g = 0.26 (95% CI: 0.05 - 0.47) and g = 0.54 (95% CI: 0.26 - 0.81), respectively.

Sun and colleagues (2022) conducted a systematic review and meta-analysis of physical exercise interventions for children with attention-deficit/hyperactivity disorder. The review included 15 RCTs with 734 participants. The meta-analysis of inattention included nine trials with 352 participants

showing a statistically significant difference in favour of the intervention group (d = 0.60 (95% CI: 0.11 - 1.10)).

3.5.8. Effects of psychosocial interventions for children and adolescents with ADHD on functional outcomes – Problem behaviour

Storebø and colleagues (2019) conducted a systematic review with meta-analysis to examine the effects of social skills groups for children and adolescents with attention-deficit/hyperactivity disorder on teacher-rated measures of social skills. The systematic review and meta-analysis included 25 RCTs with 2 690 participants. Eight studies reported teacher-rated problem behaviour (n = 1 002) and parent-rated problem behaviour (n = 995). The findings of the meta-analysis of teacher-rated problem behaviour near zero and not statistically significant (g = 0.06 (95% CI: -0.06 - 0.19)) and the finding for parent-reported problem behaviour was moderate, with a statistically significant finding favouring treatment (g = 0.39 (95% CI: 0.14 - 0.61)).

Sun and colleagues (2022) conducted a systematic review and meta-analysis of physical exercise interventions for children with attention-deficit/hyperactivity disorder. The review included 15 randomized controlled trials with 734 participants. The meta-analysis of problem behaviour included three trials with 78 participants showing a favourable but not statistically significant effect (d = 0.24 (95% CI: -0.21 - 0.69)).

3.5.9. Effects of psychosocial interventions for children and adolescents with ADHD on functional outcomes – Cognitive functioning

Cortese and colleagues (2015) conducted a systematic review with meta-analysis to examine the effects of cognitive training for children and adolescents with attention-deficit/hyperactivity disorder. Their systematic review and meta-analysis included 16 RCTs, with 759 participants. The meta-analysis of studies reporting outcomes for executive functioning and working memory both showed statistically significant effects favouring treatment g = 0.35 (95% CI: 0.08 - 0.61) and g = 0.52 (95% CI: 0.24 - 0.80), respectively.

Sun and colleagues (2022) conducted a systematic review and meta-analysis of physical exercise interventions for children with attention-deficit/hyperactivity disorder. The review included 15 RCTs with 734 participants. The meta-analysis of executive function included 12 trials with 319 participants showing a statistically significant difference in favour of the intervention group (d = 1.22 (95% CI: 0.61 - 1.82)).

3.5.10. Effects of psychosocial interventions for children and adolescents with ADHD on functional outcomes – Academic performance

Bikic and colleagues (2017) conducted a systematic review of randomized trials that explored the effects of the organizational skills training for children and adolescents with attention-deficit/hyperactivity disorder. Twelve RCTs involving 1054 participants were included in the systematic review. Seven studies examined academic performance, with a statistically significant finding favouring the treatment group (g = 0.34 (95% CI: 0.14 - 0.51)).

Cortese and colleagues (2015) conducted a systematic review with meta-analysis to examine the effects of cognitive training for children and adolescents with attention-deficit/hyperactivity disorder. Their systematic review and meta-analysis included 16 RCTs, with 759 participants. The meta-analysis of five studies reporting outcomes for academic outcomes showed no effects for reading or arithmetic g = 0.09 (95% CI: -0.09 to 0.27) and g = 0.01 (95% CI: -0.13 to 0.11), respectively.

3.5.11. Effects of psychosocial interventions for children and adolescents with intellectual disorders on developmental outcomes – Communication and language

Reichow and colleagues (2018) conducted a systematic review with meta-analysis to examine the effectiveness of interventions for teaching beginning reading skills to children and adolescents with

intellectual disability. Seven RCTs involving 352 children and adolescents with intellectual disabilities were included in the systematic review. Reichow et al. found a small but statistically significant effect for language skills, as measured by standardized norm-referenced language assessments (d = 0.28, 95% CI: 0.03 - 0.54; 3 studies, 222 participants)

3.5.12. Effects of psychosocial interventions for children and adolescents with intellectual disorders on functional outcomes – Academic performance

Reichow and colleagues (2018) conducted a systematic review with meta-analysis to examine the effectiveness of interventions for teaching beginning reading skills to children and adolescents with intellectual disability. Seven RCTs involving 352 children and adolescents with intellectual disabilities were included in the systematic review. Four studies examined the outcome of phonological awareness, which had a weighted mean effect size of d = 0.54 (95% CI 0.05 to 1.03).

3.5.13. Effects of psychosocial interventions for children and adolescents with speech disorders on developmental outcomes – Language skills

Rinaldi and colleagues (2021) conducted a systematic review without meta-analysis of interventions for the treatment of developmental language disorders in children. Their review included 27 articles; 26 RCTs and 1 systematic review. They found positive support from RCTs for improvements in children's language skills for expressive phonological skills (evidence from 5 RCTs), expressive morphology and syntax (evidence from 8 RCTs), and general language skills (evidence from 6 RCTs).

3.5.14. Effects of psychosocial interventions for children and adolescents with speech disorders on functional outcomes – Stuttering

Brignell and colleagues (2018) conducted a systematic review with meta-analysis to examine the effectiveness of direct and indirect treatment approaches for children and adolescents who stutter. Eight RCTs with 492 participants were included in the systematic review. The authors meta-analysed two trials using direct treatment approaches, with a weighted mean difference effect size of 3.79 (95% CI: 0.27 - 7.32)). Effects of other intervention types were not combined using statistical synthesis.

3.5.15. Effects of psychosocial interventions for children and adolescents with developmental learning disorders on functional outcomes – Academic performance

Ciullo and colleagues (2020) conducted a systematic review with meta-analysis on specialized instruction for students with developmental learning disorders. Their review focused on specialized instruction for the academic area of "social studies" (e.g. civics, history). Their review included 42 studies (24 RCTs and 18 other group comparative designs); total number of participants across studies was not reported. The meta-analyses of academic performance in the areas of reading comprehension and writing skills both showed statistically significant differences favouring the interventions; d = 0.33 (95% CI: 0.02 - 0.65) and d = 0.63 (95% CI: 0.00 - 1.26), respectively.

Jitendra and colleagues (2018) conducted a systematic review with meta-analysis on specialized instruction for students with math learning disorders. Their review included 19 studies (12 RCTs and 7 group comparison trials without random assignment to groups) with 1 959 participants. They found that specialized instruction had a statistically significant effect on math performance (d = 0.37 (95% CI: 0.18 - 0.56)).

3.5.16. Effects of psychosocial interventions for children and adolescents with developmental coordination disorders on developmental outcomes – Motor skills

Miyahara and colleagues (2017) conducted a systematic review and meta-analysis of task-oriented interventions for children with developmental coordination disorder. Their review included 15 RCTs (including 7 quasi-RCTs) with 649 participants. The meta-analysis of motor skills in six trials (n = 169) showed statistically significantly improved motor performance favouring the intervention group (MD = 3.63 (95% CI: 1.39 - 5.88)).

3.5.17. Effects of psychosocial interventions for children and adolescents with developmental coordination disorders on functional outcomes – Task performance

Miyahara and colleagues (2017) conducted a systematic review and meta-analysis of task-oriented interventions for children with developmental coordination disorder. Their review included 15 RCTs (including 7 quasi-RCTs) with 649 participants. Two trials included the functional outcome of task performance, which was narratively reviewed (see Table 3.11).

3.5.18. Effects of psychosocial interventions for children and adolescents with developmental coordination disorders on participation

Miyahara and colleagues (2017) conducted a systematic review and meta-analysis of task-oriented interventions for children with developmental coordination disorder. Their review included 15 RCTs (including 7 quasi-RCTs) with 649 participants. Two trials included the outcome of participation, which was narratively reviewed (see Table 3.11).

3.5.19. Effects of psychosocial interventions for children and adolescents with developmental coordination disorders on adverse events

Miyahara and colleagues (2017) conducted a systematic review and meta-analysis of task-oriented interventions for children with developmental coordination disorder. Their review included 15 RCTs (including 7 quasi-RCTs) with 649 participants. Eleven trials reported adverse events (n = 340) with zero adverse events reported across trials.

3.5.20. Effects of psychosocial interventions for children and adolescents with cerebral palsy on developmental outcomes – Motor development and skills

Abdelhaleem and colleagues (2022) conducted a systematic review with meta-analysis of virtual reality exercise interventions for children with cerebral palsy. Their review included 19 RCTs (n = 645). They found statistically significant findings favouring treatment for both fine motor skills (d = 0.75 (95% CI: 0.02 - 1.51)) and gross motor skills (d = 0.15 (95% CI: 0.09 - 0.40)).

Liang and colleagues (2021) conducted a systematic review and meta-analysis of exercise interventions for children with cerebral palsy. The review included 27 RCTs with 834 participants. They did not find a statistically significant difference favouring the intervention group for gross motor functioning (MD = 1.19 (95% CI: -1.07 to 3.46)).

3.5.21. Effects of psychosocial interventions for children and adolescents with cerebral palsy on functional outcomes

Chen and colleagues conducted a systematic review with meta-analysis on the effects of virtual reality exercise interventions for children with cerebral palsy. Their review included 19 RCTs with 504 participants. They found statistically significant effects favouring the intervention groups for upper extremity (arm) functioning (d = 0.84 (95% CI: 0.39 - 1.28)), ambulatory skills (d = 0.76 (95% CI: 0.35 - 1.16)), and postural control (d = 1.00 (95% CI: 0.50 - 1.50)).

Liang and colleagues (2021) conducted a systematic review and meta-analysis of exercise interventions for children with cerebral palsy. The review included 27 RCTs with 834 participants. They found a statistically significant difference favouring the intervention group for gait speed (MD = 0.05 (95% CI: 0.00 - 0.10)) and muscle strength (MD = 0.92 (95% CI: 0.19 - 1.64)).

3.5.22. Effects of psychosocial interventions for children and adolescents with neurodevelopmental disorders on functional outcomes – Adaptive behaviour

Ahn and colleagues (2018) performed a meta-analysis to provide a statistical synthesis of the evidence of changes following cognitive therapy for children with neurodevelopmental disorders. Six RCTs involving 544 were included in the meta-analysis. The weighted mean effect size for improvement in adaptive behaviour following cognitive therapy in children with neurodevelopmental disorders was statistically significant (g = 0.64 (95% CI: 0.40 - 0.87)).

3.6. Grading the Evidence

Table 2. Grade Table 1. GRADE Evidence Profile: Effects of Cognitive Behavioural Therapy for Individuals with ASD aged through 24 years

Certainty assessment							№ of participants	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
Developmental (social-emotional skills)											
23[1]	randomized trials	not serious	very serious[a]	not serious	not serious	none	1 458	-	SMD **0.57 SD higher** (0.24 higher to 0.90 higher)	⨁⨁◯◯ Low	CRITICAL
Health and well-being (anxiety)											
18[2]	randomized trials	not serious	Serious[b]	not serious	not serious	none	679	-	SMD **0.40 SD higher** (0.24 higher to 0.56 higher)	⨁⨁⨁◯ Moderate	CRITICAL
Functioning - not reported											
-	-	-	-	-	-	-	-	-	-	-	CRITICAL
Participation - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Caregiver well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Satisfaction with care - not reported											

Certainty assessment							№ of participants	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Adverse events - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT

CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation

a. Visual investigation of forest plots suggests high degree of heterogeneity, supported by an I-squared test greater than 75%

b. Visual investigation of forest plots suggests some degree of heterogeneity, supported by an I-squared test between 50% and 75%

1. Wang, X., Zhao, J., Huang, S., Chen, S., Zhou, T., Li, Q., Luo, X., & Hao, Y. (2021). Cognitive behavioral therapy for autism spectrum disorders: A systematic review. Pediatrics, 147(5): e2020049880. https://doi.org/10.1542/peds.2020-049880

2. Sharma, S., Hucker, A., Matthews, T., Grohmann, D., & Laws, K. R. (2021). Cognitive behavioral therapy for anxiety in children and young people on the autism spectrum: A systematic review and meta-analysis. BMC Psychology, 9:151. https://doi.org/10.1186/s40359-021-00658-8

Table 3. Grade Table 2. GRADE Evidence Profile: Effects of Social Skills Training Interventions for Individuals with ASD aged through 24 years

Certainty assessment							№ of participants	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
Developmental (social-emotional skills)											
14[1]	randomized trials	not serious	Serious[a]	not serious	not serious	none	1 128	-	SMD **0.81 SD higher** (0.53 higher to 1.08 higher)	⊕⊕⊕◯ Moderate	CRITICAL
Health and well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	CRITICAL
Functioning (problem behaviour)											
3[2]	randomized trials	Serious[b]	not serious	not serious	serious[c]	none	108	-	SMD **0.55 SD higher** (0.03 lower to 1.13 higher)	⊕⊕◯◯ Low	CRITICAL
Participation - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Caregiver well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Satisfaction with care - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT

Certainty assessment							№ of participants	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
Adverse events - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT

CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation

a. Visual investigation of forest plots suggests some degree of heterogeneity, supported by an I-squared test between 50% and 75%

b. Review reported high risk of bias for blinding of outcome assessors

c. Overall number of individuals in and across trials is low

1. Soares, E. E., Bausback, K., Beard, C. L., Higinbotham, M., Bunge, E. L., & Gengoux, G. W. (2021). Social skills training for autism spectrum disorder: A meta-analysis of in-person and technological interventions. Journal of Technology in Behavioral Science, 6(1), 166-180. https://doi.org/10.1007/s41347-020-00177-0

2. Wolstencroft, J., Robinson, L., Srinivasan, R., Kerry, E., Mandy, W., & Skuse, D. (2018). A systematic review of group social skills interventions, and meta-analysis of outcomes, for children with high functioning ASD. Journal of Autism and Developmental Disorders, 48(7), 2293-2307. https://doi.org/10.1007/s10803-018-3485-1

Table 4. Grade Table 3. GRADE Evidence Profile: Effects of Physical Exercise Interventions for Individuals with ASD aged through 24 years

Certainty assessment							№ of participants	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
Developmental (communication)											
4[1]	randomized trials	serious[a]	not serious	not serious	not serious	none	240	-	SMD **0.29 SD more** (0.04 more to 0.55 more)	⊕⊕⊕◯ Moderate	CRITICAL
Developmental (social skills)											
3[1]	randomized trials	serious[a]	not serious	not serious	serious[b]	none	197	-	SMD **0.58 SD higher** (0.29 higher to 0.87 higher)	⊕⊕◯◯ Low	CRITICAL
Developmental (motor skills)											
4[1]	randomized trials	serious[a]	very serious[c]	not serious	serious[b]	none	172	-	SMD **0.17 SD lower** (1.46 lower to 1.11 higher)	⊕◯◯◯ Very low	CRITICAL
Health and well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	CRITICAL
Functioning (autism symptoms)											

Certainty assessment							№ of participants	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
4[1]	randomized trials	serious[a]	very serious[c]	not serious	serious[b]	none	194	-	SMD **1.14 SD higher** (0.25 higher to 2.02 higher)	⨁◯◯◯ Very low	CRITICAL
Participation - not measured											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Caregiver and well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Satisfaction with care - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Adverse events - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT

CI: confidence interval; **SMD:** standardized mean difference

a. Most studies did not include blind outcome raters
b. Overall number of individuals in and across trials is low
c. Visual investigation of forest plots suggests high degree of heterogeneity, supported by an I-squared test greater than 75%
1. Huang, J., Du, C., Liu, J., & Tan, G. (2020). Meta-analysis on intervention effects of physical activities on children and adolescents with autism. International Journal of Environmental Research and Public Health, 17:1950. https://doi.org/10.3390/ijerph17061950

Table 5. Grade Table 4. GRADE Evidence Profile: Effects of Social Skills Training Interventions for Children and Adolescents with ADHD aged through 24 years

Certainty assessment							№ of participants	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
Developmental (social-emotional skills)											
11[1]	randomized trials	serious[a]	not serious	not serious	not serious	none	1271	-	SMD **0.11 SD higher** (0 to 0.22 higher)	⨁⨁⨁◯ Moderate	CRITICAL
Health and well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	CRITICAL
Functioning (inattention)											
14[1]	randomized trials	not serious	serious[b]	serious[c]	not serious	none	1379	-	SMD **0.26 SD higher** (0.05 higher to 0.47 higher)	⨁⨁◯◯ Low	CRITICAL
Functioning (problem behaviour)											
8[1]	randomized trials	not serious	not serious	serious[c]	not serious	none	1002	-	SMD **0.06 SD higher** (0.06 lower to 0.19 higher)	⨁⨁⨁◯ Moderate	CRITICAL
Functioning (academic performance)											

Certainty assessment							№ of participants	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
5[1]	randomized trials	not serious	not serious	not serious	not serious	none	642	-	SMD **0.15 SD higher** (0.01 lower to 0.31 higher)	⨁⨁⨁⨁ High	CRITICAL
Participation - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Caregiver well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Satisfaction with care											
4[1]	randomized trials	-	-	-	-	-	Although satisfaction with treatment was high in all four trials, two trials found no significant difference between the intervention and control groups, and two trials did not report on differences between the groups (n = 242).			-	IMPORTANT
Adverse events											
2[1]	randomized trials	-	-	-	-	-	226	0/118 (0.0%)	0/108 (0.0%)	-	IMPORTANT

CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation

a. Under-reported outcome leading to suspicion of selective outcome reporting

b. Visual investigation of forest plots suggests some degree of heterogeneity, supported by an I-squared test between 50% and 75%

c. Outcome assessed by different types of rating scales, each with a different focus on behaviour

1. Storebø, O. J., Andersen, M. E., Skoog, M., Hansen, S. J., Simonsen, E., Pedersen, N., Tendal, B., Callesen, H. E., Faltinsen, E., & Gluud, C. (2019). Social skills training for attention deficit hyperactivity disorder (ADHD) in children aged 5 to 18 years. Cochrane Database of Systematic Reviews 2019, Issue 6. Art. No.: CD008223. https://doi.org/10.1002/14651858.CD008223.pub3

Table 6. Grade Table 5. GRADE Evidence Profile for Effects of Cognitive Intervention for Children and Adolescents with ADHD aged through 24 years

Certainty assessment							№ of participants	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
Developmental - not reported											
-	-	-	-	-	-	-	-	-	-	-	CRITICAL
Health and well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	CRITICAL
Functioning (inattention)											
11[1]	randomized trials	not serious	very serious[a]	not serious	not serious	none	759	-	SMD **0.47 SD higher** (0.14 higher to 0.80 higher)	⨁⨁◯◯ Low	CRITICAL
Functioning (cognitive function)											
6[1]	randomized trials	not serious	not serious	not serious	not serious	none	362	-	SMD **0.35 SD higher** (0.08 higher to 0.61 higher)	⨁⨁⨁⨁ High	CRITICAL
Functioning (academic performance)											
5[1]	randomized trials	not serious	not serious	not serious	not serious	none	249	-	SMD **0.09 SD higher** (0.09 lower to 0.27 higher)	⨁⨁⨁⨁ High	CRITICAL

Certainty assessment							№ of participants	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
Participation - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Caregiver well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Satisfaction with care - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Adverse events - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT

CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation

a. Visual investigation of forest plots suggests high degree of heterogeneity, supported by an I-squared test greater than 75%

1. Cortese, S., Ferrin, M., Brandeis, D., Buitelaar, J., Daley, D., Dittmann, R. W., Holtmann, M., Santosh, P., Stevenson, J., Stringaris, A., Zuddas, A., & Sonuga-Barke, E. J. S. (2015). Cognitive training for attention-deficit/hyperactivity disorder: Meta-analysis of clinical and neuropsychological outcomes from randomized controlled trials. Journal of the American Academy of Child & Adolescent Psychiatry, 54(3), 164-174. https://doi.org/10.1016/j.jaac.2014.12.010

Table 7. Grade Table 6. GRADE Evidence Profile for Effects of Organizational Skills Training for Children and Adolescents with ADHD aged through 24 years

Certainty assessment							№ of participants	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
Developmental - not reported											
-	-	-	-	-	-	-	-	-	-	-	CRITICAL
Health and well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	CRITICAL
Functioning (inattention)											
10[1]	randomized trials	not serious	not serious	not serious	not serious	none	893	-	SMD **0.56 SD higher** (0.38 higher to 0.74 higher)	⨁⨁⨁⨁ High	CRITICAL
Functioning (academic performance)											
7[1]	randomized trials	not serious	not serious	not serious	not serious	none	663	-	SMD **0.33 SD higher** (0.14 higher to 0.51 higher)	⨁⨁⨁⨁ High	CRITICAL
Participation - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Caregiver well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT

Certainty assessment							№ of participants	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
Satisfaction with care - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Adverse events - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT

CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation

1. Bikic, A., Reichow, B., McCauley, S. A., Ibrahim, K., & Sukhodolsky, D. G. (2017). Meta-analysis of organizational skills interventions for children and adolescents with attention-deficit/hyperactivity disorder. Clinical Psychology Review, 52(1), 108-123. https://doi.org/10.1016/j.cpr.2016.12.004

Table 8. Grade Table 7. GRADE Evidence Profile for Effects of Physical Exercise for Children and Adolescents with ADHD aged through 24 years

Certainty assessment							№ of participants	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
Developmental (motor skills)											
4[1]	randomized trials	serious[a]	serious[b]	not serious	serious[c]	none	191	-	SMD **0.67 SD higher** (0.22 higher to 1.12 higher)	⨁◯◯◯ Very low	CRITICAL
Health and well-being (anxiety)											
2[2]	randomized trials	serious[a]	not serious	not serious	very serious[c]	none	65	-	SMD **0.66 SD higher** (0.13 higher to 1.18 higher)	⨁◯◯◯ Very low	CRITICAL
Functioning (attention)											
9[1]	randomized trials	serious[a]	very serious[d]	not serious	not serious	none	352	-	SMD **0.60 SD higher** (0.11 higher to 1.1 higher)	⨁◯◯◯ Very low	CRITICAL
Functioning (executive functioning)											

Certainty assessment							№ of participants	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
12[1]	randomized trials	serious[a]	very serious[d]	not serious	not serious	none	319	-	SMD **1.22 SD higher** (0.61 higher to 1.82 higher)	⨁◯◯◯ Very low	CRITICAL
Functioning (problem behaviour)											
3[1]	randomized trials	serious[a]	not serious	not serious	very serious[c]	none	78	-	SMD **0.24 SD higher** (0.21 lower to 0.69 higher)	⨁◯◯◯ Very low	CRITICAL
Participation - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Caregiver well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Satisfaction with care - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Adverse events - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT

CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation

a. Most studies risk of detection bias rated unclear

b. Visual investigation of forest plots suggests some degree of heterogeneity, supported by an I-squared test between 50% and 75%

c. Overall number of individuals in and across trials is low

d. Visual investigation of forest plots suggests some degree of heterogeneity, supported by an I-squared test between 50% and 75%

1. Sun, W., Yu, M., & Zhou, X. (2022). Effects of physical exercise on attention deficit and other major symptoms in children with ADHD: A meta-analysis. Psychiatry Research, 311: 114509. https://doi.org/10.1016/j.psychres.2022.114509
2. Cerrillo-Urbina, A. J., Garcia-Hermoso, A., Sanchez-Lopez, M., Pardo-Guijarro, M. J., Santos Gomez, J. L., & Martinez-Vizcaino, V. (2015). The effects of physical activity in children with attention deficit hyperactivity disorder: A systematic review and meta-analysis of randomized control trials. Child: Care, Health, and Development, 41(6), 779-788. https://doi.org/10.1111/cch.12255

Table 9. Grade Table 8. GRADE Evidence Profile for Effects of Beginning Reading Interventions for Children and Adolescents with Intellectual Disorders aged through 24 years

Certainty assessment							№ of participants	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
Developmental (communication)											
3[1]	randomized trials	not serious	not serious	not serious	serious[a]	none	222	-	SMD **0.28 SD higher** (0.03 higher to 0.54 higher)	⊕⊕⊕◯ Moderate	CRITICAL
Health and well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	CRITICAL
Functioning (reading skills)											
4[1]	randomized trials	not serious	not serious	not serious	serious[b]	none	178	-	SMD **0.55 SD higher** (0.23 higher to 0.86 higher)	⊕⊕⊕◯ Moderate	CRITICAL
Participation - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Caregiver well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Satisfaction with care - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT

Certainty assessment							№ of participants	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
Adverse events - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT

CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation

a. Low number of studies with small sample sizes (largest trail contributing data for this outcome had 76 participants) and wide CIs around point estimates of study effects

b. Low number of studies with small sample sizes (largest trail contributing data for this outcome had 92 participants) and wide CIs around point estimates of study effects

1. Reichow, B., Lemons, C. L., Maggin, D., & Hill, D. R. (2019). Beginning reading interventions for children and adolescents with intellectual disability. Cochrane Database of Systematic Reviews 2019, Issue 12. Art. No. CD011359. https://doi.org/10.1002/14651858.CD011359.pub2

Table 10. Grade Table 9. GRADE Evidence Profile for Effects of Communication Interventions for Children and Adolescents with Speech Disorders aged through 24 years

Certainty assessment							№ of patients	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
Developmental (language skills)											
26[1]	randomized trials	serious[a]	n/a[b]	n/a[b]	not serious	n/a[b]	Evidence that interventions aimed at expressive phonological skills produce appreciable results. Evidence on the effect of intervention on receptive phonological skills is too limited to draw any conclusion. Limited evidence that targeted interventions on expressive vocabulary acquisition produce effective results. No studies were identified that investigated the effectiveness of receptive vocabulary interventions in children with DLD. Some evidence that interventions aimed at morphological and syntactic expressive skills in children with DLD produce effective results.			-	CRITICAL
Health and well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	CRITICAL
Functioning (stuttering)											
2[2]	randomized trials	not serious	very serious[c]	not serious	Serious[d]	none	100	-	MD **3.79 more** (0.27 more to 7.32 more)	⨁◯◯◯ Very low	CRITICAL
Participation - not reported											

Certainty assessment							№ of patients	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Caregiver well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Satisfaction with care - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Adverse events - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT

CI: confidence interval; **MD:** mean difference

a. Risk of bias assessment of blind outcome assessors mostly unclear

b. Unknown; narrative synthesis only

c. Visual investigation of forest plots suggests high degree of heterogeneity, supported by an I-squared test greater than 75%

d. Overall number of individuals included in trials is low (between 200 and 100 individuals, both treatment arms)

1. Rinaldi, S., Caselli, M. C., Cofelice, V., D'Amico, S., de Cagno, A. G., Della Corte, G., Di Martino, M. V., Di Costanzo, B., Levorato, M. C., Penge, R., Rossetto, T., Sansavini, A., Vecchi, S., & Zoccolotti, P. (2021). Efficacy of the treatment of developmental language disorder: A systematic review. Brain Sciences, 11: 407. https://doi.org/10.3390/brainsci11030407

2. Brignell, A., Krahe, M., Downes, M., Kefalianos, E., Reilly, S., & Morgan, A. (2021). Interventions for children and adolescence who stutter: A systematic review, meta-analysis, and evidence map. Journal of Fluency Disorders, 70, 105843. https://doi.org/10.1016/j.jfludis.2021.105843

Table 11. Grade Table 10. GRADE Evidence Profile for Effects of Specialized Instruction for Children and Adolescents with Developmental Learning Disorders aged through 24 years

Certainty assessment							№ of patients	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
Developmental - not reported											
-	-	-	-	-	-	-	-	-	-	-	CRITICAL
Health and well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	CRITICAL
Functioning (academic performance - reading comprehension)											
4[1]	observational studies	serious[a,b]	serious[c]	not serious	not serious	none	not reported	-	SMD 0.33 SD higher (0.02 higher to 0.65 higher)	⨁◯◯◯ Very low	CRITICAL
Functioning (academic performance - writing)											
5[1]	observational studies	serious[a,b]	not serious	not serious	not serious	none	not reported	-	SMD 0.63 SD higher (0.00 to 1.26 higher)	⨁◯◯◯ Very low	CRITICAL
Functioning (academic performance - math)											

Certainty assessment							№ of patients	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
20[2]	observational studies	serious[a,b]	not serious	not serious	not serious	none	1959	-	SMD 0.37 SD higher (0.18 higher to 0.56 higher)	⨁◯◯◯ Very low	CRITICAL
Participation - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Caregiver well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Satisfaction with care - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Adverse events - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT

CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation

a. Inclusion of randomized controlled trials and controlled trials without random assignment
b. Risk of bias assessment of blind outcome assessors mostly unclear
c. Homogeneity test was statistically significant

1. Ciullo, S., Collins, A., Wisinger, D. R., McKenna, J. W., Lo, Y. L., & Osman, D. (2020). Students with learning disabilities in the social studies: A meta-analysis of intervention research. Exceptional Children, 86(4), 393-412. https://doi.org/10.1177/0014402919893932
2. Jitendra, A. K., Lein, A. E., Im, S. H., Alghamdi, A. A., Hefte, S. B., & Mouanoutoua, J. (2018). Mathematical interventions for secondary students with learning disabilities and mathematics difficulties: A meta-analysis. Exceptional Children, 84(2), 177-196. https://doi.org/10.1177/0014402917737467

Table 12. Grade Table 11. GRADE Evidence Profile for Effects of Task-oriented Interventions for Children and Adolescents with Developmental Coordination Disorder aged through 24 years

Certainty assessment							№ of patients	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
Developmental (motor coordination)											
6[1]	randomized trials	serious[a]	not serious	not serious	very serious[b]	none	169	-	MD 3.63 higher (1.39 higher to 5.88 higher)	⨁◯◯◯ Very low	CRITICAL
Health and well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	CRITICAL
Functioning (occupational and task performance)											
2[1]	randomized trials						2 studies (n = 40) used the COPM and reported improved performance and satisfaction as a result of intervention (Miller 2001; Thornton 2016). Miller 2001 reported that the differential intervention effect between the CO-OP and the contemporary treatment approach (defined as a variety of approaches) was significant on the satisfaction subscale only, which had a considerable baseline difference between the 2 groups. Thornton 2016 reported the significant pre-post improvement in the CO-OP group only; the change in the control group is not reported.			-	CRITICAL
Participation											

Certainty assessment							№ of patients	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
2[1]	randomized trials						2 trials (n = 49) measured participation in physical activities by self-made questionnaires only after the intervention (Hillier 2010; Pless 2000b). Hillier 2010 administered a participation questionnaire after the intervention and found no group difference between the intervention and the control group. Pless 2000b found no group difference in practicing motor tasks at home.			-	IMPORTANT
Caregiver health and well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Satisfaction with care - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Adverse events											
11[1]							0 events reported in both the intervention and control group across 11 trials (n = 340).			-	IMPORTANT

CI: confidence interval; **MD:** mean difference

a. Concerns with allocation concealment

b. Small sample size

1. Miyahara, M., Hillier, S. L., Pridham, L., & Nakagawa, S. (2017). Task-oriented interventions for children with developmental co-ordination disorder. Cochrane Database of Systematic Reviews 2017, Issue 7. Art. No.: CD010914. https://doi.org/10.1002/14651858.CD010914.pub2

Table 13. Grade Table 12. GRADE Evidence Profile for Effects of Exercise Interventions for Children and Adolescents with Cerebral Palsy aged through 24 years

Certainty assessment							№ of patients	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
Developmental (motor skills)											
17[1]	randomized trials	serious[a]	not serious	not serious	not serious	none	503	-	MD 1.19 higher (1.07 lower to 3.46 higher)	⊕⊕⊕◯ Moderate	CRITICAL
Health and well-being – not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Functioning (gait speed)											
16[1]	randomized trials	serious[a]	serious[b]	not serious	not serious	none	426	-	MD 0.05 higher (0.00 to 0.10 higher)	⊕⊕◯◯ Low	CRITICAL
Functioning (muscle strength)											
17[1]	randomized trials	serious[a]	very serious[c]	not serious	not serious	none	592	-	MD 0.92 higher (0.19 higher to 1.64 higher)	⊕◯◯◯ Very low	CRITICAL
Participation – not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT

Certainty assessment							№ of patients	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
Caregiver well-being – not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Satisfaction with care - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Adverse events – not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT

CI: confidence interval; **MD:** mean difference

a. Most risk of bias categories unclear, likely to have some serious limitations

b. Visual investigation of forest plots suggests some degree of heterogeneity, supported by an I-squared test between 50% and 75%

c. Visual investigation of forest plots suggests high degree of heterogeneity, supported by an I-squared test greater than 75%

1. Liang, X., Tan, Z., Yun, G., Cao, J., Wang, J., Liu, Q., & Chen, T. (2021). Effectiveness of exercise interventions for children with cerebral palsy: A systematic review and meta-analysis of randomized controlled trials. Journal of Rehabilitative Medicine, 53(4):jrm00176. https://doi.org/10.2340/16501977-2772

Table 14. Grade Table 13. GRADE Evidence Profile for Effects of Virtual Reality Exercise Training Interventions for Children and Adolescents with Cerebral Palsy aged through 24 years

Certainty assessment							№ of patients	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
Developmental (fine motor coordination)											
6[1]	randomized trials	serious[a]	very serious[b]	not serious	not serious	none	225	-	SMD 0.75 SD higher (0.02 higher to 1.51 higher)	⨁◯◯◯ Very low	CRITICAL
Developmental (gross motor coordination)											
14[1]	randomized trials	serious[a]	not serious	not serious	not serious	none	363	-	SMD 0.15 SD higher (0.09 higher to 0.40 higher)	⨁⨁⨁◯ Moderate	CRITICAL
Health and well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	CRITICAL
Functioning (arm function)											

Certainty assessment							№ of patients	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
13[2]	randomized trials	serious[c]	serious[d]	not serious	not serious	none	390	-	SMD 0.84 SD higher (0.39 higher to 1.28 higher)	⨁⨁◯◯ Low	CRITICAL
Functioning (ambulation)											
8[2]	randomized trials	serious[c]	serious[d]	not serious	not serious	none	282	-	SMD 0.76 SD higher (0.35 higher to 1.16 higher)	⨁⨁◯◯ Low	CRITICAL
Functioning (postural control)											
10[2]	randomized trials	serious[c]	serious[d]	not serious	not serious	none	227	-	SMD 1.00 SD higher (0.50 higher to 1.50 higher)	⨁⨁◯◯ Low	CRITICAL
Participation - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Caregiver well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT

Certainty assessment							№ of patients	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
Satisfaction with care - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Adverse events - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT

CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation

a. Greater than 30% of trials likely to not have utilized blind outcome assessors
b. Visual investigation of forest plots suggests high degree of heterogeneity, supported by an I-squared test greater than 75%
c. Most risk of bias categories unclear, likely to have some serious limitations
d. Visual investigation of forest plots suggests some degree of heterogeneity, supported by an I-squared test between 50% and 75%

1. Abdelhaleem, N., El Wahab, M. S. A., & Elshennawy, S. (2022). Effect of virtual reality on motor coordination in children with cerebral palsy: A systematic review and meta-analysis of randomized controlled trials. Egyptian Journal of Medical Human Genetics, 23: 71. https://doi.org/10.1186/s43042-022-00258-0
2. Chen, Y., Fanchlang, H. D., & Howard, A. (2018). Effectiveness of virtual reality in children with cerebral palsy: A systematic review and meta-analysis of randomized controlled trials. Physical Therapy, 98(1), 63-77. https://doi.org/10.1093/ptj/pzx107

Table 15. Grade Table 14. GRADE Evidence Profile for Effects of Cognitive Interventions for Children and Adolescents with Neurodevelopmental Disorders (combined diagnoses) aged through 24 years

Certainty assessment							№ of participants	Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Combined total of treatment and control/comparison groups	Relative (95% CI)	Absolute (95% CI)		
Developmental - not reported											
-	-	-	-	-	-	-	-	-	-	-	CRITICAL
Health and well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	CRITICAL
Functioning (adaptive behaviour)											
6[1]	randomized trials	serious[a]	serious[b]	not serious	not serious	none	544	-	SMD 0.64 SD higher (0.40 higher to 0.87 higher)	⨁⨁◯◯ Low	CRITICAL
Participation - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Caregiver well-being - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Satisfaction with care - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT
Adverse events - not reported											
-	-	-	-	-	-	-	-	-	-	-	IMPORTANT

CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation

a. Some concerns to risk of bias for blinding
b. Visual inspection of forest plots suggests some degree of heterogeneity
1. Ahn, S. N., & Hwang, S. (2018). Cognitive rehabilitation of adaptive behavior in children with neurodevelopmental disorders: A meta-analysis. Occupational Therapy International, 2018, 5029571. https://doi.org/10.1155/2018/5029571

3.7. Additional evidence by outcome category not mentioned in GRADE tables

3.7.1. Effects of psychosocial interventions for children with ASD on developmental outcomes

Gates, J. A., Kang, E., & Lerner, M. D. (2017). Efficacy of group social skills interventions for youth with autism spectrum disorder: A systematic review and meta-analysis. Clinical Psychology Review, 52, 164-181
Gates and colleagues (2017) conducted a systematic review of social skills group interventions (termed group-based social skills interventions) for individuals with autism spectrum disorder. The systematic review and meta-analysis included 19 RCTs with 735 participants; 18 studies with 685 participants were included in the meta-analysis of children's social-emotional skills. The meta-analysis of these studies showed a medium to large effect, favouring the intervention group (g = 0.51 (95% CI: 0.30 - 0.72)).

Wolstencroft, J., Robinson, L., Srinivasan, R., Kerry, E., Mandy, W., & Skuse, D. (2018). A systematic review of group social skills interventions, and meta-analysis of outcomes, for children with high functioning ASD. Journal of Autism and Developmental Disorders, 48, 2293-2307.
Wolstencroft and colleagues (2018) evaluated randomized controlled trials of group social skills interventions for children and adolescents with autism spectrum disorder aged 6–25 years. Their systematic review included 10 RCTs involving 352 participants. For their meta-analysis of social-emotional skills, they found statistically significant differences, favouring treatment, for social outcomes as reported on the Social Responsiveness Scale (g = 0.85 (95% CI: 0.59 - 1.12)) and the Social Skills Rating System (g = 0.56 (95% CI: 0.18 - 0.95)).

3.7.2. Effects of psychosocial interventions for children with ASD on health and well-being

Kreslins, A., Robertson, A. E., & Melville, C. (2015). The effectiveness of psychosocial interventions for anxiety in children and adolescents with autism spectrum disorder: A systematic review and meta-analysis. Child and Adolescent Psychiatry & Mental Health, 9:22.
Kreslins and colleagues (2015) conducted a systematic review, with meta-analysis, of psychosocial interventions (primarily cognitive behavioural therapy) for children and adolescents with autism spectrum disorder. The review contained 10 RCTs (located in a search ending in November 2014). They found statistically significant effects, favouring treatment and clinician-reported outcomes (d = 1.05 (95% CI: 0.45 - 1.65)), parent-reported outcomes (d = 1.00 (95% CI: 0.21 - 1.80)) but not for self-reported outcomes (d = 0.65 (95% CI: -0.10 to 1.07)).

Wang, X., Zhao, J., Huang, S., Chen, S., Zhou, T., Li, Q., Luo, X., & Hao, Y. (2021). Cognitive behavioral therapy for autism spectrum disorders: A systematic review. Pediatrics, 147(5): e2020049880. https://doi.org/10.1542/peds.2020-049880
Wang and colleagues (2021) conducted a systematic review with meta-analysis to examine the effects of cognitive behavioural therapy for children and adolescents with autism spectrum disorder on symptoms related to autism spectrum disorder (i.e. social-emotional skills). The systematic review and meta-analysis included 51 RCTs with 2 485 participants. The review included a meta-analysis of social-emotional problems (i.e. anxiety) with nine studies, finding no statistically significant difference between treatment and control (g = 0.42 (95% CI: -0.07 to 0.90)).

3.7.3. Effects of psychosocial interventions for children and adolescents with ADHD to 24-years on functional outcomes

Cerrillo-Urbina, A. J., Garcia-Hermoso, A., Sanchez-Lopez, M., Pardo-Guijarro, M. J., Santos Gomez, J. L., & Martinez-Vizcaino, V. (2015). The effects of physical activity in children with attention deficit hyperactivity disorder: A systematic review and meta-analysis of randomized control trials. Child: Care, Health, and Development, 41(6), 779-788. https://doi.org/10.1111/cch.12255
Cerrillo-Ubrina and colleagues (2015) conducted a systematic review of the effects of exercise on children with attention-deficit/hyperactivity disorder. Their review included eight RCTs with 249

participants. They found physical activity (exercise) to have a statistically significant effects on attention (d = 0.84 (95% CI: 0.48 - 1.20)), executive function (d = 0.58 (95% CI: 0.15 - 1.00)), and social disorders (d = 0.59 (95% CI: 0.03 - 1.16)).

3.7.4. Effects of psychosocial interventions for children and adolescents with developmental learning disorders to 24-years on functional outcomes

Haberstroh, S., & Schulte-Korne, G. (2019). The diagnosis and treatment of dyscalculia. Deutsches Ärzteblatt International, 116(7), 107-114. https://doi.org/10.3238/arztebl.2019.0107
Haberstroh and Schulte-Korne (2019) conducted a systematic review of practice guidelines of the treatment of dyscalculia in children and adolescents with developmental learning disorders. Their systematic review included meta-analyses for accuracy and response timing of numerous functional outcomes, showing positive effects for math skills, working memory, executive functioning, and reading/decoding.

Peterson, A. K., Fox, C. B., & Israelsen, M. (2020). A systematic review of academic discourse interventions for school-aged children with language-related learning disabilities. Language, Speech, and Hearing Services in Schools, 51(3), 866-881.
https://doi.org/10.1044/2020_LSHSS-19-00039
Peterson and colleagues (2020) conducted a systematic review without meta-analysis of academic interventions for children ages 9 to 14 years with language-related learning disabilities. The review included seven studies (RCTs and controlled trials without random assignment) with 382 participants. Their review found academic interventions can have positive (promising) effects on student rated outcomes in multiple areas of academic performance.

3.7.5. Effects of psychosocial interventions for children and adolescents with cerebral palsy to 24-years on developmental outcomes

Hsu, C. W., Kang, Y. N., & Tseng, S. H. (2019). Effects of therapeutic exercise intensity on cerebral palsy outcomes: A systematic review with meta-regression of randomized clinical trials. Frontiers in Neurology, 10: 657. https://doi.org/10.3389/fneur.2019.00657
Hsu and colleagues (2019) conducted a systematic review and meta-analysis of therapeutic exercise for children with cerebral palsy under 18 years old. The review included 13 RCTs with 412 participants. They did not find a statistically significant difference for exercise on motor functioning (d = 0.11 (95% CI: -0.14 to 0.36)). A meta-regression of the included trials suggested that the duration of the therapeutic intervention was related to better outcomes.

Ren, Z., & Wu, J. (2019). The effect of virtual reality games on the gross motor skills of children with cerebral palsy: A meta-analysis of randomized controlled trials. International Journal of Environmental Research and Public Health, 16: 3885.
https://doi.org/10.3390/ijerph16203885
Ren and Wu (2019) conducted a systematic review with meta-analysis on virtual reality exercise interventions for children with cerebral palsy. Their review included 7 RCTs with 234 participants. They found virtual reality interventions had a statistically significant effect on gross motor skills (d = 0.37 (95% CI: 0.06 - 0.68)).

3.7.6. Effects of psychosocial interventions for children and adolescents with cerebral palsy to 24-years on functional outcomes

Liu, W., Hu, Y., Li, J., & Chang, J. (2022). Effect of virtual reality on balance function in children with cerebral palsy: A systematic review and meta-analysis. Frontiers in Public Health, 10: 865474.
https://doi.org/10.3389/fpubh.2022.865474
Liu and colleagues (2022) conducted a systematic review and meta-analysis of virtual reality exercise interventions on balance in children with cerebral palsy. Their review included 18 RCTs with 474 participants. A meta-analysis of 16 trials showed statistically significant effects of the virtual reality interventions on balance (d = 0.47 (95% CI: 0.04 - 1.74)).

Wu, J., Loprinzi, P. D., & Ren, Z. (2019). The rehabilitative effects of virtual reality games on balance performance among children with cerebral palsy: A meta-analysis of randomized controlled trials. International Journal of Environmental Research and Public Health, 16: 4161. https://doi.org/10.3390/ijerph16214161

Wu and colleagues (2019) conducted a systematic review and meta-analysis of virtual reality exercise interventions on balance in children with cerebral palsy. Their review included 11 RCTs with 313 participants. A meta-analysis of these trials showed statistically significant effects of the virtual reality interventions on balance (d = 0.29 (95% CI: 0.10 - 0.48)). Moderator analyses of intervention density (i.e. length, frequency, total time) did not show statistically significant relations between density and outcome (balance).

4. From Evidence to Recommendations

4.1. Summary of findings

Table 16.1: Summary of findings: Cognitive behavioural therapy compared to no treatment control or treatment as usual for children and adolescents to 24 years with autism spectrum disorder

Cognitive behavioural therapy compared to no treatment control or treatment as usual for children and adolescents to 24 years with autism spectrum disorder				
Outcomes	**Anticipated effects** (95% CI) **with cognitive behavioural therapy**	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
Developmental (social-emotional skills)	SMD **0.57 SD higher** (0.24 higher to 0.90 higher)	1 458 (23 RCTs)[1]	⨁⨁◯◯ Low[a]	Range of mean ages of participants of studies included in meta-analytic synthesis: 4.5-years-old to 14.7-years-old[†]
Health and well-being (anxiety)	SMD **0.40 SD higher** (0.24 higher to 0.56 higher)	679 (18 RCTs)[2]	⨁⨁⨁◯ Moderate[b]	Range of mean ages of participants of studies included in meta-analytic synthesis: 5.4-years-old to 14.6-years-old
Functioning - not reported	-	-	-	
Participation - not reported	-	-	-	
Caregiver well-being - not reported	-	-	-	
Satisfaction with care - not reported	-	-	-	
Adverse events - not reported	-	-	-	
CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation; **RCTs:** randomized controlled trials				

a. Visual investigation of forest plots suggests high degree of heterogeneity, supported by an I-squared test greater than 75%
b. Visual investigation of forest plots suggests some degree of heterogeneity, supported by an I-squared test between 50% and 75%
[†] Moderator analysis of age showed studies with mean age at start of treatment 10-years-old or more had statistically significantly better outcomes than studies with participants under 10-years-old

1. Wang, X., Zhao, J., Huang, S., Chen, S., Zhou, T., Li, Q., Luo, X., & Hao, Y. (2021). Cognitive behavioral therapy for autism spectrum disorders: A systematic review. Pediatrics, 147(5): e2020049880. https://doi.org/10.1542/peds.2020-049880
2. Sharma, S., Hucker, A., Matthews, T., Grohmann, D., & Laws, K. R. (2021). Cognitive behavioral therapy for anxiety in children and young people on the autism spectrum: A systematic review and meta-analysis. BMC Psychology, 9:151. https://doi.org/10.1186/s40359-021-00658-8

GRADE Working Group grades of evidence

High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.

Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.

Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.

Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

Table 16.2: Summary of findings: Social skills training compared to no treatment control or treatment as usual for children and adolescents to 24 years with autism spectrum disorder

Social skills training compared to no treatment control or treatment as usual for children and adolescents to 24 years with autism spectrum disorder				
Outcomes	**Anticipated effects** (95% CI) **with social skills training**	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
Developmental (social-emotional skills)	SMD **0.81 SD higher** (0.53 higher to 1.08 higher)	1 128 (14 RCTs)[1]	⊕⊕⊕◯ Moderate[a]	Age of participants in the studies included in the review: 3- to 19-years-old (per review inclusion criteria; mean age note reported and could not be calculated)
Health and well-being - not reported	-	-	-	
Functioning – (problem behaviour)	SMD **0.55 SD higher** (0.03 lower to 1.13 higher)	108 (3 RCTs)[2]	⊕⊕◯◯ Low[b,c]	Mean age of participants of included studies in meta-analytic synthesis15.2-years-old (range 13.7 to 20.4)
Participation - not reported	-	-	-	
Caregiver well-being - not reported	-	-	-	
Satisfaction with care - not reported	-	-	-	
Adverse events - not reported	-	-	-	
CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation; **RCTs:** randomized controlled trials				

a. Visual investigation of forest plots suggests some degree of heterogeneity, supported by an I-squared test between 50% and 75%
b. Review reported high risk of bias for blinding of outcome assessors
c. Overall number of individuals in and across trials is low

1. Soares, E. E., Bausback, K., Beard, C. L., Higinbotham, M., Bunge, E. L., & Gengoux, G. W. (2021). Social skills training for autism spectrum disorder: A meta-analysis of in-person and technological interventions. Journal of Technology in Behavioral Science, 6(1), 166-180. https://doi.org/10.1007/s41347-020-00177-0
2. Wolstencroft, J., Robinson, L., Srinivasan, R., Kerry, E., Mandy, W., & Skuse, D. (2018). A systematic review of group social skills interventions, and meta-analysis of outcomes, for children with high functioning ASD. Journal of Autism and Developmental Disorders, 48(7), 2293-2307. https://doi.org/10.1007/s10803-018-3485-1

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

Table 16.3: Summary of findings: Exercise compared to no treatment control or treatment as usual for children and adolescents to 24 years with autism spectrum disorder

Exercise compared to no treatment control or treatment as usual for children and adolescents to 24 years with autism spectrum disorder				
Outcomes	**Anticipated effects** (95% CI) **with exercise**	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
Developmental (communication skills)	SMD **0.29 SD more** (0.04 more to 0.55 more)	240 (4 RCTs)[1]	⨁⨁⨁◯ Moderate[a]	Range of mean ages of participants of studies included in meta-analytic synthesis: 3-years-old to 18-years-old
Developmental (social skills)	SMD **0.58 SD higher** (0.29 higher to 0.87 higher)	197 (3 RCTs)[1]	⨁⨁◯◯ Low [a,b]	Range of mean ages of participants of studies included in meta-analytic synthesis: 3-years-old to 18-years-old
Developmental (motor skills)	SMD **0.17 SD lower** (1.46 lower to 1.11 higher)	172 (4 RCTs)[1]	⨁◯◯◯ Very low [a,b,c]	Range of mean ages of participants of studies included in meta-analytic synthesis: 3-years-old to 18-years-old
Health and well-being - not reported	-	-	-	
Functioning (autism symptoms)	SMD **1.14 SD higher** (0.25 higher to 2.02 higher)	194 (4 RCTs)[1]	⨁◯◯◯ Very low [a,b,c]	Range of mean ages of participants of studies included in meta-analytic synthesis: 3-years-old to 18-years-old
Participation - not reported	-	-	-	
Caregiver and well-being - not reported	-	-	-	
Satisfaction with care - not reported	-	-	-	
Adverse events - not reported	-	-	-	
CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation; **RCTs:** randomized controlled trials				

a. Most studies did not include blind outcome raters

b. Overall number of individuals in and across trials is low
c. Visual investigation of forest plots suggests high degree of heterogeneity, supported by an I-squared test greater than 75%
1. Huang, J., Du, C., Liu, J., & Tan, G. (2020). Meta-analysis on intervention effects of physical activities on children and adolescents with autism. International Journal of Environmental Research and Public Health, 17:1950. https://doi.org/10.3390/ijerph17061950
GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

Table 16.4: Summary of findings: Social skills training compared to no treatment control or treatment as usual for children and adolescents to 24 years with attention-deficit/hyperactivity disorder

Social skills training compared to no treatment control or treatment as usual for children and adolescents to 24 years with attention-deficit/hyperactivity disorder				
Outcomes	**Anticipated effects** (95% CI) **with social skills training**	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
Developmental (social-emotional skills)	SMD **0.11 SD higher** (0 to 0.22 higher)	1 271 (11 RCTs)[1]	⊕⊕⊕◯ Moderate[a]	Ages of participants of most studies included in meta-analytic synthesis: 5-years-old to 13-years-old[†]
Health and well-being - not reported	-	-	-	
Functioning (inattention)	SMD **0.26 SD higher** (0.05 higher to 0.47 higher)	1 379 (14 RCTs)[1]	⊕⊕◯◯ Low[b,c]	Ages of participants of most studies included in meta-analytic synthesis: 5-years-old to 13-years-old[†]
Functioning (problem behaviour)	SMD **0.06 SD higher** (0.06 lower to 0.19 higher)	1 002 (8 RCTs)[1]	⊕⊕⊕◯ Moderate[c]	Ages of participants of most studies included in meta-analytic synthesis: 5-years-old to 13-years-old[†]
Functioning (academic performance)	SMD **0.15 SD higher** (0.01 lower to 0.31 higher)	642 (5 RCTs)[1]	⊕⊕⊕⊕ High	Ages of participants of most studies included in meta-analytic synthesis: 5-years-old to 13-years-old[†]
Participation - not reported	-	-	-	
Caregiver well-being - not reported	-	-	-	

Satisfaction with care	Although satisfaction with treatment was high in all four trials, two trials found no significant difference between the intervention and control groups, and two trials did not report on differences between the groups.	242 (4 studies)[1]	-	Ages of participants of most studies included in meta-analytic synthesis: 5-years-old to 13-years-old
Adverse events	not pooled	226 (2 RCTs)[1]	-	Ages of participants of most studies included in meta-analytic synthesis: 5-years-old to 13-years-old
CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation; **RCTs:** randomized controlled trials				

a. Under-reported outcome leading to suspicion of selective outcome reporting
b. Visual investigation of forest plots suggests some degree of heterogeneity, supported by an I-squared test between 50% and 75%
c. Outcome assessed by different types of rating scales, each with a different focus on behaviour
[†] One trial included participants aged 12-to 17-years-old
1. Storebø, O. J., Andersen, M. E., Skoog, M., Hansen, S. J., Simonsen, E., Pedersen, N., Tendal, B., Callesen, H. E., Faltinsen, E., & Gluud, C. (2019). Social skills training for attention deficit hyperactivity disorder (ADHD) in children aged 5 to 18 years. Cochrane Database of Systematic Reviews 2019, Issue 6. Art. No.: CD008223. https://doi.org/10.1002/14651858.CD008223.pub3
GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

Table 16.5: Cognitive intervention compared to no treatment control or treatment as usual for children and adolescents to 24 years with attention-deficit/hyperactivity disorder

Cognitive rehabilitation compared to no treatment control or treatment as usual for children and adolescents to 24 years with attention-deficit/hyperactivity disorder				
Outcomes	**Anticipated effects** (95% CI) **with cognitive intervention**	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
Developmental - not reported	-	-	-	
Health and well-being - not reported	-	-	-	
Functioning (inattention)	SMD **0.47 SD higher** (0.14 higher to 0.80 higher)	759 (11 RCTs)[1]	⨁⨁◯◯ Low[a]	Age of participants in the studies included in the review: 3- to 18-years-old (per review inclusion criteria; mean age note reported and could not be calculated)
Functioning (cognitive function)	SMD **0.35 SD higher** (0.08 higher to 0.61 higher)	362 (6 RCTs)[1]	⨁⨁⨁⨁ High	Age of participants in the studies included in the review: 3- to 19-years-old (per review inclusion criteria; mean age note reported and could not be calculated)
Functioning (academic performance)	SMD **0.09 SD higher** (0.09 lower to 0.27 higher)	249 (5 RCTs)[1]	⨁⨁⨁⨁ High	Age of participants in the studies included in the review: 3- to 19-years-old (per review inclusion criteria; mean age note reported and could not be calculated)
Participation - not reported	-	-	-	
Caregiver well-being - not reported	-	-	-	
Satisfaction with care - not reported	-	-	-	
Adverse events - not reported	-	-	-	
CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation; **RCTs:** randomized controlled trials				

a. Visual investigation of forest plots suggests high degree of heterogeneity, supported by an I-squared test greater than 75%

1. Cortese, S., Ferrin, M., Brandeis, D., Buitelaar, J., Daley, D., Dittmann, R. W., Holtmann, M., Santosh, P., Stevenson, J., Stringaris, A., Zuddas, A., & Sonuga-Barke, E. J. S. (2015). Cognitive training for attention-deficit/hyperactivity disorder: Meta-analysis of clinical and neuropsychological outcomes from randomized controlled trials. Journal of the American Academy of Child & Adolescent Psychiatry, 54(3), 164-174. https://doi.org/10.1016/j.jaac.2014.12.010

GRADE Working Group grades of evidence

High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.

Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.

Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.

Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

Table 16.6: Summary of findings: Organizational skills training compared to no treatment control or treatment as usual for children and adolescents to 24 years with attention-deficit/hyperactivity disorder

Organizational skills training compared to no treatment control or treatment as usual for children and adolescents to 24 years with attention-deficit/hyperactivity disorder				
Outcomes	**Anticipated effects** (95% CI) **with organizational skills training**	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
Developmental - not reported	-	-	-	
Health and well-being - not reported	-	-	-	
Functioning (inattention)	SMD **0.56 SD higher** (0.38 higher to 0.74 higher)	893 (10 RCTs)[1]	⨁⨁⨁⨁ High	Age of participants in the studies included in the review: 8- to 15-years-old or 2nd to 8th grade (mean age could not be calculated)
Functioning (academic performance)	SMD **0.33 SD higher** (0.14 higher to 0.51 higher)	663 (7 RCTs)[1]	⨁⨁⨁⨁ High	Age of participants in the studies included in the review: 8- to 15-years-old or 2nd to 8th grade (mean age could not be calculated)
Participation - not reported	-	-	-	
Caregiver well-being - not reported	-	-	-	
Satisfaction with care - not reported	-	-	-	
Adverse events - not reported	-	-	-	
CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation; **RCTs:** randomized controlled trials				

1. Bikic, A., Reichow, B., McCauley, S. A., Ibrahim, K., & Sukhodolsky, D. G. (2017). Meta-analysis of organizational skills interventions for children and adolescents with attention-deficit/hyperactivity disorder. Clinical Psychology Review, 52(1), 108-123. https://doi.org/10.1016/j.cpr.2016.12.004

GRADE Working Group grades of evidence

High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.

Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.

Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

Table 16.7: Summary of findings: Exercise compared to no treatment control or treatment as usual for children and adolescents to 24 years with attention-deficit/hyperactivity disorder

Exercise compared to no treatment control or treatment as usual for children and adolescents to 24 years with attention-deficit/hyperactivity disorder				
Outcomes	**Anticipated effects** (95% CI) **with exercise**	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
Developmental (motor skills)	SMD **0.67 SD higher** (0.22 higher to 1.12 higher)	191 (4 RCTs)[1]	⨁◯◯◯ Very low[a,b,c]	Mean age of participants in the studies included in the review: 6.8- to 13.9-years-old (overall mean age could not be calculated because not all studies reported mean age of participants)
Health and well-being (anxiety)	SMD **0.66 SD higher** (0.13 higher to 1.18 higher)	65 (2 RCTs)[2]	⨁◯◯◯ Very low[a,c]	Mean age of participants of included studies in meta-analytic synthesis10.6-years-old (SD = 1.2, range 8.6 to 16.0)
Functioning (attention)	SMD **0.60 SD higher** (0.11 higher to 1.10 higher)	352 (9 RCTs)[1]	⨁◯◯◯ Very low[a,d]	Mean age of participants in the studies included in the review: 6.8- to 13.9-years-old (overall mean age could not be calculated because not all studies reported mean age of participants)
Functioning (executive functioning)	SMD **1.22 SD higher** (0.61 higher to 1.82 higher)	319 (12 RCTs)[1]	⨁◯◯◯ Very low[a,d]	Mean age of participants in the studies included in the review: 6.8- to 13.9-years-old (overall mean age could not be calculated because not all studies reported mean age of participants)
Functioning (problem behaviour)	SMD **0.24 SD higher** (0.21 lower to 0.69 higher)	78 (3 RCTs)[1]	⨁◯◯◯ Very low[a,c]	Mean age of participants in the studies included in the review: 6.8- to 13.9-years-old (overall mean age could not be calculated because not all studies reported mean age of participants)
Participation - not reported	-	-	-	
Caregiver well-being - not reported	-	-	-	

Exercise compared to no treatment control or treatment as usual for children and adolescents to 24 years with attention-deficit/hyperactivity disorder				
Outcomes	**Anticipated effects** (95% CI) **with exercise**	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
Satisfaction with care - not reported	-	-	-	
Adverse events - not reported	-	-	-	
CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation; **RCTs:** randomized controlled trials				

a. Most studies risk of detection bias rated unclear
b. Visual investigation of forest plots suggests some degree of heterogeneity, supported by an I-squared test between 50% and 75%
c. Overall number of individuals in and across trials is low
d. Visual investigation of forest plots suggests high degree of heterogeneity, supported by an I-squared test greater than 75%

1. Sun, W., Yu, M., & Zhou, X. (2022). Effects of physical exercise on attention deficit and other major symptoms in children with ADHD: A meta-analysis. Psychiatry Research, 311: 114509. https://doi.org/10.1016/j.psychres.2022.114509
2. Cerrillo-Urbina, A. J., Garcia-Hermoso, A., Sanchez-Lopez, M., Pardo-Guijarro, M. J., Santos Gomez, J. L., & Martinez-Vizcaino, V. (2015). The effects of physical activity in children with attention deficit hyperactivity disorder: A systematic review and meta-analysis of randomized control trials. Child: Care, Health, and Development, 41(6), 779-788. https://doi.org/10.1111/cch.12255

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

Table 16.8: Summary of findings: Beginning reading interventions compared to no treatment control or treatment as usual for children and adolescents to 24 years with intellectual disorders

Beginning reading interventions compared to no treatment control or treatment as usual for children and adolescents to 24 years with intellectual disorders				
Outcomes	**Anticipated effects** (95% CI) **with beginning reading interventions**	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
Developmental (communication)	SMD **0.28 SD higher** (0.03 higher to 0.54 higher)	222 (3 RCTs)[1]	⊕⊕⊕◯ Moderate[a]	Mean age of participants of included studies in meta-analytic synthesis 9.5-years-old (range 5.5-years-old to 18-years-old)
Health and well-being - not reported	-	-	-	
Functioning (reading skills)	SMD **0.55 SD higher** (0.23 higher to 0.86 higher)	178 (4 RCTs)[1]	⊕⊕⊕◯ Moderate[b]	Mean age of participants of included studies in meta-analytic synthesis 9.5-years-old (range 5.5-years-old to 18-years-old)
Participation - not reported	-	-	-	
Caregiver well-being - not reported	-	-	-	
Satisfaction with care - not reported	-	-	-	
Adverse events - not reported	-	-	-	
CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation; **RCTs:** randomized controlled trials				

a. Low number of studies with small sample sizes (largest trail contributing data for this outcome had 76 participants) and wide CIs around point estimates of study effects
b. Low number of studies with small sample sizes (largest trail contributing data for this outcome had 92 participants) and wide CIs around point estimates of study effects
1. Reichow, B., Lemons, C. L., Maggin, D., & Hill, D. R. (2019). Beginning reading interventions for children and adolescents with intellectual disability. Cochrane Database of Systematic Reviews 2019, Issue 12. Art. No. CD011359. https://doi.org/10.1002/14651858.CD011359.pub2

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.

Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

Table 16.9: Summary of findings: Communication interventions compared to no treatment control or treatment as usual for children and adolescents to 24 years with speech disorders

Communication interventions compared to no treatment control or treatment as usual for children and adolescents to 24 years with speech disorders				
Outcomes	**Anticipated effects** (95% CI) **with communication interventions**	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
Developmental (language skills)	Evidence that interventions aimed at expressive phonological skills produce appreciable results. Evidence on the effect of intervention on receptive phonological skills is too limited to draw any conclusion. Limited evidence that targeted interventions on expressive vocabulary acquisition produce effective results. No studies were identified that investigated the effectiveness of receptive vocabulary interventions in children with DLD. Some evidence that interventions aimed at morphological and syntactic expressive skills in children with DLD produce effective results.	n/a	n/a[a,b]	Mean age of participants in the studies included in the review: 2.5- to 7.4-years-old (overall mean age could not be calculated because not all studies reported mean age of participants)
Health and well-being - not reported	-	-	-	
Functioning (stuttering)	MD **3.79 more** (0.27 more to 7.32 more)	100 (2 RCTs)[1]	⨁◯◯◯ Very low[c,d]	Age of participants in the studies included in the review: 3- to 6-years-old (mean age note reported and could not be calculated)
Participation - not reported	-	-	-	

Caregiver well-being - not reported	-	-	-	
Satisfaction with care - not reported	-	-	-	
Adverse events - not reported	-	-	-	
CI: confidence interval; **MD:** mean difference; **RCTs:** randomized controlled trials				

a. Risk of bias assessment of blind outcome assessors mostly unclear
b. Unknown; narrative synthesis only
c. Visual investigation of forest plots suggests high degree of heterogeneity, supported by an I-squared test greater than 75%
d. Overall number of individuals included in trials is low (between 200 and 100 individuals, both treatment arms)
1. Rinaldi, S., Caselli, M. C., Cofelice, V., D'Amico, S., de Cagno, A. G., Della Corte, G., Di Martino, M. V., Di Costanzo, B., Levorato, M. C., Penge, R., Rossetto, T., Sansavini, A., Vecchi, S., & Zoccolotti, P. (2021). Efficacy of the treatment of developmental language disorder: A systematic review. Brain Sciences, 11: 407. https://doi.org/10.3390/brainsci11030407
2. Brignell, A., Krahe, M., Downes, M., Kefalianos, E., Reilly, S., & Morgan, A. (2021). Interventions for children and adolescence who stutter: A systematic review, meta-analysis, and evidence map. Journal of Fluency Disorders, 70, 105843. https://doi.org/10.1016/j.jfludis.2021.105843
GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

Table 16.10: Summary of findings: Specialized instruction compared to no treatment control or treatment as usual for children and adolescents to 24 years with developmental learning disorders

Specialized instruction compared to no treatment control or treatment as usual for children and adolescents to 24 years with developmental learning disorders				
Outcomes	**Anticipated effects** (95% CI) **with specialized instruction**	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
Developmental - not reported	-	-	-	
Health and well-being - not reported	-	-	-	
Functioning (academic performance - reading comprehension)	SMD **0.33 SD higher** (0.02 higher to 0.65 higher)	(4 studies)[1]	⨁◯◯◯ Very low [a,b,c]	Age of participants in the studies included in the review: Kindergarten to 12th grade (approximately 5- to -18-years-old; (per review inclusion criteria; mean age note reported and could not be calculated)
Functioning (academic performance - writing)	SMD **0.63 SD higher** (0 to 1.26 higher)	(5 studies)[1]	⨁◯◯◯ Very low [a,b]	Age of participants in the studies included in the review: Kindergarten to 12th grade (approximately 5- to -18-years-old; (per review inclusion criteria; mean age note reported and could not be calculated)
Functioning (academic performance - math)	SMD **0.37 SD higher** (0.18 higher to 0.56 higher)	1959 (19 studies)[2]	⨁◯◯◯ Very low [a,b]	Age of participants in the studies included in the review: 6th to 12th grade (approximately 5- to -18-years-old; per review inclusion criteria; mean age note reported and could not be calculated)
Participation - not reported	-	-	-	
Caregiver well-being - not reported	-	-	-	
Satisfaction with care - not reported	-	-	-	
Adverse events - not reported	-	-	-	
CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation				

a. Inclusion of randomized controlled trials and controlled trials without random assignment
b. Risk of bias for use of blind outcome assessors was rated mostly not clear
c. Homogeneity test was statistically significant
1. Ciullo, S., Collins, A., Wisinger, D. R., McKenna, J. W., Lo, Y. L., & Osman, D. (2020). Students with learning disabilities in the social studies: A meta-analysis of intervention research. Exceptional Children, 86(4), 393-412. https://doi.org/10.1177/0014402919893932
2. Jitendra, A. K., Lein, A. E., Im, S. H., Alghamdi, A. A., Hefte, S. B., & Mouanoutoua, J. (2018). Mathematical interventions for seconday students with learning disabilities and mathematics difficulties: A meta-analysis. Exceptional Children, 84(2), 177-196.
https://doi.org/10.1177/0014402917737467
GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

Table 16.11: Summary of findings: Task-oriented interventions instruction compared to no treatment control or treatment as usual for children and adolescents to 24 years with developmental coordination disorder

Task-oriented interventions instruction compared to no treatment control or treatment as usual for children and adolescents to 24 years with developmental coordination disorder				
Outcomes	**Anticipated effects** (95% CI) **with psychosocial intervention**	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
Developmental (motor coordination)	MD **3.63 higher** (1.39 higher to 5.88 higher)	169 (6 RCTs)[1]	⨁◯◯◯ Very low [a,b]	Age of participants in the studies included in the review: 5- to 12-years-old (mean age note reported and could not be calculated)
Health and well-being - not reported	-	-	-	
Functioning (occupational and task performance)	2 studies used the COPM and reported improved performance and satisfaction as a result of intervention (Miller 2001; Thornton 2016). Miller 2001 reported that the differential intervention effect between the CO-OP and the contemporary treatment approach (defined as a variety of approaches) was significant on the satisfaction subscale only, which had a considerable baseline difference between the 2 groups. Thornton 2016 reported the significant pre-post improvement in the CO-OP group only; the change in the control group is not reported.	40 (2 RCTs)[1]	-	Age of participants in the studies included in the review: 5- to 12-years-old (mean age note reported and could not be calculated)

Participation	2 trials measured participation in physical activities by self-made questionnaires only after the intervention (Hillier 2010; Pless 2000b). Hillier 2010 administered a participation questionnaire after the intervention and found no group difference between the intervention and the control group. Pless 2000b found no group difference in practicing motor tasks at home.	49 (2 RCTs)[1]	-	Age of participants in the studies included in the review: 5- to 12-years-old (mean age note reported and could not be calculated)
Caregiver health and well-being - not reported	-	-	-	
Satisfaction with care - not reported	-	-	-	
Adverse events	0 events reported in both the intervention and control group.	340 (11 RCTs)[1]	-	Age of participants in the studies included in the review: 5- to 12-years-old (mean age note reported and could not be calculated)
CI: confidence interval; **MD:** mean difference; **RCTs:** randomized controlled trials				

a. Risk of bias assessment indicated some concerns with allocation concealment
b. Low number of studies with small sample sizes
1. Miyahara, M., Hillier, S. L., Pridham, L., & Nakagawa, S. (2017). Task-oriented interventions for children with developmental co-ordination disorder. Cochrane Database of Systematic Reviews 2017, Issue 7. Art. No.: CD010914. https://doi.org/10.1002/14651858.CD010914.pub2
GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

Table 16.12: Summary of findings: Exercise compared to no treatment control or treatment as usual for children and adolescents to 24 years with cerebral palsy

Exercise compared to no treatment control or treatment as usual for children and adolescents to 24 years with cerebral palsy				
Outcomes	**Anticipated effects** (95% CI) **with exercise**	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
Developmental (gross motor)	MD **1.19 higher** (1.07 lower to 3.46 higher)	503 (17 RCTs)[1]	⨁⨁⨁◯ Moderate [a]	Mean age of participants of included studies in meta-analytic synthesis10.6-years-old (range 1.8 to 16.0)
Health and well-being – not reported	-	-	-	
Functioning (gait speed)	MD **0.05 higher** (0 to 0.10 higher)	426 (16 RCTs)[1]	⨁⨁◯◯ Low [a,b]	Mean age of participants of included studies in meta-analytic synthesis10.6-years-old (range 1.8 to 16.0)
Functioning (muscle strength)	MD **0.92 higher** (0.19 higher to 1.64 higher)	592 (17 RCTs)[1]	⨁◯◯◯ Very low [a,c]	Mean age of participants of included studies in meta-analytic synthesis10.6-years-old (range 1.8 to 16.0)
Participation - not reported	-	-	-	
Caregiver well-being - not reported	-	-	-	
Satisfaction with care - not reported	-	-	-	
Adverse events - not reported	-	-	-	
CI: confidence interval; **MD:** mean difference; **RCTs:** randomized controlled trials				

a. Most risk of bias categories unclear, likely to have some serious limitations
b. Visual investigation of forest plots suggests some degree of heterogeneity, supported by an I-squared test between 50% and 75%
c. Visual investigation of forest plots suggests high degree of heterogeneity, supported by an I-squared test greater than 75%
1. Liang, X., Tan, Z., Yun, G., Cao, J., Wang, J., Liu, Q., & Chen, T. (2021). Effectiveness of exercise interventions for children with cerebral palsy: A systematic review and meta-analysis of randomized controlled trials. Journal of Rehabilitative Medicine, 53(4):jrm00176. https://doi.org/10.2340/16501977-2772

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

Table 16.13: Summary of findings: Virtual reality exercise training compared to no treatment control or treatment as usual for children and adolescents to 24 years with cerebral palsy

Virtual reality exercise training compared to no treatment control or treatment as usual for children and adolescents to 24 years with cerebral palsy				
Outcomes	**Anticipated effects** (95% CI) **with virtual reality exercise training**	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
Developmental (fine motor coordination)	SMD **0.75 SD higher** (0.02 higher to 1.51 higher)	225 (6 RCTs)[1]	⨁◯◯◯ Very low [a,b]	Mean age of participants in the studies included in the review: 7.1- to 12.4-years-old
Developmental (gross motor coordination)	SMD **0.15 SD higher** (0.09 higher to 0.40 higher)	363 (14 RCTs)[1]	⨁⨁⨁◯ Moderate [a]	Mean age of participants in the studies included in the review: 7.1- to 12.4-years-old
Health and well-being - not reported	-	-	-	
Functioning (arm function)	SMD **0.84 SD higher** (0.39 higher to 1.28 higher)	390 (13 RCTs)[2]	⨁⨁◯◯ Low [c,d]	Mean age of participants of included studies in meta-analytic synthesis 9.4-years-old (range 3- to 20-years-old)
Functioning (ambulation)	SMD **0.76 SD higher** (0.35 higher to 1.16 higher)	282 (8 RCTs)[2]	⨁⨁◯◯ Low [c,d]	Mean age of participants of included studies in meta-analytic synthesis 9.4-years-old (range 3- to 20-years-old)
Functioning (postural control)	SMD **1.00 SD higher** (0.50 higher to 1.50 higher)	227 (10 RCTs)[2]	⨁⨁◯◯ Low [c,d]	Mean age of participants of included studies in meta-analytic synthesis 9.4-years-old (range 3- to 20-years-old)
Participation - not reported	-	-	-	
Caregiver well-being - not reported	-	-	-	
Satisfaction with care - not reported	-	-	-	
Adverse events - not reported	-	-	-	

CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation; **RCTs:** randomized controlled trials

a. Greater than 30% of trials likely to not have utilized blind outcome assessors
b. Visual investigation of forest plots suggests high degree of heterogeneity, supported by an I-squared test greater than 75%
c. Most risk of bias categories unclear, likely to have some serious limitations
d. Visual investigation of forest plots suggests some degree of heterogeneity, supported by an I-squared test between 50% and 75%

1. Abdelhaleem, N., El Wahab, M. S. A., & Elshennawy, S. (2022). Effect of virtual reality on motor coordination in children with cerebral palsy: A systematic review and meta-analysis of randomized controlled trials. Egyptian Journal of Medical Human Genetics, 23: 71. https://doi.org/10.1186/s43042-022-00258-0
2. Chen, Y., Fanchlang, H. D., & Howard, A. (2018). Effectiveness of virtual reality in children with cerebral palsy: A systematic review and meta-analysis of randomized controlled trials. Physical Therapy, 98(1), 63-77. https://doi.org/10.1093/ptj/pzx107

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

Table 16.14: Summary of findings: Cognitive intervention compared to no treatment control or treatment as usual for children and adolescents to 24 years with neurodevelopmental disorders

Cognitive rehabilitation compared to no treatment control or treatment as usual for children and adolescents to 24 years with neurodevelopmental disorders				
Outcomes	**Anticipated effects** (95% CI) **with cognitive intervention**	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
Developmental - not reported	-	-	-	
Health and well-being - not reported	-	-	-	
Functioning (adaptive behaviour)	SMD **0.64 SD higher** (0.40 higher to 0.87 higher)	544 (6 RCTs)[1]	⨁⨁◯◯ Low[a,b]	Age of participants in the studies included in the review: < 13-years-old (per review inclusion criteria; 5 of 6 studies indicated children, on average, were less than 7-years-old at start; mean age not reported)
Participation - not reported	-	-	-	
Caregiver well-being - not reported	-	-	-	
Satisfaction with care - not reported	-	-	-	
Adverse events - not reported	-	-	-	
CI: confidence interval; **SMD:** standardized mean difference; **SD:** standard deviation; **RCTs:** randomized controlled trials				

a. Some concerns to risk of bias for blinding

b. Visual inspection of forest plots suggests some degree of heterogeneity

1. Ahn, S. N., & Hwang, S. (2018). Cognitive rehabilitation of adaptive behavior in children with neurodevelopmental disorders: A meta-analysis. Occupational Therapy International, 2018, 5029571. https://doi.org/10.1155/2018/5029571

GRADE Working Group grades of evidence

High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.

Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.

Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.

Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

4.2. Evidence to decision

Table 17. Evidence to decision table

Please note * indicates evidence from overarching qualitative review by Gronholm et al, 2023

CRITERIA, QUESTIONS		JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
Priority of the problem	Is the problem a priority? The more serious a problem is, the more likely it is that an option that addresses the problem should be a priority (e.g. diseases that are fatal or disabling are likely to be a higher priority than diseases that only cause minor distress). The more people who are affected, the more likely it is that an option that addresses the problem should be a priority.			
	• Are the consequences of the problem serious (that is, severe or important in terms of the potential benefits or savings)? • Is the problem urgent? • Is it a recognized priority (such as based on a political or policy decision)? [Not relevant when an individual patient perspective is taken]	☐ No ☐ Probably no ☐ Probably yes ☒ Yes ☐ Varies ☐ Don't know	While neurodevelopmental disorders have a childhood onset, individuals with neurodevelopmental disabilities often face challenges in development, leading to the need for interventions throughout their lives. Developmental disabilities affect 52.9 million children younger than 5 years worldwide, and account for more than 13.3% of all years lived with disability for all health conditions in that age range (Olusanya et al., 2018).	
Desirable Effects	How substantial are the desirable anticipated effects? The larger the benefit, the more likely it is that an option should be recommended.			
	• Judgements for each outcome for which there is a desirable effect • How substantial (large) are the desirable anticipated effects (including health and other benefits) of the option (taking into account the severity or importance of the desirable consequences and the number of people affected)?	☐ Trivial ☒ Small ☒ Moderate ☒ Large ☐ Varies ☐ Don't know	A range of types of psychosocial interventions were located for this report. Collectively, psychosocial interventions for individuals with neurodevelopmental disorders were positive. We found significant effects favouring intervention for most types of interventions on most outcomes. The magnitude of effect varied by type of psychosocial intervention, outcome domain, and characteristics of the population. Across intervention types and outcome categories, there were 33 point estimates calculated using the standardized mean difference effect size (SMD) and 5 estimates calculated using the mean	

CRITERIA, QUESTIONS		JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
			difference effect size. Collectively, 17 outcomes had a SMD > 0.50, ten outcomes had a SMD 0.20 to 0.50, and six outcomes had a SMD < 0.20. In the interventions discussed individually during the GDG meeting, desirable effects were small to large depending on the respective population. **Psychological interventions for children and young people with autism spectrum disorder (large):** Large and clinically significant desirable effects were found for social-emotional skills (child development) after treatment with cognitive behavioural therapies and social skills trainings. Large desirable effect found for problem behaviour (functioning) after treatment with social skills trainings **Psychological interventions for children and young people with ASD and anxiety (moderate):** Moderate desirable effect found for anxiety (children's health and well-being) after treatment with cognitive behavioural therapy. **Psychological interventions for Attention deficit hyperactivity disorder (moderate):** Large desirable effect found for attention (functioning in one review) Medium desirable effects found for child development (social skills) in one review, attention (functioning) in two reviews, cognitive function (functioning) in one review, and academic performance (functioning) in one review.	

CRITERIA, QUESTIONS		JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
			Small effect found for problem behaviour (functioning) in one review and academic performance (functioning) in two reviews. **Psychological interventions for children and young people with disorders of intellectual development (moderate):** Large desirable effect found for reading skills / academic performance (functioning) in one review Medium desirable effect found for communication and language skills (child development) in one review **Psychological interventions for children and young people with speech disorders (small):** Small effect found for stuttering (functioning) in one review **Psychological interventions for children and young people with Neurodevelopmental disorders (mixed type)(large):** Large desirable effect found for adaptive behaviour (functioning) in one review.	
Undesirable Effects	How substantial are the undesirable anticipated effects? The greater the harm, the less likely it is that an option should be recommended.			
	• Judgements for each outcome for which there is an undesirable effect • How substantial (large) are the undesirable anticipated effects (including harms to health and other harms) of the option (taking into account the severity or importance of the adverse effects and the number of people affected)?	☐ Large ☐ Moderate ☒ Small ☐ Trivial ☐ Varies ☒ Don't know	Undesirable effects were only reported in a small number of the systematic reviews included in this report, with a small number of studies reporting adverse events in the systematic reviews that included this outcome. Thus, the impact of adverse events is not known at this time. In the interventions discussed individually during the GDG meeting,	

CRITERIA, QUESTIONS		JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
			undesirable effects were small to don't know depending on the respective population. **Psychological interventions for children and young people with autism spectrum disorder (don't know):** The impact of adverse events is not known at this time (not reported in included systematic review). **Psychological interventions for children and young people with ASD and anxiety (don't know):** The impact of adverse events is not known at this time (not reported in included systematic review). **Psychological interventions for Attention deficit hyperactivity disorder (small):** Adverse events (i.e., undesirable effects) was reported in four studies included in the review used for this recommendation. No adverse events were reported for treatment or control groups of the primary studies reporting this as an outcome. **Psychological interventions for children and young people with disorders of intellectual development (small):** Adverse events (i.e. undesirable effects) was reported in two studies included in the review used for this recommendation. No adverse events were reported for treatment or control groups of the primary studies reporting this as an outcome. **Psychological interventions for children and young people with speech disorders (don't know):**	

CRITERIA, QUESTIONS		JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
			The impact of adverse events is not known at this time (not reported in included systematic review). **Psychological interventions for children and young people with Neurodevelopmental disorders (mixed type)(don't know):** The impact of adverse events is not known at this time (not reported in included systematic review).	
Certainty of evidence	What is the overall certainty of the evidence of effects? The less certain the evidence is for critical outcomes (those that are driving a recommendation), the less likely that an option should be recommended (or the more important it is likely to be to conduct a pilot study or impact evaluation, if it is recommended).			
	• What is the overall certainty of this evidence of effects, across all of the outcomes that are critical to making a decision? • See GRADE guidance regarding detailed judgements about the quality of evidence or certainty in estimates of effects	☒ Very low ☒ Low ☒ Moderate ☒ High ☐ No included studies	As shown in the GRADE evidence profiles and summary of findings, we found varying levels of certainty across the systematic reviews included in this report. Across the 38 outcomes for which a certainty of evidence recommendation was made, 14 outcomes had very low certainty, 10 outcomes had low certainty, 9 outcomes had moderate certainty, and 5 outcomes had high certainty. In the interventions discussed individually during the GDG meeting, certainty of evidence was very low to moderate depending on the respective population. **Psychological interventions for children and young people with autism spectrum disorder (low):** Child development – social-emotional skills Low and moderate certainty – mainly due to heterogeneity. Functioning - problem behaviour	

CRITERIA, QUESTIONS		JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
			Low certainty – due to heterogeneity and a small number of included studies with small sample sizes. **Psychological interventions for children and young people with ASD and anxiety (moderate):** Moderate certainty – due mainly to heterogeneity **Psychological interventions for Attention deficit hyperactivity disorder (moderate):** Child development – social-emotional skills: Moderate certainty – due to heterogeneity. Functioning – attention: Low certainty in two reviews – due to heterogeneity of findings and use of outcome measures with significant differences across studies; High certainty in one review Functioning – cognitive function: High certainty Functioning – academic performance: High certainty across three systematic reviews **Psychological interventions for children and young people with disorders of intellectual development (moderate):** Child Development – communication and language Moderate certainty – due to heterogeneity Functioning – reading skills / academic performance Moderate certainty – due to heterogeneity **Psychological interventions for children and young people with speech disorders (very low):** Functioning – stuttering Very low certainty – due to very high heterogeneity and a very small sample of	

CRITERIA, QUESTIONS		JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
			primary studies included in the meta-analysis (k = 2). **Psychological interventions for children and young people with Neurodevelopmental disorders (mixed type)(low):** Functioning – adaptive behaviour Low certainty – due to very heterogeneity and use of outcome measures with significant differences across studies	
Values	Is there important uncertainty about or variability in how much people value the main outcomes? The more likely it is that differences in values would lead to different decisions, the less likely it is that there will be a consensus that an option is a priority (or the more important it is likely to be to obtain evidence of the values of those affected by the option). Values in this context refer to the relative importance of the outcomes of interest (how much people value each of those outcomes). These values are sometimes called "utility values".			
	• Is there important uncertainty about how much people value each of the main outcomes? • Is there important variability in how much people value each of the main outcomes?	☐ Important uncertainty or variability ☐ Possibly important uncertainty or variability ☒ Probably no important uncertainty or variability ☐ No important uncertainty or variability	• A qualitative systematic review (Gronholm et al., 2023) was conducted to assess values, resources, cost effectiveness, health equity quality and non-discrimination, feasibility and human rights related factors in mental health care and mental health services. • Overall, the studies reviewed highlighted importance and recognition of importance of mental health interventions and the outcomes of those interventions on people's mental health and well-being. • The utility value could be limited by certain factors and barriers present in the health systems. For instance, low awareness, poor funding and poor political buy-in, or other social barriers. Social networks or raising awareness can facilitate adoption and	

CRITERIA, QUESTIONS		JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
			recognition of mental health issues and the perceived value of the interventions.	
Balance of effects	Does the balance between desirable and undesirable effects favour the intervention or the comparison? The larger the desirable effects in relation to the undesirable effects, taking into account the values of those affected (i.e. the relative value they attach to the desirable and undesirable outcomes) the more likely it is that an option should be recommended.			
	• Judgements regarding each of the four preceding criteria • To what extent do the following considerations influence the balance between the desirable and undesirable effects: - How much less people value outcomes that are in the future compared to outcomes that occur now (their discount rates)? - People's attitudes towards undesirable effects (how risk averse they are)? - People's attitudes towards desirable effects (how risk seeking they are)?	☐ Favours the comparison ☐ Probably favours the comparison ☐ Does not favour either the intervention or the comparison ☒ Probably favours the intervention ☒ Favours the intervention ☐ Varies ☐ Don't know	Of the 33 outcomes for which a weighted standardized mean difference (SMD) effect size was examined, 27 of 33 (82%) of outcomes favoured the treatment condition with a confidence interval above the critical value. 6 outcomes (18%) had a confidence interval that contained the critical value. For the five outcomes for which a mean difference (MD) effect size was examined, 4 of 5 (80%) of outcomes favoured the treatment condition with a confidence interval above the critical value; 1 outcome (20%) had a confidence interval that contained the critical value. Across both outcomes examined with the SMD and MD effect sizes, zero outcomes (0 of 33; 0%) were shown to favour the comparison condition. In the interventions discussed individually during the GDG meeting, balance of effects was probably favours the intervention to favours the intervention depending on the respective population. **Psychological interventions for children and young people with autism spectrum disorder (favours the intervention)** **Psychological interventions for children and young people with ASD and anxiety (probably favours the intervention)** **Psychological interventions for Attention deficit hyperactivity disorder (moderate)**	

CRITERIA, QUESTIONS		JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
			Psychological interventions for children and young people with disorders of intellectual development (probably favours the intervention) **Psychological interventions for children and young people with speech disorders (probably favours the intervention)** **Psychological interventions for children and young people with Neurodevelopmental disorders (mixed type) (favours the intervention)**	
Resources required	How large are the resource requirements (costs)? The greater the cost, the less likely it is that an option should be a priority. Conversely, the greater the savings, the more likely it is that an option should be a priority.			
	• How large is the difference in each item of resource use for which fewer resources are required? • How large is the difference in each item of resource use for which more resources are required? • How large an investment of resources would the option require or save?	☐ Large costs ☐ Moderate costs ☐ Negligible costs and savings ☐ Moderate savings ☐ Large savings ☐ Varies ☒ Don't know	• No reviews examining resources were identified.	
Certainty of evidence of required resources	What is the certainty of the evidence of resource requirements (costs)?			
	• Have all-important items of resource use that may differ between the options being considered been identified? • How certain is the evidence of differences in resource use between the options being considered (see GRADE guidance regarding detailed judgements about the quality of evidence or certainty in estimates)? • How certain is the cost of the items of resource use that differ between the options being considered?	☐ Very low ☐ Low ☐ Moderate ☐ High ☒ No included studies	• No reviews examining resources were identified.	

CRITERIA, QUESTIONS		JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
	• Is there important variability in the cost of the items of resource use that differ between the options being considered?			
Cost effectiveness	Does the cost-effectiveness of the intervention favour the intervention or the comparison? The greater the cost per unit of benefit, the less likely it is that an option should be a priority.			
	• Judgements regarding each of the six preceding criteria • Is the cost effectiveness ratio sensitive to one-way sensitivity analyses? • Is the cost effectiveness ratio sensitive to multivariable sensitivity analysis? • Is the economic evaluation on which the cost effectiveness estimate is based reliable? • Is the economic evaluation on which the cost effectiveness estimate is based applicable to the setting(s) of interest?	☐ Favours the comparison ☐ Probably favours the comparison ☐ Does not favour either the intervention or the comparison ☐ Probably favours the intervention ☐ Favours the intervention ☐ Varies ☒ No included studies	• No reviews examining cost effectiveness identified	
Health equity, equality and non-discrimination	What would be the impact on health equity, equality and non-discrimination? (WHO INTEGRATE) Health equity and equality reflect a concerted and sustained effort to improve health for individuals across all populations, and to reduce avoidable systematic differences in how health and its determinants are distributed. Equality is linked to the legal principle of non-discrimination, which is designed to ensure that individuals or population groups do not experience discrimination on the basis of their sex, age, ethnicity, culture or language, sexual orientation or gender identity, disability status, education, socioeconomic status, place of residence or any other characteristics. All recommendations should be in accordance with universal human rights standards and principles. The greater the likelihood that the intervention increases health equity and/or equality and that it reduces discrimination against any particular group, the greater the likelihood of a general recommendation in favour of this intervention.			
	• How are the condition and its determinants distributed across different population groups? Is the intervention likely to reduce or increase existing health inequalities and/or health inequities? Does the intervention prioritize and/or aid those furthest behind? • How are the benefits and harms of the intervention distributed across the population? Who carries the burden (e.g.	☐ Reduced ☐ Probably reduced ☐ Probably no impact ☒ Probably increased ☐ Increased ☐ Varies ☐ Don't know	There was no direct evidence to evaluate impact on health equity, equality and non-discrimination. Psychological interventions for children with neurodevelopmental disorders can contribute to equalizing opportunities by promoting the improvement in social and communication skills and functioning. Early psychological interventions enhance opportunities for children to engage with caregivers in playful	

CRITERIA, QUESTIONS		JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS

	all), who benefits (e.g. a very small sub-group)?
	• How affordable is the intervention for individuals, workplaces or communities?
	• How accessible - in terms of physical as well as informational access - is the intervention across different population groups?
	• Is there any suitable alternative to addressing the condition, does the intervention represent the only available option? Is this option proportionate to the need, and will it be subject to periodic review?
			interactions, access early learning and enhance participation in community activities.
			• The qualitative review (Gronholm et al., 2023) noted considerations for ensuring mental, neurological and substance use interventions are equitable, equally available and non-discriminatory:
			  • Accessibility, physical/practical considerations
			  • time & travel constraints.
			  • Accessibility, informational barriers
			  • Affordability - treatment costs
			• These factors may be exacerbated for certain groups:
			  • People with low education/literacy (e.g. written instructions, psychoeducation materials)
			  • Low resource settings - affordability/cost considerations exacerbated	

Feasibility	Is the intervention feasible to implement? The less feasible (capable of being accomplished or brought about) an option is, the less likely it is that it should be recommended (i.e. the more barriers there are that would be difficult to overcome).			
	• Can the option be accomplished or brought about? • Is the intervention or option sustainable? • Are there important barriers that are likely to limit the feasibility of implementing the intervention (option) or require consideration when implementing it?	☐ No ☐ Probably no ☒ Probably yes ☐ Yes ☐ Varies ☐ Don't know	There was no direct evidence to evaluate feasibility to implement the interventions. However, emerging evidence supports the notion that a range of low-intensity psychosocial interventions to improve outcomes in children with neurodevelopmental disorders are effective when delivered in non-specialist settings and in low-income settings (Reichow et al. 2013; Burkey et al. 2018). The qualitative review (Gronholm et al., 2023) also considered feasibility, and how this can be enhanced in the following areas:	

CRITERIA, QUESTIONS		JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
			• Acceptability of interventions for stakeholders • Health worker workload, competency – requires training, refreshers, supervision; networking with others in same role • Availability of a task-sharing workforce • Participant education and literacy requires verbal explanations/tasks • Logistical issues - such as mobile populations, affordability of travel to receive care, lack of private space • Limited resources/mental health budget. Sustainability considerations identified were: • Training and supervision • Integrating into routine clinical practice.	
Human rights and sociocultural acceptability	Is the intervention aligned with human rights principles and socioculturally acceptable? This criterion encompasses two distinct constructs: The first refers to an intervention's compliance with universal human rights standards and other considerations laid out in international human rights law beyond the right to health (as the right to health provides the basis of other criteria and sub-criteria in this framework). The second, sociocultural acceptability, is highly time-specific and context-specific and reflects the extent to which those implementing or benefiting from an intervention as well as other relevant stakeholder groups consider it to be appropriate, based on anticipated or experienced cognitive and emotional responses to the intervention. The greater the sociocultural acceptability of an intervention to all or most relevant stakeholders, the greater the likelihood of a general recommendation in favour of this intervention.			
	• Is the intervention in accordance with universal human rights standards and principles? • Is the intervention socioculturally acceptable to patients/beneficiaries as well as to those implementing it? To which extent do patients/beneficiaries value different non-health outcomes? • Is the intervention socioculturally acceptable to the public and other relevant stakeholder groups? Is the intervention sensitive to sex, age, ethnicity, culture or language, sexual orientation or gender identity, disability	☐ No ☐ Probably no ☒ Probably yes ☐ Yes ☐ Varies ☐ Don't know	Only one review had direct evidence to evaluate sociocultural acceptability. Storebo et al. (2019) found satisfaction with treatment was high in four trials. Attrition within primary studies can be sued as a proxy for treatment acceptability; in Risk of Bias assessments, significant bias due to missing data (attrition) was not frequently noted and was not considered a risk for any of the outcomes included in this report. The qualitative review (Gronholm et al., 2023) noted several considerations which would impact the right to health and access to health care. (e.g. stigma and discrimination and lack	

CRITERIA, QUESTIONS		JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
	status, education, socioeconomic status, place of residence or any other relevant characteristics? • How does the intervention affect an individual's, population group's or organization's autonomy, i.e. their ability to make a competent, informed and voluntary decision? • How intrusive is the intervention, ranging from low intrusiveness (e.g. providing information) to intermediate intrusiveness (e.g. guiding choices) to high intrusiveness (e.g. restricting or eliminating choices)? Where applicable, are high intrusiveness and/or impacts on the privacy and dignity of concerned stakeholders justified?		of confidentiality could affect the help-seeking among service users). • The importance of sociocultural acceptability of mental, neurological and substance use interventions was clearly expressed. Pre-intervention considerations that consider cultural and social aspects improve the acceptability of implemented interventions. • When interventions were perceived as appropriate for the culture and target group, the content and medium of the intervention received more positive feedback from service users and caregivers Also, considerations of age, sex and language have been highlighted as important to acceptability and accessibility. Mitigating steps to improve sociocultural acceptability include: • To train health workers in non-judgemental care • Integrate preventative mental health awareness messages to reduce the stigma • Train acceptable counsellors for the local settings and target groups. • Facilitate the use of indigenous/ local phrases and terms to increase acceptability, accessibility and fidelity.	

4.3. Summary of judgements

Table 18. Summary of judgements

Priority of the problem	- Don't know	- Varies		- No	- Probably No	- Probably Yes	✓ **Yes**
Desirable effects*	- Don't know	- Varies		- Trivial	✓ **Small**	✓ **Moderate**	✓ **Large**
Undesirable effects*	✓ **Don't know**	- Varies		- Large	- Moderate	✓ **Small**	- Trivial
Certainty of the evidence*	- No included studies			✓ **Very low**	✓ **Low**	✓ **Moderate**	✓ **High**
Values				- Important uncertainty or variability	- Possibly important uncertainty or variability	✓ **Probably no important uncertainty or variability**	- No important uncertainty or variability
Balance of effects*	- Don't know	- Varies	- Favours comparison	- Probably favours comparison	- Does not favour either	✓ **Probably favours intervention**	✓ **Favours intervention**
Resources required	✓ **Don't know**	- Varies	- Large costs	- Moderate costs	- Negligible costs or savings	- Moderate savings	- Large savings
Certainty of the evidence on required resources	✓ **No included studies**			- Very low	- Low	- Moderate	- High
Cost–effectiveness	✓ **No included studies**	- Varies	- Favours comparison	- Probably favours comparison	- Does not favour either	- Probably favours intervention	- Favours intervention
Equity, equality and non-discrimination	- Don't know	- Varies	- Reduced	Probably reduced	- Probably no impact	✓ **Probably increased**	- Increased
Feasibility	- Don't know	- Varies		- No	- Probably No	✓ **Probably Yes**	- Yes
Human rights and sociocultural acceptability	- Don't know	- Varies		- No	- Probably No	✓ **Probably Yes**	- Yes

✓Indicates category selected, -Indicates category not selected
*Note: Separate ratings provided by population for these aspects.

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Appendix I: mhGAP process note

mhGAP Guideline Update: Notes on process for identifying level of evidence review required v2_0 (13/12/2021)

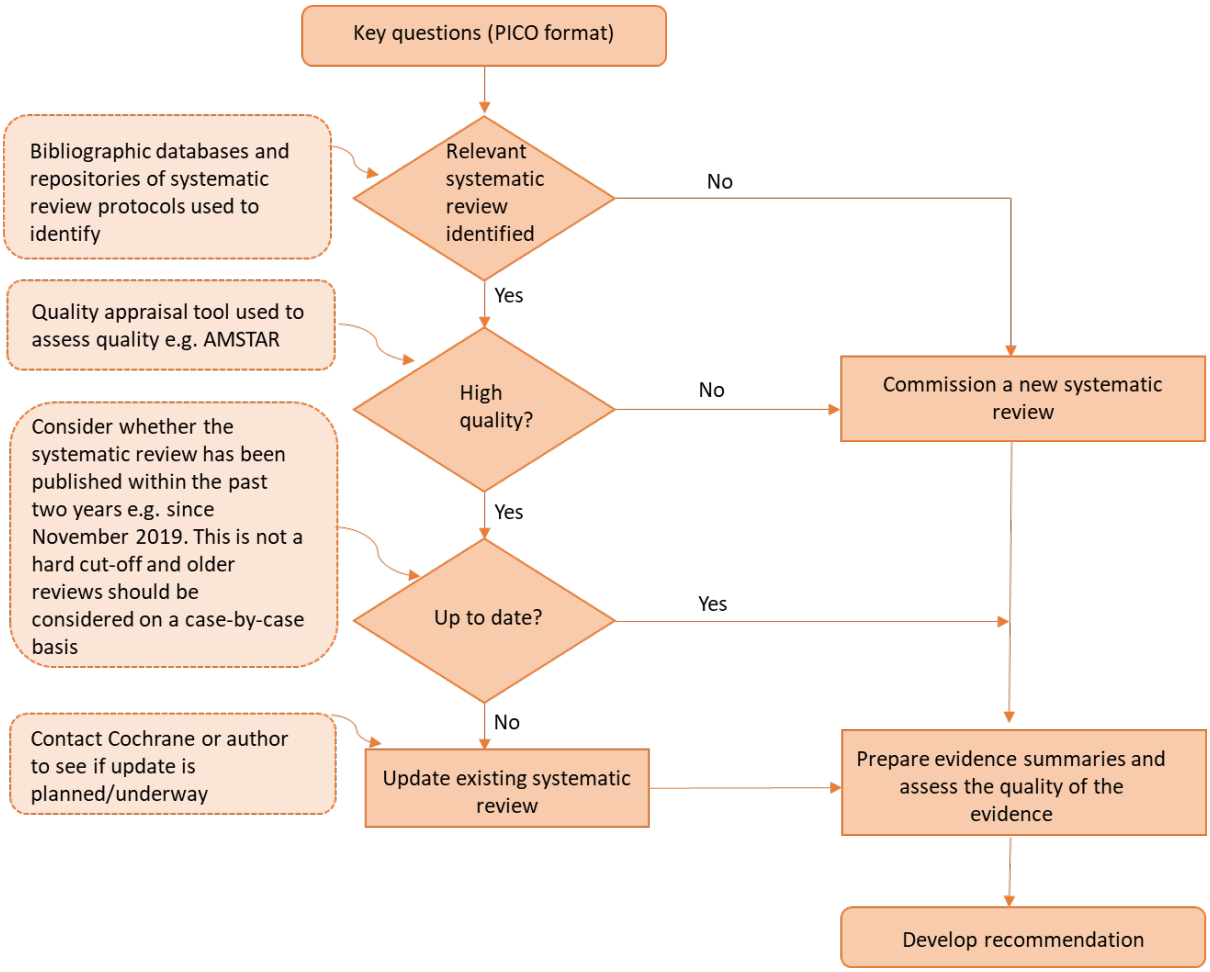
This document is intended to provide guidance to focal points on the level of evidence review required as part of the evidence retrieval process for the mhGAP guideline update process. As a general rule, the update process should be informed by existing high quality systematic reviews.
The process for evidence retrieval and synthesis is fully outlined in chapter 8 of the WHO handbook for guideline development https://apps.who.int/iris/handle/10665/145714.

Three main categories of evidence review are proposed in this document:

1) Existing relevant, up to date, high quality systematic review(s) provide the evidence required. **An existing systematic review is sufficient to prepare the evidence summaries**. It may be possible to include more than one systematic review for the same PICO, as different reviews may match different outcomes of a PICO. However, if more than one systematic review is available for the same PICO outcome, one review should be selected, based on quality, relevance, search comprehensiveness and date of last update. The selection process should be transparently reported, with justification of choices.
2) Existing high quality systematic reviews are either out of date or do not fully address the PICO, though it is considered that the review can be updated to meet these requirements. **An update of an existing systematic review is required before the evidence summaries can be prepared**. The update process may require addition of new studies published after the review, or inclusion of outcomes not covered by the existing reviews.
3) Existing systematic reviews are either not of sufficiently high quality or cannot be updated to fully address the PICO. **A new systematic review is required before the evidence summaries can be prepared**

Figure 1 below details the process to identify which level of evidence review is required to support the evidence retrieval process for a PICO.

Fig. 1. Is a new systematic review needed



All key questions are currently in PICO format as presented in the Appendix of the planning proposal PICOs. Subsequent steps include the following:

1. **Identify and evaluate existing systematic reviews**: Identify one or more systematic review(s) to address each PICO question. Existing systematic reviews will inform the guideline development process, whether or not a new systematic review or an update of an existing review is required, and the evidence review team will detail existing systematic reviews in each case. The method for identifying existing systematic reviews should be fully detailed in the evidence summary and include the following sources:
    a. Search of bibliographic databases, including MEDLINE, Embase, APA PsycInfo, Cumulative Index of Nursing and Allied Health Libraries (CINAHIL), and Education Resources Information Centre (ERIC).
    b. Search of repositories of systematic reviews protocols, including PROSPERO, Campbell Systematic Reviews, and Cochrane.
2. **Assess if systematic review is up to date:** It is preferred that identified systematic reviews have been published within the past two years (e.g. since November 2019). This is not a hard cut-off and older reviews should be considered on a case-by-case basis, particularly those covering the time period since the last update of the mhGAP guideline in 2015. It is acknowledged that COVID has led to a pausing of many mental health research activities over the past two years, and this may also impact the availability of systematic reviews within the preferred two year period. For any reviews that fall outside the two year period, the guideline methodologist will advise on suitability.
3. **Appraise quality of systematic review:** Use the AMSTAR-2 quality appraisal tool to assess the quality of the identified systematic review(s) https://amstar.ca/docs/AMSTAR-2.pdf . This

includes consideration of the extent to which the PICO is fully addressed by the systematic review(s) identified.

By following the process outlined in figure 1, and steps 1-3 above, the FP and evidence review team will have sufficient evidence to assess which of the three main categories of evidence review apply to each PICO under consideration:

1) Existing systematic reviews are sufficient to prepare the evidence summaries
2) An update of an existing systematic review is required before the evidence summaries can be prepared
3) A new systematic review is required before the evidence summaries can be prepared

Appendix II: Search terms used to identify systematic reviews

II.1: APA PsycInfo

II.2: Education Resources Information Centre

II.3: Cumulative Index to Nursing and Allied Health Literature

II.4: MEDLINE

II.5: Embase

II.6: Cochrane Database of Systematic Reviews, Campbell Systematic Reviews, International Prospective Register of Systematic Reviews

II.1:
APA PsycInfo

(Searched in EBSCOhost; 17 May 2022 and 29 July 2022)

1. autis*
2. Asperger*
3. pervasive development* disorder*
4. developmental delay*
5. developmental disorder*
6. developmental disability
7. developmental disabilities
8. developmental difference*
9. down* syndrome
10. fragile X
11. mental retard*
12. intellectual disorder*
13. intellectual disability
14. cerebral palsy
15. attention deficit disorder
16. attention deficit hyperactivity disorder
17. ADD or ADHD
18. Learning disabilities
19. Learning difficult*
20. Developmental learning disorder
21. Language delay
22. Speech disorder*
23. Language disorder*
24. Speech delay
25. Stereotyped movement
26. Developmental motor coordination
27. Motor coordination disorder
28. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 34 or 25 or 26 or 27
29. infant*
30. toddler*
31. school-age*
32. child*
33. adolescent*
34. teen*
35. 29 or 30 or 31 or 32 or 33 or 34
36. 28 and 35
37. educat*
38. train*
39. program*
40. therap*
41. intervention*
42. treatment*
43. psychosocial*
44. 37 or 38 or 39 or 40 or 41 or 42 or 43
45. 36 and 44
46. “systematic review”:ti
47. “systematic review”:ab

48. “systematic literature”:ti
49. “systematic literature”:ab
50. “meta analy*”:ti
51. “meta analy*”:ab
52. “meta synthes*”:ti
53. “meta synthes*”:ab
54. 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53
55. 45 and 54
56. 45 and 54 (Limiters: Publication Year: 2015-2022)

II.2

Education Resources Information Centre (ERIC)

(Searched in EBSCOhost; 17 May 2022 and 29 July 2022)

1. autis*
2. Asperger*
3. pervasive development* disorder*
4. developmental delay*
5. developmental disorder*
6. developmental disability
7. developmental disabilities
8. developmental difference*
9. down* syndrome
10. fragile X
11. mental retard*
12. intellectual disorder*
13. intellectual disability
14. cerebral palsy
15. attention deficit disorder
16. attention deficit hyperactivity disorder
17. ADD or ADHD
18. Learning disabilities
19. Learning difficult*
20. Developmental learning disorder
21. Language delay
22. Speech disorder*
23. Language disorder*
24. Speech delay
25. Stereotyped movement
26. Developmental motor coordination
27. Motor coordination disorder
28. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 34 or 25 or 26 or 27
29. infant*
30. toddler*
31. school-age*
32. child*
33. adolescent*
34. teen*
35. 29 or 30 or 31 or 32 or 33 or 34
36. 28 and 35
37. educat*
38. train*
39. program*
40. therap*
41. intervention*
42. treatment*
43. psychosocial*
44. 37 or 38 or 39 or 40 or 41 or 42 or 43
45. 36 and 44
46. “systematic review”:ti
47. “systematic review”:ab

48. “systematic literature”:ti
49. “systematic literature”:ab
50. “meta analy*”:ti
51. “meta analy*”:ab
52. “meta synthes*”:ti
53. “meta synthes*”:ab
54. 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53
55. 45 and 54
56. 45 and 54 (Limiters: Date Puyblished: 20150101-20221231)

II.3

Cumulative Index to Nursing and Allied Health Literature (CINAHL)

(searched in EBSCOhost; 17 May 2022 and 29 July 2022)

1. autis*
2. Asperger*
3. pervasive development* disorder*
4. developmental delay*
5. developmental disorder*
6. developmental disability
7. developmental disabilities
8. developmental difference*
9. down* syndrome
10. fragile X
11. mental retard*
12. intellectual disorder*
13. intellectual disability
14. cerebral palsy
15. attention deficit disorder
16. attention deficit hyperactivity disorder
17. ADD or ADHD
18. Learning disabilities
19. Learning difficult*
20. Developmental learning disorder
21. Language delay
22. Speech disorder*
23. Language disorder*
24. Speech delay
25. Stereotyped movement
26. Developmental motor coordination
27. Motor coordination disorder
28. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 34 or 25 or 26 or 27
29. infant*
30. toddler*
31. school-age*
32. child*
33. adolescent*
34. teen*
35. 29 or 30 or 31 or 32 or 33 or 34
36. 28 and 35
37. educat*
38. train*
39. program*
40. therap*
41. intervention*
42. treatment*
43. psychosocial*
44. 37 or 38 or 39 or 40 or 41 or 42 or 43
45. 36 and 44
46. “systematic review”:ti
47. “systematic review”:ab

48. “systematic literature”:ti
49. “systematic literature”:ab
50. “meta analy*”:ti
51. “meta analy*”:ab
52. “meta synthes*”:ti
53. “meta synthes*”:ab
54. 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53
55. 45 and 54
56. 45 and 54 (Limiters: Date of Publication: 20150101-)

II.4
MEDLINE

(Searched in EBSCOhost; 17 May 2022 and 29 July 2022)

1. autis*
2. Asperger*
3. pervasive development* disorder*
4. developmental delay*
5. developmental disorder*
6. developmental disability
7. developmental disabilities
8. developmental difference*
9. down* syndrome
10. fragile X
11. mental retard*
12. intellectual disorder*
13. intellectual disability
14. cerebral palsy
15. attention deficit disorder
16. attention deficit hyperactivity disorder
17. ADD or ADHD
18. Learning disabilities
19. Learning difficult*
20. Developmental learning disorder
21. Language delay
22. Speech disorder*
23. Language disorder*
24. Speech delay
25. Stereotyped movement
26. Developmental motor coordination
27. Motor coordination disorder
28. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 34 or 25 or 26 or 27
29. infant*
30. toddler*
31. school-age*
32. child*
33. adolescent*
34. teen*
35. 29 or 30 or 31 or 32 or 33 or 34
36. 28 and 35
37. educat*
38. train*
39. program*
40. therap*
41. intervention*
42. treatment*
43. psychosocial*
44. 37 or 38 or 39 or 40 or 41 or 42 or 43
45. 36 and 44
46. “systematic review”:ti
47. “systematic review”:ab

48. “systematic literature”:ti
49. “systematic literature”:ab
50. “meta analy*”:ti
51. “meta analy*”:ab
52. “meta synthes*”:ti
53. “meta synthes*”:ab
54. 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53
55. 45 and 54
56. 45 and 54 (Limiters: Date of Publication: 20150101-)

II.5
Embase

(Searched 17 May 2022 and 29 July 2022)

1. autis*
2. Asperger*
3. pervasive development* disorder*
4. developmental delay*
5. developmental disorder*
6. developmental disability
7. developmental disabilities
8. developmental difference*
9. down* syndrome
10. fragile X
11. mental retard*
12. intellectual disorder*
13. intellectual disability
14. cerebral palsy
15. attention deficit disorder
16. attention deficit hyperactivity disorder
17. ADD or ADHD
18. Learning disabilities
19. Learning difficult*
20. Developmental learning disorder
21. Language delay
22. Speech disorder*
23. Language disorder*
24. Speech delay
25. Stereotyped movement
26. Developmental motor coordination
27. Motor coordination disorder
28. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 34 or 25 or 26 or 27
29. infant*
30. toddler*
31. school-age*
32. child*
33. adolescent*
34. teen*
35. 29 or 30 or 31 or 32 or 33 or 34
36. 28 and 35
37. educat*
38. train*
39. program*
40. therap*
41. intervention*
42. treatment*
43. psychosocial*
44. 37 or 38 or 39 or 40 or 41 or 42 or 43
45. 36 and 44
46. “systematic review”:ti
47. “systematic review”:ab

48. “systematic literature”:ti
49. “systematic literature”:ab
50. “meta analy*”:ti
51. “meta analy*”:ab
52. “meta synthes*”:ti
53. “meta synthes*”:ab
54. 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53
55. 45 and 54
56. 45 and 54 and [embase]/lim
57. 45 and 54 and [embase]/lim and [2015-2022]/py

II.6

Cochrane Database of Systematic Reviews (https://www.cochranelibrary.com/cdsr/about-cdsr), Campbell Systematic Reviews (https://onlinelibrary.wiley.com/journal/18911803), International Prospective Register of Systematic Reviews (https://www.crd.york.ac.uk/prospero/)

(searched online databases individually 31 July 2022)

1. Autism
2. Intellectual disability
3. Developmental disability
4. Developmental disorder
5. Cerebral Palsy
6. Attention deficit
7. Motor coordination
8. Speech disorder
9. Learning disability
10. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9
11. 10 (limiter: publication 2015-)