

A review of evidence for interventions for children on the autism spectrum

Community Summary 2: Umbrella review

Background

There are many interventions available for children on the autism spectrum. It is important that decisions regarding the choice and use of interventions are based on the best available research evidence.

Autism CRC has completed a report, entitled *Interventions for children on the autism spectrum: A synthesis of research evidence*. The report includes two reviews:

- narrative review, to provide an overview of interventions for children on the autism spectrum and their use in Australia.
- umbrella review, to understand and summarise the evidence base for interventions for children on the autism spectrum.

The review was commissioned by the National Disability Insurance Agency and completed by Autism CRC through the work of a team that included researchers with a diverse range of professional backgrounds.

This community summary provides a brief overview of the umbrella review, which looked at the evidence base for interventions for children on the autism spectrum. A [separate summary](#) provides a brief overview of the findings of the narrative review.

You can find the full report, and the summary of the narrative review, at autismcrc.com.au/interventions-evidence

What did the umbrella review examine?

The umbrella review summarised data from systematic reviews of intervention research for children on the autism spectrum, in particular those aged 0-12 years. The umbrella review

focused on non-pharmacological interventions and was conducted to international best-practice standards.

To be included in the umbrella review, systematic reviews needed to include at least one study with a controlled group design, and to examine one of the following child and family outcomes:

1. Core autism characteristics
2. Related skills and development
3. Education and participation
4. Family wellbeing

The following categories of intervention were examined for their effect on these outcomes:

1. Behavioural interventions
2. Developmental interventions
3. Naturalistic developmental and behavioural interventions (NDBIs)
4. Sensory-based interventions
5. Technology-based interventions
6. Animal-assisted interventions
7. Cognitive behavioural therapy (CBT)
8. Treatment and Education of Autistic and related Communication-handicapped Children (TEACCH)
9. Other interventions, which did not fit within any other categories.

For further information about these categories please refer to the community summary entitled, ***Interventions for children on the autism spectrum, and their application in the Australian community (Summary 1 of 2: Narrative review)***.

How many studies and participants were included in the review?

A total of 58 systematic reviews were included, which encompassed information from 1,787 unique studies. These reviews examined at least 111 intervention practices across the 9 categories of intervention. There were more than 41,000 individuals identified as

study participants. It was not possible to calculate the number of unique participants due to overlapping studies included across the systematic reviews.

What was the quality of the included systematic reviews?

The systematic reviews were of variable quality, and only 4 of the 58 systematic reviews met all indicators of high methodological quality.

What was the review able to answer?

The review summarised the latest research evidence regarding which interventions are more likely to have a positive effect on which child and family outcomes. This information provides a critical evidencebase that can be used to inform decision making for families, clinicians, and policy-makers. This information is presented in Table 1.

What was the review unable to answer?

While the review was able to report findings at a broad level (i.e., which interventions have a positive effect on which outcomes), there was insufficient research evidence to understand the effect of interventions at the individual level (i.e., which interventions have a positive effect on which outcomes, for which children).

Did the amount of intervention influence the effects of intervention?

There was no consistent evidence as to whether the amount of intervention children received influenced the effects of intervention.

Did the way in which interventions were delivered influence the effects of the intervention?

There was insufficient evidence to determine whether particular delivery characteristics (e.g., individual or group delivery; clinic, home or school setting) may maximise the effects of intervention and, if so, for which children. Active caregiver involvement in intervention

was reported to have a similar, and at times greater, intervention effect on child outcomes compared to interventions delivered by clinical practitioners or educators alone.

Were negative effects of interventions examined?

Only 8 of the 58 systematic reviews included any information on potential harms or negative effects of interventions. Minimal negative effects of interventions were reported.

What are the implications of these findings for clinical practice?

The findings are a summary of the best available evidence of the effects of a range of interventions for children on the autism spectrum. This information can help to inform clinical and policy decision making regarding the most appropriate clinical supports for children on the autism spectrum and their families. The information also serves an important role in supporting caregivers to make informed decisions regarding the interventions they access to support their child(ren)'s learning and participation in all aspects and activities of their lives.

What are the implications of these findings for future research?

The review identifies clear gaps in knowledge that can guide future research investment. Future research priorities include an understanding of:

- How child characteristics (e.g., age, core autism characteristics, and communication skills) may influence the effects of interventions.
- How the way an intervention is delivered may influence the effects of interventions, and how this differs between children and families.
- The amount of intervention that may maximise the effects of interventions on outcomes, and how this differs between children and families.
- The costs and benefits of interventions including unintended consequences, negative impacts, and opportunity costs that can occur when time and money is spent on less effective interventions.
- How interventions may improve broader areas of child and family wellbeing, such as quality of life.

Behavioural

Systematic reviews of assorted behavioural practices*

No. of systemic reviews: 3

Core autism characteristics

Overall autistic characteristics: Positive effect (Evidence from 1 moderate quality review)

Social-communication: Positive effect (Evidence from 1 moderate quality review)

Restricted and repetitive interests and behaviours: Positive effect (Evidence from 1 low quality review)

Sensory behaviours: Positive effect (Evidence from 1 low quality review)

Related skills and development

Communication: Positive effect (Evidence from 1 moderate quality review)

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: Positive effect (Evidence from 1 moderate quality review)

Motor: Positive effect (Evidence from 1 moderate quality review)

Social-emotional/ challenging behaviour: Positive effect (Evidence from 1 moderate quality review)

Play: Positive effect (Evidence from 1 low quality review)

Adaptive behaviour: Positive effect (Evidence from 1 moderate quality review)

General outcomes: No evidence available

Education and participation

School/ learning readiness: Positive effect (Evidence from 1 low quality review)

Academic skills: Positive effect (Evidence from 1 low quality review)

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Discrete Trial Training

No. of systemic reviews: 1

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: Positive effect (Evidence from 1 low quality review)

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: Positive effect (Evidence from 1 low quality review)

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: Positive effect (Evidence from 1 low quality review)

Motor: No evidence available

Social-emotional/ challenging behaviour: Positive effect (Evidence from 1 low quality review)

Play: Positive effect (Evidence from 1 low quality review)

Adaptive behaviour: Positive effect (Evidence from 1 low quality review)

General outcomes: No evidence available

Education and participation

School/ learning readiness: Positive effect (Evidence from 1 low quality review)

Academic skills: Positive effect (Evidence from 1 low quality review)

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Early intensive behavioural intervention

No. of systemic reviews: 4

Core autism characteristics

Overall autistic characteristics: Null effect (Evidence from 1 moderate quality review)

Social-communication: Positive effect (Evidence from 1 moderate quality review)

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: Positive effect (Evidence from 1 moderate quality review)

Expressive language: Positive effect (Evidence from 1 moderate quality review)

Receptive language: Positive effect (Evidence from 1 moderate quality review)

Cognition: Positive effect (Evidence from 1 moderate quality review)

Motor: Positive effect (Evidence from 1 low quality review)

Social-emotional/ challenging behaviour: Null effect (Evidence from 1 moderate quality review)

Play: No evidence available

Adaptive behaviour: Positive effect (Evidence from 1 low quality review)

General outcomes: No evidence available

Education and participation

School/ learning readiness: Positive effect (Evidence from 1 low quality review, 1 moderate quality review)

Academic skills: Positive effect (Evidence from 1 low quality review)

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: Null effect (Evidence from 1 moderate quality review)

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Functional Communication training

No. of systemic reviews: 2

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: Positive effect (Evidence from 1 low quality review)

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: Positive effect (Evidence from 1 low quality review)

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: No evidence available

Motor: No evidence available

Social-emotional/ challenging behaviour: Positive effect (Evidence from 1 low quality review)

Play: Positive effect (Evidence from 1 low quality review)

Adaptive behaviour: Positive effect (Evidence from 1 low quality review)

General outcomes: Inconsistent effect (Evidence from 1 low quality review)

Education and participation

School/ learning readiness: Positive effect (Evidence from 1 low quality review)

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Language Training (production)

No. of systemic reviews: 1

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: No evidence available

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: Positive effect (Evidence from 1 low quality review)

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: No evidence available

Motor: No evidence available

Social-emotional/ challenging behaviour: No evidence available

Play: No evidence available

Adaptive behaviour: No evidence available

General outcomes: No evidence available

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Language Training (production and understanding)

No. of systemic reviews: 1

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: No evidence available

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: No evidence available

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: No evidence available

Motor: No evidence available

Social-emotional/ challenging behaviour: No evidence available

Play: No evidence available

Adaptive behaviour: No evidence available

General outcomes: Inconsistent effect (Evidence from 1 low quality review)

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Picture Exchange Communication System (PECS)

No. of systemic reviews: 2

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: Positive effect (Evidence from 1 low quality review)

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

- Communication:** No evidence available
- Expressive language:** Null effect (Evidence from 1 low quality review)
- Receptive language:** No evidence available
- Cognition:** No evidence available
- Motor:** No evidence available
- Social-emotional/ challenging behaviour:** No evidence available
- Play:** No evidence available
- Adaptive behaviour:** No evidence available
- General outcomes:** Inconsistent effect (Evidence from 1 low quality review)

Education and participation

- School/ learning readiness:** No evidence available
- Academic skills:** No evidence available
- Quality of life:** No evidence available
- Community participation:** No evidence available

Family wellbeing

- Caregiver communication and interaction strategies:** No evidence available
- Caregiver social emotional wellbeing:** No evidence available
- Caregiver satisfaction:** No evidence available
- Caregiver financial wellbeing:** No evidence available
- Child satisfaction:** No evidence available

Developmental

Systematic reviews of assorted developmental interventions*

No. of systemic reviews: 2

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: Positive effect (Evidence from 1 moderate quality review)

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: Null effect (Evidence from 1 moderate quality review)

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: No evidence available

Motor: No evidence available

Social-emotional/ challenging behaviour: No evidence available

Play: No evidence available

Adaptive behaviour: No evidence available

General outcomes: No evidence available

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: Positive effect (Evidence from 1 high quality review)

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Developmental relationship-based treatment

No. of systemic reviews: 1

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: No evidence available

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: No evidence available

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: No evidence available

Motor: No evidence available

Social-emotional/ challenging behaviour: No evidence available

Play: No evidence available

Adaptive behaviour: No evidence available

General outcomes: Inconsistent effect (Evidence from 1 low quality review)

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

DIR/Floortime

No. of systemic reviews: 2

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: Positive effect (Evidence from 1 moderate quality review)

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: Null effect (Evidence from 1 moderate quality review)

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: No evidence available

Motor: Null effect (Evidence from 1 moderate quality review)

Social-emotional/ challenging behaviour: No evidence available

Play: No evidence available

Adaptive behaviour: No evidence available

General outcomes: Null effect (Evidence from 1 low quality review)

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Naturalistic teaching strategies

No. of systemic reviews: 2

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: Positive effect (Evidence from 2 low quality reviews)

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: Positive effect (Evidence from 2 low quality reviews)

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: Positive effect (Evidence from 1 low quality review)

Motor: Positive effect (Evidence from 1 low quality review)

Social-emotional/ challenging behaviour: Positive effect (Evidence from 1 low quality review)

Play: Positive effect (Evidence from 1 low quality review)

Adaptive behaviour: Positive effect (Evidence from 1 low quality review)

General outcomes: No evidence available

Education and participation

School/ learning readiness: Positive effect (Evidence from 2 low quality reviews)

Academic skills: Positive effect (Evidence from 1 low quality review)

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Naturalistic developmental behavioural interventions

Systematic reviews of assorted NDBIs*

No. of systemic reviews: 2

Core autism characteristics

Overall autistic characteristics: Null effect (Evidence from 1 moderate quality review)

Social-communication: Positive effect (Evidence from 1 moderate quality review)

Restricted and repetitive interests and behaviours: Null effect (Evidence from 1 moderate quality review)

Sensory behaviours: No evidence available

Related skills and development

Communication: Positive effect (Evidence from 1 moderate quality review)

Expressive language: Positive effect (Evidence from 1 moderate quality review)

Receptive language: Positive effect (Evidence from 1 moderate quality review)

Cognition: Positive effect (Evidence from 1 moderate quality review)

Motor: No evidence available

Social-emotional/ challenging behaviour: Null effect (Evidence from 1 moderate quality review)

Play: Positive effect (Evidence from 1 moderate quality review)

Adaptive behaviour: Null effect (Evidence from 1 moderate quality review)

General outcomes: No evidence available

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Early Start Denver Model

No. of systemic reviews: 2

Core autism characteristics

Overall autistic characteristics: Null effect (Evidence from 1 moderate quality review)

Social-communication: Null effect (Evidence from 1 moderate quality review)

Restricted and repetitive interests and behaviours: Null effect (Evidence from 1 moderate quality review)

Sensory behaviours: No evidence available

Related skills and development

Communication: Positive effect (Evidence from 1 moderate quality review)

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: Positive effect (Evidence from 1 moderate quality review)

Motor: No evidence available

Social-emotional/ challenging behaviour: No evidence available

Play: No evidence available

Adaptive behaviour: Null effect (Evidence from 1 moderate quality review)

General outcomes: Positive effect (Evidence from 1 moderate quality review)

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: Positive effect (Evidence from 1 moderate quality review)

Caregiver social emotional wellbeing: Positive effect (Evidence from 1 moderate quality review)

Caregiver satisfaction: Positive effect (Evidence from 1 moderate quality review)

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Pivotal Response Treatment

No. of systemic reviews: 3

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: Inconsistent effect (Evidence from 1 low quality review)

Restricted and repetitive interests and behaviours: Positive effect (Evidence from 1 low quality review)

Sensory behaviours: No evidence available

Related skills and development

Communication: Null effect (Evidence from 1 low quality review)

Expressive language: Positive effect (Evidence from 1 low quality review)

Receptive language: No evidence available

Cognition: No evidence available

Motor: No evidence available

Social-emotional/ challenging behaviour: No evidence available

Play: Positive effect (Evidence from 1 low quality review)

Adaptive behaviour: No evidence available

General outcomes: Inconsistent effect (Evidence from 1 low quality review)

Education and participation

School/ learning readiness: Positive effect (Evidence from 1 low quality review)

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: Inconsistent effect (Evidence from 1 low quality review)

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Sensory-based interventions

Systematic reviews of assorted sensory-based interventions*

No. of systemic reviews: 3

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: No evidence available

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: Null effect (Evidence from 1 moderate quality review)

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: No evidence available

Motor: No evidence available

Social-emotional/ challenging behaviour: No evidence available

Play: No evidence available

Adaptive behaviour: No evidence available

General outcomes: Null effect (Evidence from 2 low quality reviews)

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Auditory integration Therapy

No. of systemic reviews: 3

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: No evidence available

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: Null effect (Evidence from 1 moderate quality review)

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: No evidence available

Motor: No evidence available

Social-emotional/ challenging behaviour: No evidence available

Play: No evidence available

Adaptive behaviour: No evidence available

General outcomes: Null effect (Evidence from 2 low quality reviews)

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Ayers Sensory Integration (ASI)

No. of systemic reviews: 4

Core autism characteristics

Overall autistic characteristics: Inconsistent effect (Evidence from 1 low quality review)

Social-communication: Inconsistent effect (Evidence from 2 low quality reviews)

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: Inconsistent effect (Evidence from 1 low quality review, 1 moderate quality review)

Related skills and development

Communication: Inconsistent effect (Evidence from 2 low quality reviews)

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: Positive effect (Evidence from 1 low quality review)

Motor: Positive effect (Evidence from 1 low quality review, 1 moderate quality review)

Social-emotional/ challenging behaviour: Positive effect (Evidence from 1 low quality review)

Play: Null effect (Evidence from 1 low quality review)

Adaptive behaviour: Inconsistent effect (Evidence from 2 low quality reviews)

General outcomes: Inconsistent effect (Evidence from 1 moderate quality review)

Education and participation

School/ learning readiness: No evidence available

Academic skills: Positive effect (Evidence from 1 low quality review)

Quality of life: No evidence available

Community participation: Positive effect (Evidence from 1 low quality review)

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Environmental enrichment

No. of systemic reviews: 1

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: No evidence available

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: No evidence available

Expressive language: Null effect (Evidence from 1 moderate quality review)

Receptive language: No evidence available

Cognition: Positive effect (Evidence from 1 moderate quality review)

Motor: No evidence available

Social-emotional/ challenging behaviour: No evidence available

Play: No evidence available

Adaptive behaviour: No evidence available

General outcomes: No evidence available

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Music therapy

No. of systemic reviews: 4

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: Positive effect (Evidence from 1 moderate quality review)

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: Positive effect (Evidence from 1 moderate quality review)

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: No evidence available

Motor: Positive effect (Evidence from 1 low quality review)

Social-emotional/ challenging behaviour: Positive effect (Evidence from 1 low quality review)

Play: Positive effect (Evidence from 1 low quality review)

Adaptive behaviour: Inconsistent effect (Evidence from 2 low quality reviews)

General outcomes: Inconsistent effect (Evidence from 1 low quality review)

Education and participation

School/ learning readiness: Positive effect (Evidence from 1 low quality review)

Academic skills: No evidence available

Quality of life: Positive effect (Evidence from 1 moderate quality review)

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: Positive effect (Evidence from 1 moderate quality review)

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Sensory diet

No. of systemic reviews: 1

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: No evidence available

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: No evidence available

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: No evidence available

Motor: No evidence available

Social-emotional/ challenging behaviour: No evidence available

Play: No evidence available

Adaptive behaviour: No evidence available

General outcomes: Null effect (Evidence from 1 low quality review)

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Treatment and Education of Autistic and related Communication-handicapped Children' (TEACCH)

Systematic review of TEACCH*

No. of systemic reviews: 1

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: Null effect (Evidence from 1 moderate quality review)

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: No evidence available

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: No evidence available

Motor: No evidence available

Social-emotional/ challenging behaviour: No evidence available

Play: No evidence available

Adaptive behaviour: No evidence available

General outcomes: No evidence available

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Structured teaching

No. of systemic reviews: 1

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: No evidence available

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: No evidence available

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: No evidence available

Motor: No evidence available

Social-emotional/ challenging behaviour: No evidence available

Play: No evidence available

Adaptive behaviour: No evidence available

General outcomes: Inconsistent effect (Evidence from 1 low quality review)

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Technology-based interventions

Systematic reviews of assorted technology-based interventions*

No. of systemic reviews: 5

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: Null effect (Evidence from 1 moderate quality review)

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: Positive effect (Evidence from 1 low quality review)

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: Positive effect (Evidence from 1 low quality review)

Motor: Positive effect (Evidence from 1 low quality review)

Social-emotional/ challenging behaviour: Null effect (Evidence from 1 moderate quality review)

Play: Positive effect (Evidence from 1 low quality review)

Adaptive behaviour: Positive effect (Evidence from 1 low quality review)

General outcomes: Inconsistent effect (Evidence from 2 low quality reviews)

Education and participation

School/ learning readiness: Positive effect (Evidence from 1 low quality review)

Academic skills: Positive effect (Evidence from 1 low quality review)

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: Inconsistent effect (Evidence from 1 moderate quality review)

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Apps

No. of systemic reviews: 2

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: Null effect (Evidence from 1 high quality review)

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: Null effect (Evidence from 1 high quality review)

Expressive language: Null effect (Evidence from 1 high quality review)

Receptive language: Null effect (Evidence from 1 high quality review)

Cognition: Positive effect (Evidence from 1 high quality review)

Motor: Positive effect (Evidence from 1 high quality review)

Social-emotional/ challenging behaviour: No evidence available

Play: No evidence available

Adaptive behaviour: No evidence available

General outcomes: No evidence available

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Augmentative and Alternative Communication (AAC)

No. of systemic reviews: 3

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: Inconsistent effect (Evidence from 1 low quality review, 1 moderate quality review)

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: Positive effect (Evidence from 1 low quality review)

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: No evidence available

Motor: Positive effect (Evidence from 1 low quality review)

Social-emotional/ challenging behaviour: Positive effect (Evidence from 1 low quality review)

Play: Positive effect (Evidence from 1 low quality review)

Adaptive behaviour: No evidence available

General outcomes: Inconsistent effect (Evidence from 1 low quality review)

Education and participation

School/ learning readiness: No evidence available

Academic skills: Positive effect (Evidence from 1 low quality review)

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: Inconsistent effect (Evidence from 1 moderate quality review)

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Computer-based instruction

No. of systemic reviews: 2

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: Positive effect (Evidence from 1 low quality review)

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: No evidence available

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: No evidence available

Motor: No evidence available

Social-emotional/ challenging behaviour: No evidence available

Play: No evidence available

Adaptive behaviour: No evidence available

General outcomes: No evidence available

Education and participation

School/ learning readiness: No evidence available

Academic skills: Inconsistent effect (Evidence from 1 low quality review)

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Facilitated communication

No. of systemic reviews: 1

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: No evidence available

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: No evidence available

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: No evidence available

Motor: No evidence available

Social-emotional/ challenging behaviour: No evidence available

Play: No evidence available

Adaptive behaviour: No evidence available

General outcomes: Null effect (Evidence from 1 low quality review)

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Robots

No. of systemic reviews: 1

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: Inconsistent effect (Evidence from 1 low quality review)

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: No evidence available

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: No evidence available

Motor: No evidence available

Social-emotional/ challenging behaviour: No evidence available

Play: No evidence available

Adaptive behaviour: No evidence available

General outcomes: No evidence available

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Sign instruction

No. of systemic reviews: 1

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: No evidence available

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: No evidence available

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: No evidence available

Motor: No evidence available

Social-emotional/ challenging behaviour: No evidence available

Play: No evidence available

Adaptive behaviour: No evidence available

General outcomes: Inconsistent effect (Evidence from 1 low quality review)

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Animal-assisted interventions

Systematic reviews of assorted animal-assisted interventions*

No. of systemic reviews: 2

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: No evidence available

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: No evidence available

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: No evidence available

Motor: No evidence available

Social-emotional/ challenging behaviour: No evidence available

Play: No evidence available

Adaptive behaviour: No evidence available

General outcomes: Null effect (Evidence from 2 low quality reviews)

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Canine-assisted intervention

No. of systemic reviews: 2

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: Inconsistent effect (Evidence from 1 low quality review, 1 moderate quality review)

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: No evidence available

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: No evidence available

Motor: No evidence available

Social-emotional/ challenging behaviour: No evidence available

Play: No evidence available

Adaptive behaviour: No evidence available

General outcomes: No evidence available

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Equine assisted therapy

No. of systemic reviews: 3

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: Null effect (Evidence from 1 low quality review)

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: Positive effect (Evidence from 1 low quality review)

Related skills and development

Communication: Null effect (Evidence from 1 low quality review)

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: Null effect (Evidence from 1 low quality review)

Motor: Inconsistent effect (Evidence from 1 low quality review)

Social-emotional/ challenging behaviour: Inconsistent effect (Evidence from 1 low quality review)

Play: No evidence available

Adaptive behaviour: Null effect (Evidence from 1 low quality review)

General outcomes: Inconsistent effect (Evidence from 1 low quality review, 1 moderate quality review)

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: Inconsistent effect (Evidence from 1 low quality review)

Community participation: Inconsistent effect (Evidence from 1 low quality review)

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Cognitive behaviour therapy

Systematic reviews of cognitive behavioural therapy

No. of systemic reviews: 4

Core autism characteristics

Overall autistic characteristics: Inconsistent effect (Evidence from 1 moderate quality review)

Social-communication: Positive effect (Evidence from 1 low quality review)

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: Positive effect (Evidence from 1 low quality review)

Related skills and development

Communication: Positive effect (Evidence from 1 low quality review)

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: Positive effect (Evidence from 1 low quality review)

Motor: No evidence available

Social-emotional/ challenging behaviour: Positive effect (Evidence from 2 low quality reviews)

Play: No evidence available

Adaptive behaviour: Positive effect (Evidence from 2 low quality reviews)

General outcomes: No evidence available

Education and participation

School/ learning readiness: Positive effect (Evidence from 2 low quality reviews)

Academic skills: Positive effect (Evidence from 1 low quality review)

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Exposure package

No. of systemic reviews: 1

Core autism characteristics

Overall autistic characteristics: No evidence available

Social-communication: No evidence available

Restricted and repetitive interests and behaviours: No evidence available

Sensory behaviours: No evidence available

Related skills and development

Communication: No evidence available

Expressive language: No evidence available

Receptive language: No evidence available

Cognition: No evidence available

Motor: No evidence available

Social-emotional/ challenging behaviour: No evidence available

Play: No evidence available

Adaptive behaviour: No evidence available

General outcomes: Inconsistent effect (Evidence from 1 low quality review)

Education and participation

School/ learning readiness: No evidence available

Academic skills: No evidence available

Quality of life: No evidence available

Community participation: No evidence available

Family wellbeing

Caregiver communication and interaction strategies: No evidence available

Caregiver social emotional wellbeing: No evidence available

Caregiver satisfaction: No evidence available

Caregiver financial wellbeing: No evidence available

Child satisfaction: No evidence available

Combined practices for each category

Behavioural

Behavioral Parent Training; Behavioural early intervention programmes; Discrete Trial Training with Motor Vocal Imitation Assessment; Early Intensive Behavioral Treatment; Functional Behavior Skills Training Home-based behavioral treatment; Home-based Early Intensive Behavioral Intervention (EIBI); Intensive ABA; Intensive Early Intervention; Low Intensity Behavioral Treatment; Managing Repetitive Behaviors; Peer-Mediated Intervention; Picture Exchange Communication System (PECS); Rapid Motor Imitation Antecedent; Regular Intensive Learning for Young Children with Autism; Schedules, Tools, and Activities for Transitions (STAT); Social Skills Group; Stepping Stones Triple P Positive Parenting Program; Strategies for Teaching Based on Autism Research (STAR).

Developmental

Child Talk; Developmental Individual-Difference Relationship-Based (DIR)/Floortime; Hanen More Than Words; Joint Attention Mediated Learning (JAML); Milton and Ethel Harris Research Initiative Treatment (MEHRIT)-DIR based; Parent-Mediated Communication Focused Treatment; Parent-mediated intervention for autism spectrum disorder in South Asia (PASS); Pediatric Autism and Communication Therapy (PACT); Play and Language for Autistic Youngsters (PLAY) project - DIR based; Scottish Early Intervention Program; Social Communication Intervention for Children with Autism and Pervasive Developmental Disorder; Social communication, emotion regulation, transactional support (SCERTS); Video-feedback Intervention to Promote Positive Parenting adapted to autism (VIPP-AUTI).

Cognitive behaviour therapy

Building Confidence Family Cognitive behaviour therapy (FCBT); Cool Kids; Coping Cat CBT program; Facing your fears; Group Cognitive Behaviour Therapy (CBT); Social Skills Training for Children and Adolescents with Asperger Syndrome and Social-Communications Problems; Thinking about you, thinking about me.

Naturalistic developmental behavioural interventions

Advancing Social-Communication and Play (ASAP); Caregiver-based intervention program in community day-care centers; Denver Model; Early Social Interaction Project (ESI); Early Social Interaction Project (SCERTS); Early Start Denver Model (ESDM); Focus parent training program; Home-based Building Blocks Program; ImPACT Online; Interpersonal Synchrony; Joint Attention, Symbolic Play, Engagement, and Regulation (JASPER); Joint Engagement Intervention with Creative Movement Therapy; Joint Engagement Intervention; Learning Experiences Alternative Program (LEAP); Parent-Early Start Denver Model (P-ESDM); Pivotal Response Treatment (PRT); Reciprocal Imitation Training (RIT); Social ABCs.

Sensory-based

Alternative seating; Blanket or “body sock”; Brushing with a bristle or a feather; Chewing on a rubber tube; Developmental Speech and Language Training through Music; Family-Centered

Music Therapy; Joint compression or stretching; Jumping or bouncing; Music Therapy; Playing with a water and sand sensory table; Playing with specially textured toys; Qigong (QST) Massage Treatment; Rhythm Intervention Sensorimotor Enrichment; Sensory Enrichment; Swinging or rocking stimulation; Thai Traditional Massage; Tomatis Sound Therapy; Weighted vests.

Technology-based

ABRACADABRA; Apps; Computer-based interventions; FaceSay; Gaming Open Library for Intervention in Autism at Home (GOLIAH); Gaze-contingent attention training; Robot-based interventions; Serious games; Social Skills Training using a robotic behavioral intervention system; The Transporters animated series; Therapy Outcomes By You (TOBY) App; Transporters DVD; Transporters Program for Children with Autism; Videoconferencing; Virtual environment with playable games; Web-based cognitive behavioural therapy (CBT) intervention.

Animal-assisted

Not specified

TEACCH

Not specified