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This is a brief overview of information about naturalistic developmental behavioural interventions (NDBIs), taken from the Autism CRC report, Interventions for children on the autism spectrum: A synthesis of research evidence (Autism Interventions Evidence Report).

There are seven other category overviews available designed to help people learn about different interventions and their research evidence.

To understand the information in its full context, we encourage you to access the full report .

Why are NDBIs supposed to support children's development?

The intervention category of NDBIs was proposed in 2015 to describe several intervention practices that had recently emerged from the practical integration of behavioural and developmental theories (note 1).

NDBI techniques are based on behavioural principles, but applied in a way that emphasises their delivery in the context of developmentally appropriate adult-child interactions, with a focus on learning in the context of play and routine activities (note 1). Skills are taught in a developmental sequence, with early skills (e.g., eye contact) considered pre-requisites for the development of more complex behaviours (eg. joint attention).

How are these interventions used in clinical practice?

NDBIs share similarities in terms of the nature of the learning targets, contexts, and strategies (note 1).

First, in relation to the nature of the learning targets, skills in these interventions are taught across developmental domains (eg. social, communication, motor, play), and with a focus on integration and generalisation across contexts and as part of daily activities, interactions, and routines with a variety of communication partners.

There is a focus on helping children develop precursor knowledge and skills that lay the foundation for later development.

For instance, intervention may focus on supporting a child who is not speaking to initiate joint attention with others, use gestures, and imitate sounds, as a step towards the development of spoken language.

Second, in terms of the nature of the learning contexts, interventions are delivered in contexts that promote social engagement, in particular, dyadic caregiver-child interactions.

Finally, with respect to the nature of the development-enhancing strategies, interventions bring together a range of behavioural strategies (eg. modelling, shaping, differential reinforcement) as part of intrinsically motivating routines that build in complexity over time and as part of daily routines and play.

What are the principles that underpin the use of NDBIs?

Schreibman et al. (note 1) described 13 features that are common to the intervention approaches classified as NDBIs:

- Teaching incorporates the three-part contingency of antecedent, behaviour, consequence.
- The use of a manual to guide implementation.
- Fidelity checks to ensure the intervention is implemented accurately.
- Individualised intervention goals.
- Ongoing measurement of progress.
- Child-initiated teaching episodes.
- Arranging the environment to promote children's interaction and learning.
- A focus on intrinsic reinforcement and natural contingencies, over external reinforcement.
- Use of prompting and prompt fading to teach skills, leading to children's independent use.
- Helping children to learn to take turns in social and play routines.
- Adults modelling the skills children are being supported to learn.
- Adults imitating children's actions and attempts to communicate to motivate further communication attempts.
- Systematic attempts to broaden children's repertoires of skills and interests.

Who delivers these interventions?

Children on the autism spectrum often have needs across multiple domains of learning, and physical and mental health.

Accordingly, children and families may benefit from the expertise of a range of clinical practitioners spanning health, education and medical disciplines.

For all intervention categories, it is essential that clinical practitioners have acquired appropriate qualifications, are regulated (eg. by a professional or government body), and deliver interventions that are within their scope of practice. A detailed explanation is provided in the full report.

What is the evidence for the effect of NDBIs on child and family outcomes?

Below is a summary of the evidence for the effect of NDBIs on child and family outcomes, taken from systematic reviews published since 2010.

This means that a range of relevant individual studies have been considered, and thus reflects the best available evidence at this point in time.

Listed first are findings from systematic reviews that considered a mixture of NDBIs. Following that are findings relating to specific NDBI practices.

Summary of evidence tables

- Each cell represents evidence for the intervention category or practice (horizontal rows) on various child and family outcomes (vertical columns).
- The effect of these interventions on a range of child and family outcomes is summarised as positive, null, or mixed.
  - **+** means that all available evidence indicated a positive effect of the intervention on a given child or family outcome.
  - **?** means that there was a mixture of positive and null effects reported for the intervention on a given child or family outcome.
  - **0** means that all available evidence indicated a null effect of the intervention on a given child or family outcome.
- H / M / L indicates the methodological quality of the evidence that contributed to the overall intervention effect for a given child or family outcome. The quality of evidence on which these findings are based is summarised as high, moderate, or low. These quality ratings are relative to those that met the minimum standards to be included in the report. Where there is more than one quality rating, it means more than one systematic review is represented.
  - **H** indicates evidence from a high quality review
  - **M** indicates evidence from a moderate quality review
  - **L** indicates evidence from a low quality review
- Where a cell is empty, it means there was no evidence available from the systematic reviews included in the report.

Please refer to the full report for a detailed explanation of the process used to collect, summarise, and synthesise the evidence presented here.

Core autism characteristics

Interventions	No. of systemic reviews	Overall autistic characteristics	Social-communication	Restricted and repetitive interests and behaviours	Sensory behaviours
Systematic reviews of assorted NDBIs*	2	0 M	+ M	0 M	
Early Start Denver Model	2	0 M	0 M	0 M	
Pivotal Response Treatment	3		? L	+ L	

Related skills and development

Interventions	No. of systemic reviews	Communication	Expressive language	Receptive language	Cognition	Motor	Social-emotional/ challenging behaviour	Play	Adaptive behaviour	General outcomes
Systematic reviews of assorted NDBIs*	2	+ M	+ M	+ M	+ M		0 M	+ M	0 M	
Early Start Denver Model	2	+ M			+ M				0 M	+ M
Pivotal Response Treatment	3	0 L	+ L					+ L		? L

Education and participation

Interventions	No. of systemic reviews	School/ learning readiness	Academic skills	Quality of life	Community participation
Systematic reviews of assorted NDBIs*	2				
Early Start Denver Model	2				
Pivotal Response Treatment	3	+ L			

Family wellbeing

Interventions	No. of systemic reviews	Caregiver communication and interaction strategies	Caregiver social emotional wellbeing	Caregiver satisfaction	Caregiver financial wellbeing	Child satisfaction
Systematic reviews of assorted NDBIs*	2					
Early Start Denver Model	2	+ M	+ M	+ M		
Pivotal Response Treatment	3		? L			

*Practices included in systematic reviews of assorted naturalistic developmental behaviourial 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.

View the full evidence table for all intervention categories

Full reference of report

Whitehouse, A., Varcin, K., Waddington, H., Sulek, R., Bent, C., Ashburner, J., Eapen, V., Goodall, E., Hudry, K., Roberts, J., Silove, N., Trembath, D. Interventions for children on the autism spectrum: A synthesis of research evidence. Autism CRC, Brisbane, 2020

Intervention category overviews

- Behavioural interventions
- Developmental interventions
- Naturalistic developmental behavioural interventions
- Sensory-based interventions
- Technology-based interventions
- Animal-assisted interventions
- Cognitive behaviour therapy
- Treatment and Education of Autistic and related Communication-handicapped Children (TEACCH) interventions

Notes

1. Schreibman, L., Dawson, G., Stahmer, A. C., Landa, R., Rogers, S. J., McGee, G. G., Halladay, A. (2015). Naturalistic developmental behavioral interventions: empirically validated treatments for autism spectrum disorder. *Journal of Autism and Developmental Disorders, 45*(8), 2411-2428. doi:10.1007/s10803-015-2407-8