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This is a brief overview of information about technology-based interventions, 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 technology-based interventions supposed to support children's development?

Technology-based interventions predominantly use computer technology as the primary medium of intervention delivery.

The theoretical underpinnings differ across practices, but generally centre on the premise that children on the autism spectrum may have an affinity with technology due to behavioural characteristics that are often observed in this population (note 1 and 2).

For example, computerised technology may reduce the social demands of an intervention, complement a special interest a child may have in computers, and/or provide consistency in instruction that aligns with a child's preference for routine and sameness.

These differences in intervention delivery may make learning through this modality equally, or even more, effective than via solely human interaction (note 1 and 2).

How are these interventions used in clinical practice?

Kientz, Goodwin, Hayes, and Abowd (note 3) proposed eight categories of technology-based interventions:

- personal computers and the internet;
- video and multimedia;

- mobile technologies;
- shared active surfaces;
- virtual reality and augmented reality;
- sensor based and wearables;
- robotics; and
- natural user interfaces.

These technologies may be used by children independently (e.g., to complete online social skills training), to support daily activities (eg. using video modelling as one of several practices aimed at teaching dressing skills), or as an alternative modality for interacting with people (eg. avatar based interaction in online environments).

The development of interventions in this category has occurred broadly in parallel with the emergence of these technologies in society more generally, and has included the use of mainstream technologies as well as bespoke applications (note 3).

For the purpose of this review, augmentative and alternative communication interventions were included in this category, with the exception of the Picture Exchange Communication System which is based primarily on behavioural principles.

Augmentative and alternative communication interventions include both low-tech (eg. picture boards) and high-tech (tablet-based communication apps) systems that are external to the person's body, which aligns with the classification as technology-based intervention.

However, it is noted that augmentative and alternative communication also includes unaided gesture and sign language, which do not align well with this category classification.

What are the principles that underpin the use of technology-based interventions?

There is no universal set of principles relating to technology-based interventions for children on the autism spectrum.

However, where core principles have been articulated such as with the use of augmentative and alternative communication interventions (note 4) key aspects have been highlighted relating to the interaction of the technology, the individual and their environment.

These principles include:

- The importance of an individual's strengths serving as the foundation for the intervention practice.
- Ensuring a supportive alignment between the technology and the broader environment around the child, including other aspects of an intervention program.
- Providing opportunities for learned skills to be applied in real world contexts.

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 technology-based interventions on child and family outcomes?

Below is a summary of the evidence for the effect of technology-based interventions 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 technology-based interventions.

Following that are findings relating to specific technology-based intervention 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 technology-based interventions*	5		0 M		
Apps	2		0 H		
Augmentative and Alternative Communication (AAC)	3		? LM		
Computer-based instruction	2		+ L		
Facilitated communication	1				
Robots	1		? L		
Sign instruction	1				

Related skills and development

Interventions	No. of systemic reviews	Communication	Expressive language	Receptive language	Cognition	Motor	Social-emotional/ challenging behaviour	Play	Adaptive behaviour	Gener outcom
Systematic reviews of assorted technology-based interventions*	5	+ L			+ L	+ L	0 M	+ L	+ L	? L
Apps	2	0 H	0 H	0 H						
Augmentative and Alternative Communication (AAC)	3	+ L				+ L	+ L	+ L		? L
Computer-based instruction	2									
Facilitated communication	1									0 L
Robots	1									
Sign instruction	1									? L

Education and participation

Interventions	No. of systemic reviews	School/ learning readiness	Academic skills	Quality of life	Community participation
Systematic reviews of assorted technology-based interventions*	5	+ L	+ L		
Apps	2				
Augmentative and Alternative Communication (AAC)	3	+ L			
Computer-based instruction	2	? L			
Facilitated communication	1				
Robots	1				
Sign instruction	1				

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 technology-based interventions*	5		? M			
Apps	2					
Augmentative and Alternative Communication (AAC)	3		? M			
Computer-based instruction	2					
Facilitated communication	1					
Robots	1					
Sign instruction	1					

*Practices included in systematic reviews of assorted technology-based interventions

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.

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. Grynszpan, O., Weiss, P. L., Perez-Diaz, F., & Gal, E. (2014). Innovative technology-based interventions for autism spectrum disorders: A meta-analysis. *Autism, 18*(4), 346-361. doi:10.1177/1362361313476767
2. Sandbank, M., Bottema-Beutel, K., Crowley, S., Cassidy, M., Dunham, K., Feldman, J. I., Woynaroski, T. G. (2020a). Project AIM: Autism intervention meta-analysis for studies of young children. *Psychological Bulletin*, 146(1), 1-29.
3. Kientz, J A, Goodwin, M. S., Hayes, G. R., & Abowd, G. D. (2013). Interactive technologies for autism. Synthesis lectures on assistive, rehabilitative, and health-preserving technologies, 4, 1-153.
4. Light, J., & McNaughton, D. (2015). Designing AAC research and intervention to improve outcomes for individuals with complex communication needs. *Augmentative and Alternative Communication, 31*(2), 85-96. doi:10.3109/07434618.2015.1036458