Llywodraeth Cymru
Welsh Government

GUIDANCE, DOCUMENT

Support for children and young people with Autistic Spectrum Disorder (ASD) in educational settings

How to help learners with Autistic Spectrum Disorder using a variety of approaches.

First published: 29 January 2019

Last updated: 29 January 2019

Contents

Overview

This guide provides an overview of the extent to which interventions delivered in educational settings are effective in realising positive outcomes for children and young people with ASD. It was produced by SQW and the Social Care Institute for Excellence (SCIE). The views expressed in this guide are those of the authors and not necessarily those of the Welsh Government.

Purpose and aim of the guide

This report provides a summary of evidence about the effectiveness of approaches for supporting children and young people with autistic spectrum disorder (ASD) whilst in education.

The report may be of interest to:

- parents
- teachers, classroom-based support staff, early years workers and further education lecturers
- special educational needs coordinators (SENCOs)/additional learning needs co-ordinators (ALNCos)
- head teachers, principals and senior leaders in education settings
- local authority education services including specialist services such as educational psychologists
- social workers
- health professionals
- third sector organisations
- advocacy services, dispute resolution services and the Special Educational Needs Tribunal for Wales

The document focuses on learners aged 0 to 25 years, but some of the findings may be transferrable to older learners.

Practitioners do not have to use the approaches set out in this report. The report does not set out what approaches must or must not be provided for children and young people with ASD.

Practitioners can use this evidence along with their own experience and knowledge when making decisions about approaches to support children and young people with ASD. The aim of the report is to support practitioners when planning and delivering timely and effective support for children and young people with ASD.

Not all approaches outlined in the report may be suitable for all children and young people with ASD. Approaches are likely to need to be tailored to each learner based on their needs and to the specific educational setting.

Educators may find it useful to monitor how well their selected support packages are working for their learners, so they know whether they are having the desired effects or need to be altered.

Backgound

This report is based on a rapid evidence assessment (REA) of research studies, which involved reviewing and appraising existing research and considering the effectiveness of approaches to support children and young people aged up to 25 years with ASD. Effectiveness includes, but is not limited to, achieving positive outcomes for children and young people with ASD. These outcomes include attainment, attendance, inclusion, and social and emotional development

The assessment summarised the findings of the most reliable research studies

on this topic published between 2013 and 2017. It looked at approaches which had been studied in any setting where children and young people receive education, such as pre-schools, schools and further education institutions.

The report does not attempt to summarise all interventions and approaches available to support children and young people with ASD. Rather, the report provides a summary of the evidence identified during the evidence review. The evidence was not comprehensive; there were gaps in the evidence base and in some cases the evidence on effectiveness was inconclusive. In addition, not all of the studies identified were robust enough to be included.

The report is based on assessment of 16 studies and reviews. References of the studies included in the REA are provided in the Bibliography of evidence.

The evidence includes studies from many countries. The majority of the evidence came from the US, Canada, UK and Europe, and included a range of ages, settings and severity of ASD. As such, not all of the interventions and approaches detailed in this report would necessarily be applicable to all children and young people with ASD.

When the evidence assessment was complete, a workshop was held with 6 stakeholders including representatives from the National Autistic Society, researchers from Cardiff University and representatives of parents and carers. The workshop provided an opportunity for the participants to consider how the evidence could be most usefully presented in a report. Following the drafting of the report, participants were asked for their feedback, which was used to inform the development of this report.

What is ASD?

ASD can be defined as:

> " 'a developmental disorder which affects the way a person communicates with and relates to other people and the world around them. The way in which people are affected varies from one individual to another and by age and intellectual functioning' (ASD Info Wales)'. "

ASD is the name for a range of similar conditions including autistic disorder, Asperger syndrome and pervasive developmental disorder, not otherwise specified (PDD-NOS) (www.autism.org.uk)

It is estimated that ASD affects 1 in 100 people [Footnote 1].In individuals with ASD, signs of the condition usually start before the age of 3, although the **diagnosis** can be made after that age.

It is very common for children and young people with ASD to have sensory issues, alongside impairments in social imagination, and a narrow repetitive pattern of interests and activities. These challenges can cause higher than average levels of stress, anxiety and depression.

Classrooms are social environments that rely heavily on being able to interact, socialise and communicate with others effectively. The challenges that children and young people with ASD face with regards to communication skills and socialising can intensify their feelings of stress, anxiety and depression. This can, in turn, lead to a **decrease in academic performance**.

ASD can affect children and young people with any level of intellectual ability, from those who are profoundly learning disabled, to those with average or high intelligence. Having ASD doesn't necessarily imply learning difficulties. Some children and young people have learning difficulties and require high levels of support, whilst others such as those with Asperger syndrome or 'high-functioning autism' are very academically able. Some children may also have additional specific learning difficulties.

The way in which ASD impacts on one individual will be different to the way it impacts on another individual.

Therefore, when considering the evidence within this report, it is important to note that whilst an intervention may have proven effective for some children and young people with ASD, it may not necessarily be effective for all children and young people with ASD.

Support for children and young people with ASD (approaches and interventions)

Types of interventions to support children and young people with ASD

For this report we have categorised the REA evidence by the focus and type of intervention. We adopted a list of categories suggested by Bond et al. (2016) in their systematic review of existing research. Bond et al. identified 11 different types of interventions.

These categories are not mutually exclusive, and a specific intervention may span 2 or 3 categories of focus. The categories just provide a way of grouping similar types of interventions and approaches together.

Within each category there are numerous different approaches. In the table below, we provide examples of interventions covering 8 of the 11 categories identified by Bond. The REA we conducted did not provide high quality evidence of effectiveness for the other 3 categories.

Table 1: Examples of interventions explored within this document, categorised by focus

Intervention focus	Type of intervention
Joint attention	Play-based and turn-taking intervention
Social interventions	Peer-mediated instruction and intervention
	Social skills training
	Modelling
	Prompting
	Reinforcement
	Pivotal response learning
Play based interventions	Structured play groups
Challenging/interfering behaviour	Behavioural interventions
	Self-management
	Naturalistic interventions
	Antecedent-based interventions
	Differential reinforcement of alternative, incompatible or other behaviour
	Social narratives

Intervention focus	Type of intervention
	Discrete trial teaching
	Parent-implemented intervention behaviours
	Exercise
Adaptive/& self-help	Visual support
	Technology aided instruction and interventions
Communication interventions	Milieu(social environment)teaching
	Incidental teaching
	Picture exchange communication system
	Video modelling
	Language training
	Task analysis
Pre-academic/ academic skills	Direct instruction
	Comprehension interventions
	Multi-sensory interventions
Cognitive	Cognitive behavioural interventions

Who can put the interventions into practice?

The evidence indicates that a wide range of people can effectively put these interventions into practice. The implementers in the majority of the interventions reviewed were teachers and other educators (such as teaching assistants). Other implementers were children and young people without ASD, parents and carers, and children and young people with ASD. Implementers may require training in the specific techniques of the interventions to deliver them effectively.

Outcomes

The interventions reviewed were designed to improve children and young people's skills and behaviours. In most cases the interventions focused on either developing social skills (communication skills, or the reduction of challenging or disruptive behaviour) or academic attainment (for example, abilities in reading and maths). A few of the interventions focused on improving school readiness, the wellbeing of children and young people, vocational skills and improving their play and interaction with peers.

The extent to which the outcomes were achieved varied across the different interventions; this is explored in the next section.

What the research says about the effectiveness of the interventions

In this section we summarise the findings from the REA. We review each approach and intervention in turn, exploring the extent to which they were found to be effective in supporting the learning and development of children and young people with ASD.

For each intervention we provide a short description of the activities that proved effective, and examples of the types of settings and children and young people with which they were effective. Some interventions may be applicable across different settings and aspects of a child or young person's life, although the studies reviewed often provide examples of implementation in just one setting.

Joint attention

Play based and turn-taking interventions

Joint attention interventions aim to develop children and young people's joint attention or joint engagement.

Joint attention is the process in which a child learns to recognise the direction of an adult's gaze, orient their own gaze to follow it, and then look in the same direction. Joint engagement is the process in which a child learns to interact with the same object or event as another person. These interventions usually involve 1:1 delivery of play based and turn-taking activities by a teacher or parent.

Joint attention interventions were found to be effective for pre-school aged children. Improvements were noted in both joint attention and joint engagement.

The interventions were effective in a range of education settings, including a mainstream pre-school setting and an independent school for children with ASD.

Interventions were often delivered by a teacher or parent for short daily sessions over 8 to 12 weeks with external supervision. External supervision, for example from trained counsellors from Child and Adolescent Mental Health Services (CAMHS), provided qualified and experienced professional support to help deliver the intervention effectively.

In practice, the interventions included a 1:1 approach delivered by support staff focused on teaching the child(ren) to respond to joint attention approaches (e.g. another person smiling and nodding) and to teach joint attention skills in tasks based on turn-taking [Footnote 2]

Social interventions

Social interventions, as described by Bond et al. (2016) and defined by Wong et al. (2013), are those focused on developing the skills needed to interact with others.

Some specific examples are explored below.

Peer-mediated instruction and intervention (PMII)

Children and young people without ASD interact with and/or help children and young people with ASD to acquire new behaviours, communication skills and social skills, by increasing social and learning opportunities within natural environments. Learning opportunities in natural environments refers to teaching intervention in the 'real world', rather than teaching interventions in a structured setting, such as therapy.

Teachers or service providers systematically teach children and young people without ASD strategies for engaging their peers with ASD in positive and extended social interactions, in both teacher directed and learner initiated activities.

PMII was found to be an effective intervention for developing social interaction amongst children and young people with ASD (aged between 5 and 14 years old). Improvements were noted in social skills and in social interaction.

Outcomes for children receiving peer-mediated interventions included increased peer interaction, improvements in social skills, and the potential for increased social inclusion.

The evidence of the effectiveness of PMII to improve comprehension and employment skills is mixed, and therefore inconclusive.

One study implemented socialisation opportunities by offering lunchtime clubs (additional to those already on offer) with activities relating to each participant's interests. Participation was voluntary for both the children with and without ASD. Undergraduate university students acted as 'social facilitators', and introduced a daily lunchtime club (including a 'movie trivia' and 'card game' club), but then took a step back once the activity began[Footnote 3] to encourage peer-to-peer engagement.

The studies suggest that delivering peer-mediated interventions and group activities in everyday settings can prove effective. The evidence suggests that there is no difference in effectiveness when the intervention is delivered by trained peers (children and young people without ASD) compared with untrained peers. In a number of interventions training was provided to children and young people without ASD in responding to interaction initiations and social advances from participants with ASD.

Social skills training (SST)

SST involves group or individual instruction, designed to teach learners with ASD ways to appropriately interact with others. This can include instruction on basic concepts, role-playing, and providing feedback to help learners with ASD to acquire and practice communication, play or social skills, to promote more positive interactions

SST was found to be effective amongst children and young people with ASD

(aged between 2 and 17 years old). There is a gap in the evidence regarding the use of different SST techniques across different age groups.

Improvements were noted in the frequency, length and quality of social interaction between children and young people with ASD and their peers without ASD.

There is moderate evidence that SST is an effective intervention to improve social interaction. However, across the studies the number of participants varied substantially, and much of the evidence is based on small numbers of participants. This means the current evidence base regarding SST isn't as strong as that for some other interventions.

The interventions mainly involved starting and sustaining social interactions during free play (for example, suggesting games, initiating a conversation, or paying compliments), use of social scripts (for example, cue cards or comic strips) and / or prompts to teach social initiation.

One example is the Stay, Play, Talk' programme[Footnote 4] . In this intervention, selected pupils without ASD (or all classmates) learn strategies to start and maintain interaction with their peers with additional learning needs.

The interventions were delivered by a range of people including classroom teachers, specialist teachers and researchers. Activities were delivered in mainstream and specialist education settings, during or after the school day.

Modelling

Modelling involves a desired behaviour or action being demonstrated to the child or young person with ASD, to encourage imitation or mirroring of the behaviour. This in turn can then lead to the child or young person displaying that behaviour without the need for further modelling.

It is important to note that individuals with ASD may find imitation difficult, and may need to be taught this foundation skill specifically.

Modelling may be considered to be a teaching strategy rather than an 'intervention', and is often combined with other strategies, such as prompting and reinforcement.

Modelling was used in interventions to promote reading comprehension and employment skills. Modelling was found to have strong effects on promoting employment skills, such as interacting with others and completing clerical tasks amongst young people with ASD, when used alongside prompting and reinforcement approaches.

However, there is no conclusive evidence regarding the effectiveness of modelling used on its own.

Teachers or assistants may use modelling to improve the reading comprehension skills of learners, through explaining the different meanings and use of words, and then modelling their correct use.

Effective modelling requires time and planning, and modelling can be challenging when utilised in an inclusive setting (an educational setting with children and young people of a range of learning abilities, including those with and without ALN). This is because teachers are required to manage a classroom with several students in a less structured environment than that offered in clinics and special education classrooms.

Prompting

Prompting is the verbal, gestural or physical assistance given to learners to assist them in acquiring or engaging in a targeted behaviour or skill. Prompts are

generally given by an adult or peer either before or as a learner attempts to use a skill or demonstrate a particular behaviour.

As with modelling, prompting may be considered to be a teaching strategy, rather than an 'intervention'.

The evidence suggests that incorporating the use of prompting into interaction with children and young people with ASD can help to enhance the effectiveness of other interventions.

Evidence suggests that prompting and positive reinforcements can be effective with or without modelling of the desired behaviour or skill.

However, the evidence is based on a small number of studies.

Interventions using prompting as a delivery approach included:

- social story: short descriptions of a particular situation, event or activity, which include specific information about what to expect in that situation and why
- visual scripts: written and pictorial examples of phrases or sentences which children with ASD can use to cue themselves regarding appropriate topics of conversation or other verbal interactions
- peer training: training children and young people without ASD to interact with and/or help children and young people with ASD

Prompting can be used effectively to promote reading comprehension amongst children and young people with ASD. One evidenced example of prompting involved vocabulary or text reading sessions, in which an assistant read a word then asked students to re-read it. The assistant then gave a brief definition of the word and an example sentence including the word, following which a student repeated the definition and formulated a new sentence with the word (this routine was repeated for 8 words). (Cited in Roux et al.(2015))

Reinforcement

Reinforcement involves an event, activity or other circumstance occurring after a learner engages in a desired behaviour, which is intended to encourage the learner to repeat that behaviour in the future. For example, children and young people with ASD being able to choose or participate in an activity they enjoy because they complete a task that is required of them (such as homework), to encourage them to do their homework in future.

Reinforcement can also be in the form of praise to encourage desired behaviour, and may be considered a teaching strategy rather than an 'intervention'. There is, however, inconclusive and limited evidence as to its efficacy.

The evidence suggests that reinforcement can effectively be used alongside other interventions for supporting children and young people with ASD.

The evidence suggests that planned reinforcement (where activities and actions are planned in advance) can be more effective than unplanned reinforcement.

However, the evidence is limited and based on a small number of studies.

Prompting and reinforcement are often used simultaneously. Interventions which involve positive reinforcement (e.g. praise, tangibles, and/or edibles) might use:

- peer imitation: observing and replicating a peer's behaviour
- buddy skills: strategies to encourage interactions and support friendships between children with ASD and their peers without ASD

Pivotal response training (PRT)

Pivotal response training uses a child or young person's interests as motivators, to engage them in learning opportunities. It focuses on 4 key areas of child

development (motivation, responding to multiple cues, self- management, and self-initiation) to guide the intervention.

PRT was found to be effective in supporting social interaction and joint attention, but progress was not maintained for some children post- intervention.

The evidence is inconclusive with regards to the effect of PRT on improving eye contact.

There was a lack of examples of how PRT was used in practice within the evidence base. The majority of the evidence regarding PRT was based on it being implemented in children and young people's homes or at school.

Play based interventions

Play based interventions, as described by Bond et al. (2016) and defined by Wong et al. (2013), are those which use toys or leisure materials to support learning.

Structured play groups (SPG)

Structured play groups are small group activities designed to help develop play and social engagement skills. They involve carefully defined activities which encourage peer interaction and build social and communication skills; for example, developing skills such as sharing and taking turns.

The structured play groups normally include peers who can act as role- models, and activities or themes which encourage interactive play, supported with instructional techniques (for example, explaining or demonstrating, sometimes involving the use of models, objects, pictures, equipment etc.) by teachers and other adults in the form of 'scaffolding learning' (breaking up learning into

smaller pieces and providing support for that learning).

The evidence suggests that SPG is an effective intervention for improving the social skills of children aged 3 to 13 years old.

However, the evidence base is small.

Specific approaches in the evidence included activities such as:

- structured play (when an adult provides resources, starts play or joins in with children's play to offer some direction)
- Lego therapy (using Lego as a means of encouraging communication)
- friendship activities (including adapting songs and games so that opportunities occur for peers to demonstrate positive, affectionate or friendship behaviours to targeted students)
- interest clubs (for example, a cooking and crafts club)

The evidence also included support-based activities such as:

- weekly therapeutic group counselling (although it should be noted that group activities may not be appropriate for some individuals with ASD, who might find this difficult)
- 'Circle of Friends' support groups (whereby a peer group is encouraged to look at their own behaviour while developing an understanding of another child's behaviour and difficulties, to develop strategies and practical solutions to help that individual)

In most cases the activities were moderated by teachers alone or by teachers with a researcher. Interventions were mostly delivered in mainstream educational settings, with a few in a specialist setting or clinic.

Challenging or interfering behaviour interventions

Challenging or interfering behaviour interventions, as described by Bond et al. (2016) and defined by Wong et al. (2013), are those focused on decreasing or eliminating behaviours which interfere with the individual's ability to learn.

Several interventions which fall under this category are not discussed in this report because the evidence regarding effectiveness was not of a sufficiently high quality.

Behavioural interventions

The behavioural intervention category is comprised of 'antecedent interventions' and 'consequent interventions'.

Antecedents are things, events or people that come immediately before behaviour. Antecedents can be related to the time, the physical environment, activities happening, or people present. Antecedent events can also include the absence of something, such as being ignored or not able to do something the child or young person would like to do.

Consequent interventions are used to encourage desirable behaviour, by rewarding positive behaviour and discouraging less desirable behaviours. They occur after the behaviour, e.g. as a result of a desired behaviour being displayed.

The studies suggest that behavioural interventions can be effective in reducing challenging behaviours, improving communication, task engagement and social interaction skills. Behavioural interventions were found to be effective for learners aged pre-school to secondary school (up to 16 years old).

Challenging or interfering behaviour interventions can be delivered by school staff and can be adapted across a range of educational settings.

Evidence (Höher et al.(2016)) suggests that behaviourally based interventions can be highly effective for improving the social interaction skills of young children within mainstream education with ASD.

Behavioural interventions involve a range of different methods, based on behavioural principles. For instance, multi-element behaviour plans (plans which set out strategies to encourage positive behaviour) or changes to the environment (for example, lighting, colours and room layout).

Behavioural interventions can be flexibly adapted and implemented effectively in specialist or mainstream educational settings and by a range of implementers (teachers, children, young people without ASD, parents and researchers).

Seven studies on behavioural interventions to reduce challenging/interfering behaviours were reviewed by Bond et al. (2016). Most included 4 to 11 year-olds attending either specialist, mainstream or pre-school educational settings.

The studies reviewed provided good evidence for behavioural interventions, particularly for increasing on-task behaviour, communication and task engagement. The range of studies indicates these interventions can be flexibly adapted to different settings.

Self-management

Self-management involves children and young people being given instruction to help them to identify appropriate (and inappropriate) behaviours, encouraging them to demonstrate appropriate behaviours, and rewarding themselves for behaving appropriately.

The evidence suggests that self-management is highly effective in improving academic behaviours, reading comprehension and reducing problem behaviours.

However, the severity of the child or young person's ASD has proven to be a key factor in determining effectiveness, with those with high- functioning ability achieving better outcomes than those with lower- functioning abilities.

Self-management interventions were implemented effectively in a range of settings (home, community, clinic or across multiple settings) and across all age ranges, but appeared to be particularly effective amongst adolescents.

The evidenced self-management systems included:

- using an auditory prompting system, delivering prompts through technology to support users with task completion and behaviour management
- using handheld computers, or example, use of a handheld computer prompting system, to enable students to independently switch from task to task in an employment setting
- using timers to learn time management
- using a self-monitoring checklist, for example, students were taught to self-monitor their work rate on job tasks and evaluate daily performance against criteria

Carr et al. (2014) reviewed self-management interventions aimed at developing new skills and/or improving behaviour of students with ASD, and concluded there is substantial evidence to support self-management intervention across a wide range of age groups (5 to 25 years old).

Social narratives

Also known as social stories, social narratives describe social situations in some

detail, by highlighting relevant cues and offering examples of appropriate responses. Social narratives are individualised according to learner needs. They are typically quite short and can include pictures or other visual aids.

There is moderate evidence that social stories are effective in reducing challenging behaviours and supporting social interactions amongst children and young people with ASD aged 7 to 13 years old.

Social stories in the evidence were implemented by school staff, adapted to different settings and delivered using various formats, including alongside other interventions. Social stories typically involve a small number of participants (2 to 3 participants at most).

For example, one study developed social stories to address children's needs. The stories were presented in two formats (paper and computer based), and once taught, the children were directed to read the story on their own every school day.[Footnote 5]

Discrete trial teaching (DTT)

Discrete Trial Teaching is a highly structured method of teaching skills by breaking them down into smaller components. It is an instructional process usually involving one teacher or adult and one child or young person, where instructions are given in the most concise manner possible (for example, instead of asking 'which brick is yellow?', the instructions could be 'touch yellow'. If the child was unable to complete the task, the teacher/adult could provide a prompt).

DTT is a structured version of Applied Behaviour Analysis (ABA). It is designed to teach appropriate behaviours or skills. Each trial consists of the teacher/adult's instruction/presentation, the child's response, and a carefully planned consequence (i.e. a reinforcing incentive or praise). As an intensive intervention, the instruction would be repeated until mastered.

Overall, the evidence suggests that DTT is an effective intervention, particularly in helping adolescents to develop their academic skills (including reading single words, learning science vocabulary and recognising letters or numbers).

However, there is a lack of conclusive evidence with regards to the most effective duration and intensity.

An example DTT intervention is the 'Maths Recovery Programme', a five-step progressive programme that has been modified for students with additional learning needs. The curriculum is taught in a 1:1 situation and covers numeracy skills ranging from very early skills (e.g. counting 1 to 20, recognising numerals 1 to 10 etc.) to advanced skills (e.g., counting by 10s and 100s to 1000, addition/ subtraction of two-digit numbers, and word problems involving multiplication/ division) (Tzanakak et al.(2014))

Interventions focused on improving numeracy, specifically the Maths Recovery Programme, resulted in improvements in early mathematics and numerical ability compared to the control group. However, the differences were not statistically significant. The Maths Recovery intervention group sustained the improvements in mathematical ability, showing improvements in a follow-up test approximately seven months after the end of the intervention(Tzanakaki et al.(2014)).

DTT interventions can be implemented in a range of settings, including educational settings (mainstream and specialised, school and pre-school) and children and young people's homes. They have been effectively delivered by teachers and researchers.

Exercise

Increased physical exertion can serve as a means of reducing problem

behaviours or increasing appropriate behaviours.

The evidence suggests that exercise-based interventions are effective in improving academic behaviour and reducing antisocial behaviour amongst children aged 6 to 8 years old diagnosed with high functioning autism or ASD.

However, there is a small evidence base overall regarding the use of exercise to support the learning and development of children and young people with ASD.

Exercise activities evidenced as proving effective in supporting learning and development by children and young people with ASD include swimming (twice a week for 90 minutes a session) and yoga (daily for 10 to 15 minutes) sessions.

One study followed the Get Ready to Learn (GRTL) yoga programme; a daily classroom-based yoga curriculum designed for children aged between 5 and 12 years old with a range of developmental disorders including ASD.

The programme incorporated developmentally targeted breathing techniques, yoga postures, chanting, and relaxation techniques into the classroom's morning routine in order to decrease maladaptive behaviours (for example, nail-biting, separation difficulties and self-harm) and improve educational outcomes.[Footnote 6]

Adaptive and self-help

Adaptive or self-help approaches as described by Bond et al.(2016) and defined by Wong et al. (2013), are those focused on developing independent life and personal care skills.

Visual supports

Visual supports are any visual displays that support the learner engaging in a desired behaviour or skill, independent of prompts.

The evidence indicates that visual supports can prove highly effective for improving reading comprehension and employment skills.

Visual supports explored in the evidence include pictures, written words objects,arrangement of the environment or visual boundaries,schedules, maps, labels, organisation systems, graphic organisers and timelines

Visual support interventions that have proved effective have used a variety of techniques such as picture prompts, tactile cues (touch prompts to lips, jaw, nose, etc.), photo activity schedule books, picture cards and exploded view drawings (a diagram or picture showing the parts of a;product separated, but in the correct relationship for fitting together).

For example, one intervention used 'thinking maps' to enhance the learner's ability to understand and use metaphors. During the intervention, teachers worked with children and young people to discuss the meaning of common metaphors, using thinking maps. For example, the expression "train of thought" is written in a bubble at the centre of the thinking map and associations/ideas are then written in surrounding bubbles.The thinking map shows how the two ideas are connected, to support understanding[Footnote 7].

Visual support interventions have been implemented effectively in a range of settings, including schools and a workplace.The length of the intervention did not appear to impact its effectiveness.Some sessions were as short as 10 to 15 minutes long, which suggests visual support interventions can be an effective method if time is tight.

Most of the evidence is based on some degree of teacher-led instruction, conducted in small group or classroom-like settings.

Finnegan and Mazin (2016) looked at 5 studies which used graphic organisers. All 5 studies provide evidence that visual supports are an effective intervention to support reading comprehension in learners with ASD. Furthermore, students could maintain and generalise the skills they had been taught by applying the intervention to new chapters or stories.

The length of the intervention varied between the five studies, thus the length did not appear to impact the effectiveness of the intervention.

Technology-aided instruction and intervention (TAII)

Technology-aided instruction and intervention uses technology in order to support children and young people's learning. Technology is defined as ''any electronic item, equipment, application or virtual network that is used intentionally to increase/maintain and/or improve daily living, work/productivity, and recreation/leisure capabilities of adolescents with autism spectrum disorders'' (Odom et al. 2013, cited in Wong et al. 2014).[Footnote 8]

TAII interventions were found to be effective amongst children and young people of primary and secondary school age with ASD. Improvements were noted in employment skills, behaviour, emotion recognition and academic skills (maths and science vocabulary).

Computer assisted emotion recognition interventions resulted in improvements in the ability of participants to identify emotions, and the programmes were rated positively by school staff.

However, TAII was found to have little to no effect on reading comprehension.

All activities included video or audio-based instruction. For example, one study explored teaching children with ASD to respond to facial expressions using 1:1 video modelling with the researcher. During the training sessions, the children watched a video of adults responding to one of the eight facial expressions. Then the researcher performed that facial expression for the child and asked them how they should respond to it[Footnote 9]

Activities took place in a range of settings including the workplace, schools or after school centres.

Communication interventions

Communication interventions, as described by Bond et al. (2016) and defined by Wong et al. (2013), are those focused an individual's ability to express wants, needs, choices, feelings or ideas.

Several interventions which fall under this category are not discussed in this report, because the evidence regarding effectiveness was not of a sufficiently high quality. These are Milieu teaching, incidental teaching, language training, and task analysis

Picture exchange communication system (PECS)

PECS consists of 6 phases which are:

1. 'how' to communicate
2. distance and persistence
3. picture discrimination
4. sentence structure
5. responsive requesting
6. commenting

PECS was found to be an effective intervention for improving communication skills.

However, the evidence is considered to be moderate due to the small number of studies available.

Further research is required to increase the strength of the evidence.

PECS was delivered to children with ASD aged 3 to 10 years old in special education settings. The children were initially taught to give a picture of a desired item to another person, in exchange for the desired item. They were then taught to construct a sentence requesting the item and were encouraged to communicate verbally. The interventions were delivered by teachers and researchers.

A UK study delivered PECS training to 17 classes, with a child to adult ratio of approximately 2:1.

Following the training spontaneous communication using picture cards, speech or both increased significantly. In addition, there was also a significant increase in spontaneous communication to request objects.[Footnote 10]

Video modelling

Under video modelling approaches, a visual model of a desired behaviour or skill was provided via video recording and display equipment, to assist children and young people to learn or use the desired behaviour or skill.

In one study, participants used a visual cueing system (VCS) to tell the events of their school day to school staff and family members. All participants increased the number of events there were able to report to their parents[Footnote 11].

The studies reviewed in the REA showed mixed outcomes for children and young people with ASD aged between 4 and 16 years old.

This means that there is insufficient conclusive evidence to determine the effectiveness of video modelling in supporting communication and social interaction.

Pre-academic and academic skills interventions

Pre-academic/academic skills interventions, as described by Bond et al. (2016) and defined by Wong et al. (2013), are those typically focused on school-based task performance.

In addition to the interventions explored below, multi-sensory interventions fall under this category, but have not been included in this report because the evidence regarding effectiveness was not of a sufficiently high quality.

Direct instruction

Direct instruction is the use of straightforward, explicit teaching techniques, usually to teach a specific skill. It is a teacher-directed method, meaning a teacher or worker stands in front of a classroom or setting providing information or demonstrating a skill, which the children or young people then follow.

The evidence suggests that direct instruction can be an effective intervention for improving both reading comprehension and
employment skills, such as interacting with customers and completing clerical, retail and cleaning tasks.

However, the number of studies available is small, and based on a small number of participants, which means it is not possible to draw general conclusions on

the effectiveness of the approach.

The evidence explored interventions focused on promoting reading comprehension, using the Direct Instruction Programme curriculum Corrective Reading Thinking Basics: Comprehension Level A. These were taught in small groups. The programme divided learning into small chunks across 35 to 40 sessions, each 20 minutes long.

The interventions in the evidence that were focused on improving employment skills used prompting cues or hierarchies (prompting broken down into stages), sometimes alongside other instructional procedures (for example, modelling and praise).

Comprehensive interventions

Comprehensive interventions are programmes which bring together elements of several different interventions, to create a personalised programme of interventions which is as individual as the child or young person themselves.

Comprehensive interventions have several different parts to them. Examples of comprehensive interventions include Learning Experiences and Alternative Program (LEAP), Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH), Developmental Individual-

Difference Relationship-Based (DIR) method[Footnote 12]., and Comprehensive Application of Behaviour Analysis to Schooling (CABAS)[Footnote 13].

Comprehensive interventions were found to be effective in promoting communication, academic achievement, language and fine motor skills amongst young children with ASD aged between 3 and 11 years old.

Evidence on the effectiveness of such interventions for older age groups is

limited.

Comprehensive interventions can be provided at home or at school, be delivered during the school day or outside of school hours, and run for different lengths of time.

A comprehensive intervention programme for children with ASD resulted in improvements in cognition, academic achievement, communication, and adaptive behaviour when compared to a control group. The children participating in the intervention programme made statistically significant gains in non-verbal intelligence, academic achievement, and language scores - over and above the children's scores in the comparison classrooms (Sainato et al. (2015).

The evidence indicates that the most intensive interventions (of 13 hours or more per week) tend to be the most effective. Examples of such programmes and some details about ways to implement them are provided below.

TEACCH approach

The TEACCH approach focuses on the person with autism and the development of a programme around this person's skills, interests and needs. It is a programme designed for visual learners. The intervention requires implementers to undergo formal training. Boyd et al. (2014) found children and young people with ASD in the LEAP, TEACCH or non-model specific (NMS) intervention group experienced reductions in autism characteristics across time, regardless of the method used to support them.

However, findings suggest children in the TEACCH intervention group with lower (versus higher) cognitive ability showed greater improvement in autism severity. This may be explained by children with lower cognitive abilities being more likely to have more severe symptoms of ASD, and thus greater scope for improvement.

Alternatively, it may suggest that they benefitted more from some of the environmental and behavioural supports used in TEACCH (Boyd et al. (2014).

LEAP

LEAP is designed for children with ASD who are not ready to learn in a traditional classroom setting, by creating an individualised programme tailored specifically for them. The programme seeks to develop social and emotional growth, enhance language and communication abilities in work and play activities, support decision making, increase capacity to cope with transitions, and improve behaviour. Implementers are required to undergo formal training.

Early start Denver model (ESDM)

The ESDM model was explored in one of the studies reviewed. The play-based programme is tailored to each child and was delivered to pre-schoolers (aged 0 to 6 years old) in a community long-day care setting (which offered long-day care for 10 hours per day) over the course of a year. Teachers, working with a speech pathologist, psychologist and an occupational therapist, delivered 15 to 25 hours per week of ESDM to the children involved, with a staff-child ratio of 1:3. The ESDM encompasses a personalised developmental curriculum based on individual profiles of strengths and weaknesses, with a focus on developmental skills such as verbal communication, emotion sharing, and play.

Small circle group activities were used to target individual learning objectives. Activities included book activities, or song-based routines involving groups of 3 to 4 children organised to target skills such as expressive and receptive language, turn-taking, cognitive goals (e.g. matching, counting), social (e.g. giving and sharing materials) and play skills.

Comprehensive autism programme (CAP)

The Comprehensive Autism Program (CAP) (Young et al. (2016)) incorporates the use of a variety of intervention practices recommended for CAP implementers. These include:

- discrete trial teaching (with 15 minutes per school day of 1:1 instruction recommended)
- behavioural strategies within routines (used throughout the day and 15 minutes per school day of 1:1 instruction)
- pivotal response training (used throughout the day and 15 minutes per school day of 1:1 instruction).

In the evidence reviewed, lesson plans were provided across three levels of difficulty. These practices supported learning of communication, social interaction and social behaviour skills. Furthermore, treatment effects for CAP varied by severity of ASD; the strongest positive impact on language was for students with mild to moderate ASD. (Young et al. (2016))

A comparison of outcomes between children using LEAP, TEACCH and a non-model specific (NMS) special education programme produced statistically significant changes in children's outcomes across the school year for all three interventions. Outcome measures covered cognitive, behavioural, psychological and social variables.

- Children in the TEACCH group made significant changes over time across a range of measures including social interaction (rated by teachers and parents).
- For students in LEAP there was significant change over time for teacher-rated social interaction, but this was not found for parent-reported social interaction. This may reflect parental expectations. (Boyd et al. (2014). In a study by Young et al. (2016), outcomes for students receiving CAP were

compared to a 'business as usual' group. Both groups made improvements in most outcome areas including adaptive behaviours (daily living skills), cognitive ability (including perceptions, attention, memory and reasoning), expressive language (spontaneous speech and verbal communication accompanied by gestures or other means) and social skills. However, CAP did have a small positive impact on students' outcomes for social skills and receptive language at school compared to student outcomes in the 'business as usual' schools.

The study evaluated the effectiveness of a school-based Cognitive Behavioural Therapy (CBT) programme on symptoms of anxiety, social worry and social responsiveness. Pupils received six, 90-minute CBT sessions led by a researcher. Teaching assistants supported the programme by helping to reinforce the CBT sessions over the school day and encouraging pupils to use learned strategies when required.

Cognitive interventions

Cognitive behavioural interventions (CBI)

Cognitive Behavioural Interventions are talking therapies that can help people to manage or control cognitive processes that affect thoughts, behaviours and emotions.

Cognitive Behavioural Interventions were found to be effective for reducing anxiety symptoms, including school anxiety and social worry, amongst children aged 11 to 14 years old with ASD.

However, the evidence of effectiveness is limited, with only one high- quality study in our review evaluating Cognitive Behavioural Interventions.

The study evaluated the effectiveness of a school-based Cognitive Behavioural Therapy (CBT) programme on symptoms of anxiety, social worry and social responsiveness. Pupils received six, 90-minute CBT sessions led by a researcher. Teaching assistants supported the programme by helping to reinforce the CBT sessions over the school day and encouraging pupils to use learned strategies when required.

The **table in Annex A** summarises the findings from the evidence assessment.

Other points to consider when designing and providing support packages

There are several things to be considered when designing and implementing support for children and young people with ASD. Some key considerations are presented below, but there may be other factors affecting the specific child or setting that should be considered.

Severity of ASD and effectiveness

Most studies do not address whether the effectiveness of an intervention depends on the severity of ASD, and acknowledge the need for further research in this area.

Age and effectiveness

There is a gap in the evidence base regarding the effectiveness of interventions targeted at older young people (over 16s) diagnosed with ASD, and whether the effectiveness of interventions differs with age.

Only 5 of the studies reviewed focus on participants aged 14 and over ((Gilson et al(2017); Carr et al(2014); Luxford et al(2016); Finnegan and Mazin (2016); Khemka et al. (2016)). With this limited evidence base, it is not possible to assess the effectiveness of different interventions for children and young people of differing ages.

Setting type and effectiveness

Most of the studies found interventions could be flexibly adapted and implemented effectively in a variety of settings. There was no evidence that setting type had a particular impact on the effectiveness of an intervention. However, it is important to consider where a particular approach will be implemented when planning interventions.

Intervention length and effectiveness

It is important that each intervention is implemented for long enough to achieve positive outcomes. However, there was no conclusive evidence to suggest that the length or duration of an intervention had a significant impact on the effectiveness of that intervention.

Other considerations

Other key considerations need to be thought about when planning or delivering support for young learners with ASD.

Other key considerations

- Whether or not a specific intervention or approach is available within the

locality. For example, not all of the interventions and approaches outlined in this document are available in every country or local authority area. It may be worth checking what is available via the local authority.

- Any ethical implications or concerns associated with the particular intervention or approach.
- Practical implications associated with its implementation. For example, is there sufficient space available to implement the approach? Does an approach require peace and quiet, or few distractions? What resources are required (e.g. visual display equipment, toys, Lego etc.)?
- The capacity (time) and capability (skills and experience) of those implementing the intervention. What might be feasible and realistic? What else does the intervention have to align with? Is any training or support needed?
- What outcomes are hoped to be achievedSection 5 outlines how effective different interventions and approaches have proven to be in supporting achievement of specific outcomes.

What improvements might be expected from using support packages for children and young people with ASD

Outcomes

The types of outcomes that might be achieved, and the extent of the outcomes, are likely to vary depending on the severity of ASD, the type of intervention implemented, the age of the child or young person, and other factors that might affect a child or young person's learning, as outlined in section 6.

The evidence indicates that the interventions did, in some cases, lead to positive outcomes for children and young people with ASD. The outcomes identified,

starting with those most frequently occurring, centred around:

- improved attainment and academic performance, for example, increased readiness for school, improved test results, or improved vocational skills
- improved social skills and communication with peers, teachers or others
- improved behaviour, for example, reduced challenging or interfering behaviours, improved behaviour during play, increased self-regulation, increased adaptive or self-help behaviours, and improved joint attention (positive attention in an activity by two or more people)
- improved wellbeing, for example, improved mental health

Peer mentoring for students with ASD has been shown to increase levels of self-esteem, increase social satisfaction and decrease levels of bullying experienced by students (Bradley 2016)

Information sources

Local authority

The Family Information Service and Parent Support officers hold details of support groups in the area and can provide details of parent support programmes on offer.

The National ASD Development Team

Visit the Autism Wales website for resources to support the delivery of the Welsh Government's ASD Strategic Action Plan for Wales.

Health visitor

Health visitors may have some good advice and strategies to use in interventions with children and young people

Welsh Government

Autism information from the Welsh Government website.

Additional learning needs system

National Autistic Society

National Autistic Society (NAS) website.

Parent support helpline: 0845 070 4004

Contact a family

Contact a Family parent support website. Helpline: 0808 808 3555 or email **helpline@cafamily.org.uk**

Cerebra parent support

Cerebra parent support website Helpline: 0800 328 1159, or email **info@cerebra.org.uk**

Early Support Wales

Early Support Wales offer free training for parents. They also have a useful free booklet on ASD. Telephone: 029 2034 2434

Contact details

Additional Learning Needs Branch

Support for Learners Division
The Education Directorate Welsh Government
Cathays Park
Cardiff
CF10 3NQ

Email: additionallearningneedsbranch@gov.wales

Rydym yn croesawu gohebiaeth yn Gymraeg / We welcome correspondence in Welsh.

Further information about this document is also available at:
* **SQW**
* **Social Care Institute for Excellence (SCIE)**

Key words and definitions

ALN: Additional learning needs

ALNCo: Additional learning needs co-ordinator

ASD: Autistic spectrum disorder

PDD-NOS: Pervasive developmental disorder - not otherwise specified

SEN: Special educational needs

REA: Rapid evidence assessment

ABI: Antecedent-based intervention

CABAS: Comprehensive application of behaviour analysis to schooling

CAP: Comprehensive Autism Program

CBI: Cognitive behavioural interventions

CBT: Cognitive behavioural therapy

DIR: Developmental Individual-Difference Relationship- Based Method

DRA: Differential reinforcement of alternative behaviour

DRI: Differential reinforcement of incompatible behaviour

DRO: Differential reinforcement of other behaviour

DTT: Discrete trial teaching

EBP: Evidence based practice

ESD: Early Start Denver Model

HP: High-p procedure

IDP: Individual development plan

Footnotes

Footnote [1] The NHS Information Centre, Community and Mental Health Team Brugha, T. et al (2012).'Estimating;the prevalence of autism spectrum conditions;in adults: extending the Adult Psychiatric Morbidity Survey'. Leeds: NHS Information Centre for Health and Social Care.

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Footnote 11[11] Murdock, L. C. and Hobbs, J. Q. 2011. Tell me what you did today: 'A visual cueing strategy for children with ASD, in Focus on Autism and Other Developmental Disabilities', 26:3, 162 to 172, cited in Bond et al. (2016).

Footnote 12[12] 'The Developmental, Individual Difference, Relationship-Based model of intervention (DIR) provides a developmental framework for interdisciplinary assessment and intervention for autism spectrum and related disorders. It is a comprehensive foundation model that utilizes affect-based interactions and experiences tailored to individual needs to promote development' (Wieder S. 2013, Developmental, Individual Difference,

Relationship-Based (DIR) Model, page 37. In: Volkmar F. R. (ed) Encyclopaedia of Autism Spectrum Disorders.Springer, New York, NY).

Footnote 13[13] CABAS is an international certification for programs characterized by: individualized instruction, continuous measurement of teaching and student responses, graphical display of teachers and students performance, the use of scientifically-tested tactics, logically and empirically tested curricular sequences, socially significant goals of instruction, positive teaching environments and teachers trained as strategic scientists of education/therapy (Greer, R D., Keohane, D D., and Healy, O. 2002, Quality and comprehensive applications of behavior analysis to schooling, The Behavior Analyst Today 3 (2):120 to 132).

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