RCSLT RESOURCE MANUAL FOR COMMISSIONING AND PLANNING SERVICES FOR SLCN

Autistic Spectrum Disorders

© RCSLT 2009

Autistic Spectrum Disorders

1. Key points-Autistic Spectrum Disorders

1. Speech and language therapists have a unique role in identifying the social communication characteristics of importance to diagnosis, contributing to differential diagnosis and facilitating identification of retained abilities and co-morbidities e.g. hearing loss.

2. Difficulties with social communication are a predominant feature in reducing access to education, recreation, employment, and social integration, including forming relationships and expressing personality.

3. Communication difficulties are associated with increased prevalence of challenging behaviours.

4. Improved communication has an impact on behaviour, social skills, peer relationships, and self-confidence.

5. Improved communication has an impact on literacy, numeracy and skills for learning.

6. Speech and language therapists should be integral members of services and multi agency teams supporting children and adults with ASD, their families and carers.

7. Because children and adults with ASD may present in different ways and have varying profiles of skills and needs, services should provide a range of interventions.

8. There is evidence of the effectiveness of different targeted approaches to the treatment and management of social communication impairments and functioning of children with ASD.

9. Speech and language therapists have a key role in educating/training others involved in the care of those with ASD, including the family, health, education and social care staff. Parents usually have a requirement for information or wish to be trained to a level whereby they can support their child's skills actively.

10. There is evidence that interventions with preschool children are appreciated, acceptable and effective, improving communication and having a positive impact on learning.

11. Whilst most research has been conducted on preschool and school aged children with ASD, adults with this condition remain at risk and still require intervention and support particularly when life circumstances change, e.g. transition from school to college.

12. Persons with autistic spectrum disorders remain at risk as defined by the Incapacity Act and speech and language therapists are integral to assessing competence for consenting, etc.

13. Pathways of care for children and adults with ASD should take account of multiple needs and the changing focus of intervention at different points in their care.

ROYAL COLLEGE OF SPEECH & LANGUAGE THERAPISTS
© RCSLT 2009

2. What is Autistic Spectrum Disorder?

Autism/Autistic Spectrum Disorder (ASD) and Asperger's Syndrome are neurodevelopmental conditions qualitatively identified by the presence of behavioural impairments: impaired social interaction, communication and social imagination. In this synthesis the WHOICD-10 term Autism Spectrum Disorder (ASD) is used to cover the condition Autism, Atypical Autism and Asperger's Syndrome.

ASD is a pervasive developmental disorder (PDD) with severe and persistent impairments which together comprise different sub-groups. These are characterised by abnormalities in reciprocal social interactions and in patterns of communication, and by restricted, stereotyped, repetitive repertoire of interests and activities (WHO ICH-10).

In the ASD continuum, Autism has all 3 features and is evident before 3 years of age. Atypical Autism differs in the age of onset and frequently in not fulfilling all three sets of diagnostic criteria. Autism is a continuum with individuals described as being either high or low level functioning. The descriptions of behaviours and the term can include those individuals who do or do not fulfil all the criteria. Autism is categorised according to the presence of behaviour defined by DSM IV Classifications and WHO ICH-10.

It is recognised that defining ASD is problematic and that boundaries are blurred between the different identified groups [PDSNOS, Asperger Syndrome, high functioning autism (HFA), ASD], and other developmental conditions, such as severe Developmental Attention Mental Perception (DAMP) (Gillberg 1993). ASD and Asperger Syndrome do not show the same patterns of early language delay and disorder and are linked to differing degrees to other cognitive and social impairments. In individuals with ASD, HFA, and Asperger Syndrome, similar levels of performance on the 'Strange Stories Test' have been observed. This has led to a general agreement that Autistic Spectrum Disorder and Asperger's Syndrome to be part of a continuum rather than discrete conditions (Jolliffe & Baron-Cohen, 1999).

© RCSLT 2009

Table 1: **WHO ICH-10 – Autism**

<table>
<tr><th colspan="2">WHO ICH-10 – Autism</th></tr>
<tr><td>Autism Spectrum Disorder (ASD):</td><td>Individual needs to exhibit 8/16 features</td></tr>
<tr><td colspan="2">Qualitative impairments in reciprocal social interaction (3/5 needed):
1. Failure adequately to use eye-to-eye gaze, facial expression, body posture and gesture to regulate social interaction
2. Failure to develop peer relationships
3. Rarely seeking and using other people for comfort and affection at times of stress or distress and/or offering comfort and affection to others when they are showing distress or unhappiness
4. Lack of shared enjoyment in terms of vicarious pleasure in other peoples' happiness and/or spontaneous seeking to share their own enjoyment through joint involvement with others
5. Lack of socio-emotional reciprocity

Qualitative impairments in communication:
1. Lack of social usage of whatever language skills are present
2. Impairment in make-believe and social imitative play
3. Poor synchrony and lack of reciprocity in conversational interchange
4. Poor flexibility in language expression and a relative lack of creativity and fantasy in thought processes
5. Lack of emotional response to other peoples' verbal and non-verbal overtures
6. Impaired use of variations in cadence or emphasis to reflect communicative modulation
7. Lack of accompanying gesture to provide emphasis or aid meaning in spoken communication

Restricted, repetitive and stereotyped patterns of behaviour, interests and activities:
1. Encompassing preoccupation with stereotyped and restricted patterns of interest
2. Specific attachments to unusual objects
3. Apparently compulsive adherence to specific, non-functional routines or rituals
4. Stereotyped and repetitive motor mannerisms
5. Preoccupations with part-objects or non-functional elements of play material
6. Distress over changes in small, non-functional details of the environment</td></tr>
<tr><td>Autistic Savant:</td><td>Individual has exceptional abilities in one area of performance e.g. mathematics, drawing, music</td></tr>
<tr><td>High-Functioning Autism (HFA):</td><td>Term given to those individuals who have normal intelligence (IQ 70 or above) and who develop language</td></tr>
<tr><td>Asperger's Syndrome:</td><td>Qualitative deficiencies in reciprocal social interaction and restricted, repetitive, stereotyped patterns of behaviour, interests, and activities.
No general delay in language or cognitive development, pedantic speech is common, may be markedly clumsy</td></tr>
<tr><td>Pervasive developmental disorder - not otherwise specified (PDDNOS):</td><td>Criteria for ASD or Asperger syndrome has not been met but the child's difficulties are characteristic of those found within the spectrum of autistic disorder</td></tr>
</table>

© RCSLT 2009

3. How many people have Autistic Spectrum Disorder?

The heterogeneous nature of ASD has resulted in different sub-groups. As a consequence the figures on incidence and prevalence show great variation relating to sub-group, age group and to the size of the sample used, with small sample sizes generating higher numbers of incidence and prevalence (Fomfonne, 2005). A study by Baird et al (2003) quoted that children with some form of ASD constituted 1% of the child population in the UK. Increased screening and provision of diagnostic centres have resulted in more individuals obtaining a diagnosis of ASD. Current figures indicate a growth in incidence and prevalence figures which may be more related to improved identification.

Table 2: incidence and prevalence of ASD

Incidence	Prevalence	Country	Gender
	7.1/10,000 Autism 20/10,000 All ASD (Williams et al 2006)	Systematic review of all countries	
	Autism and learning disability – 296,872 HFA – 242,894 539,766 individuals with ASD (Knapp and Romeo 2001, 2007)	UK	
	1/100 in children (Autism Society UK)	UK	
	7,714/100,000 under 19yrs ASD (SIGN 2007)	Scotland	
	Autistic Savant: 10% prevalence in ASD (1% in the rest of the population) (WHO ICD-10).		Autism male 3-4/1 female Asperger's male 8/1 female (WHO ICD-10)
2.6/1000 live births (Lingam et al 2003)		UK	
8.3/10,000 children with ASD Powell et al (2007)		UK	
	24·8/10,000 ASD (Baird et al 2006)	UK	
	1:160 between 6-12 yrs (Wray & Williams 2007)	Australia	
	21.1/10,000 at 5 years (Honda et al 1996, 2005)	Japan	
	1/165 (Fombonne 2003) 16.2/10,000 median	Canada	male/female ratio 3.8:1 (Fombonne 1999)

© RCSLT 2009

Incidence	Prevalence	Country	Gender
	36.4/10,000 all PDD 13/10,000 for autistic spectrum disorder, 21/10,000 for PDDNOS, 2.6/10,000 for Asperger Syndrome (Fombonne 2005)		
	Autism and learning disability – 296,872 HFA – 242,894 (Knapp and Romeo 2007)	UK	

As shown, ASD can co-occur with other conditions, learning difficulty being the most common; 70% of individuals with ASD are estimated to have a learning difficulty.

The rate of ASD among siblings in a family, where one child already has ASD, is about 1 in 20. Sometimes siblings may have language-related difficulties or delays, but not ASD (Ronald et al 2006, 2005; Dale et al 2003).

4. What causes Autistic Spectrum Disorder?

Research suggests that there is a combination of factors both genetic and environmental which may account for changes in brain development. In some cases the disorders are associated with, and presumably due to, some medical condition, of which infantile spasms, congenital rubella, tuberous sclerosis, cerebral lipidosis, and the fragile X chromosome anomaly are among the most common (WHO ICH-10).

Recent studies using Magnetic Resonance Imagery (MRI), positron emission tomography scans and magnetoencephalography have identified underconnectivity in the brain as a factor, with thinning of the corpus callosum reducing connectivity mainly in the frontal areas and the fusiform face area (Hughes, 2007). While a study by Melke et al (2008) indicated that a low melatonin level resulted from 'a primary deficit in ASMT activity', it is considered to be a 'risk factor' for ASD. Melatonin is considered to be an important factor in both cognition and behaviour.

There is evidence that complex genetic factors play a major role in aetiology (Wing & Porter 2003, Robinson 1999, Gillberg 2003, Baird et al 2003). However, Happe et al (2006) suggest that, while each part of the 'triad of impairment' is heritable, each part makes its own individual contribution.

.

There is an increased risk of related language, speech and developmental problems in families with an autistic child (Ronald et al 2006, 2005; Dale et al 2003).

5. How does Autistic Spectrum Disorder affect individuals?

ASD affects the way an individual understands their world, communicates with, and relates to people around them. Wing (1989a, 1989b) described the 'triad of impairment' as encompassing difficulties in social interaction, communication and imagination.

© RCSLT 2009

Whilst individuals with ASD can have all levels of cognitive and intellectual ability, there is a significant learning disability in some three-quarters of cases (WHO ICH 10). A study by Rapin (1997) reported that a third of those diagnosed with ASD do not develop any useful language while those with High Functioning Autism (HFA) or Asperger's Syndrome acquire language but have social communication difficulties.

Usually language skills (both verbal and non-verbal) are affected in infancy and have been consistently reported to be the best predictor of later outcomes, including the ability to adapt, school achievement, and independence as an adult (Dworzynski et al. 2007, Howlin 2002, Szatmari 2003). A study by Dworzynski et al (2003) found that lower language performance, seen in poor expressive vocabulary, at two years was a predictor of later development of higher autistic type traits by eight years in communication, social interaction and life skills.

Semantic and pragmatic difficulties affect the individual's ability to interpret subtle messages and emotions which are communicated by facial expression and body language and are key factors in the individual's ability to effectively engage in social interactions. Gillberg (1993) observed that putting emotions into a cognitive perspective was problematic for individuals on the autistic spectrum and, while they had the ability to recognise strong emotions (happy, sad, fear, anger), comprehending the emotions of others was difficult, as were subtle emotional concepts e.g. compassion and empathy. Prosodic difficulties in both expression and reception can result in lifelong additional social and communication barriers (McCann et al 2007).

Social interaction is affected by the individual's desire to interact with others. In ASD this can vary from no interaction, through extreme remoteness, passivity, to interaction with others which can lack understanding of appropriate social participation and awareness, and inappropriate social interaction (RCSLT Clinical Guidelines 2005). In particular, individuals with Asperger Syndrome may be highly motivated to interact with others and be socially accepted by their peer groups but lack the appropriate social communication skills and awareness to successfully integrate.

Other conditions are sometimes associated with ASD. These may include attention deficit hyperactivity disorder (ADHD), attention, motor control and perception (DAMP), epilepsy, learning difficulties such as dyslexia (reading/writing problems) and dyspraxia (speech motor planning), and feeding difficulties. Individuals may also present with semantic-pragmatic (understanding meaning) difficulties affecting their ability to process information, especially verbal information, and delays with responding.

Heightened sensitivity to sounds, textures, foods, and light affects the ability to interact in social settings and impacts on all aspects of everyday life and ability to work in certain environments.

As ASD and atypical autism are lifelong conditions, an individual's behaviours need to be continually assessed throughout their life, especially at transition points between pre-school, primary and secondary school transitions and out into life (Scottish Intercollegiate Guidelines Network (SIGN) 2007, National Service Framework for Children, Every Child Matters 2003, Children Act 2004, National Service Framework for Children 2005). The transition phase from child to adult life necessitates good communications between different agencies which includes school, local authority, local Connexions service and social services. Consideration needs to be given to effect of HFA and Asperger's Syndrome in adulthood in relation to further and higher education, employment and personal relationships (e.g. marriage breakdown). There can be

© RCSLT 2009

difficulties in accessing help or services because of not meeting the criteria for help from adult learning disabilities or mental health teams (All-Party Parliamentary Group on Autism Survey 2003).

The care required throughout the life of the individual has funding implications. It has been estimated that the direct and indirect lifetime costs for individuals with ASD are £28 billion per annum as an aggregate cost for children and adults across
the spectrum in the UK, the majority of this funding being focused on intervention, child and day care (Knapp and Romeo, 2007). At present, clients with ASD do not 'fit' into a clear care pathway so they do not always access the services they need until a crisis has arisen.

Table 3: International Classification of Functioning: Dimensions and impact of ASD

ICF Dimension	Impact
Impairment	Impaired communication and cognition affecting: ❐ Receptive and expressive language including pragmatic abilities, verbal and non-verbal language, prosody, relevance, selecting salient points and a literal understanding of language ❐ Cognitive difficulties in developing theory of mind, putting emotions into a cognitive perspective in understanding or interpreting other peoples thoughts, feelings or actions, imagining alternative outcomes to situations, predicting what will happen next, in recognising or understanding other people's emotions and feelings ❐ Working Memory ❐ Visuospatial abilities ❐ Coordination for motor skills ❐ Sensory sensitivity senses, hypersensitive/ hyposensitive (e.g. sensitivity to sound, textures, foods)
Activity	Performance ability and behaviours are on a continuum of difficulty involving: ❐ Limited social use of language to communicate with others ❐ Use or understanding of facial expressions or tone of voice, jokes and sarcasm, common phrases and sayings, subtle messages put across by facial expression and body language ❐ Use of appropriate social behaviour in social situations ❐ Use of imagination to make inferences or be creative, activities can be rigid and repetitive finding change hard to cope with ❐ Use of others as a tool to get wants or needs, hand leading or using another's body to communicate rather than point ❐ Excessive mouthing of objects, fixation or obsessions on objects or how things work ❐ Reacting physically to change, sensory overload, or upset by rocking, hitting self or others ❐ Aversions to social touch, poor non-social visual orientation/ attention ❐ Unusual mannerisms involving the hands and/or fingers ❐ Difficulty in coping with unstructured spaces ❐ Difficulty in coping with unstructured situations ❐ Feeding, eating certain foods, coping with textures and consistencies
Participation	Social communication, interaction and imagination difficulties impacts on

© RCSLT 2009

ICF Dimension	Impact
	ability to: ❐ Function appropriately in social settings ❐ Form friendships because of difficulties in interacting with other people and ability to work with others cooperatively ❐ Be autonomous in life, may need life-long support ❐ May need to withdraw from social situations to cope with emotions. ❐ Behaviour appropriately to the situation ❐ Cope with changing environments
Well-being	❐ Anger, anxiety, frustration and mental anguish may result from coping with, and understanding, other people and their environment ❐ Depression, low self-esteem, low self-confidence

6. What are the aims/objectives of SLT interventions for Autistic Spectrum Disorder?

The SLT forms part of the diagnostic team. The SLT will aim to work closely with individuals, their family and caregivers to assess (RCSLT Clinical Guidelines, 2005):

- Behaviours
- Identify comorbidities
- Areas of need related to the triad of social impairments
- Executive functioning deficits, motivation, memory and central coherence
- Sensory sensitivity and integration, intersubjectivity

SLTs work to develop communication, social interaction and life skills (Bartlett et al, 2005). Any intervention will take into account age, specific ASD difficulties, learning ability/disability and the individual's own personality, strengths and weaknesses (Jones, 2002). Management of communication needs is considered in the context of a social model of disability. Due to the social and emotional nature of presenting difficulties and the effect of ASD on all aspects of the individual's and family's life, input is often best undertaken in a multi-disciplinary setting and with particular support from a psychological service.

There are issues around control of the environment in individuals with ASD. There is a need to consider their need for routine with a dislike of change, hypersensitivity to noise or textures, dislike of close proximity to others, need for rituals and other behaviours that impact on their everyday life. These needs have implications for learning and learning environments and later on the working environment for adults.

As required by the needs of the individual, the SLT will identify and aim to facilitate the development of communication in both children and adults.

© RCSLT 2009

Table 4: International Classification of Functioning: Dimensions and aims and objectives for ASD

ICF Dimension	Develop
Impairment	❑ speech and language abilities
	❑ semantic and pragmatic skills
	❑ shared attention
	❑ understanding of emotions
	❑ understanding of relevance
	❑ theory of mind
	❑ executive functioning – organisational factors for handling and processing information
Activity	❑ communication skills
	❑ turn taking
	❑ shift in attention
	❑ strategies to cope with change
	❑ strategies to reduce inappropriate behaviours
	❑ use of assistive and augmentative communication
	❑ strategies to assist understanding of environment
	❑ strategies to cope with work and work environment
	❑ strategies to develop life skills
	❑ social interactional skills
Participation	❑ ability to integrate socially with others
	❑ ability to behave appropriately in social settings
	❑ self-esteem as a communicator
	❑ autonomy
	❑ ability to work and interact appropriately with others
Well-being	❑ strategies for coping with emotions arising from different interactions ❑ strategies to cope with mood changes ❑ strategies to reduce anxiety ❑ strategies to promote emotional well-being

Approaches to intervention encapsulate different theories of underlying difficulties (Heflin & Simpson 1998, The National Autistic Society webpage 06022009).

1. Relationship-based - facilitating attachment, affect, or relatedness
2. Skill-based - facilitating development of specific skills through differing strategies, such as Picture Exchange Communication System (PECS), social stories, discreet trial learning, Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH www.teacch.com)
3. Physiologically oriented - facilitating changes in brain processes through sensory and auditory integration, psychopharmacological treatments and dietary alterations

The SLT will have a clear role in educating/training broadly across a wide range of settings in mainstream arenas so that ‘reasonable adjustments’ are made to enable people with HFA/AS to function and integrate.

© RCSLT 2009

7. What is the management for Autistic Spectrum Disorder?

The management of ASD involves multidisciplinary and multi-agency teams (SIGN 2007, NRC 2001). Provision of care is across health, social services, education and the voluntary and independent sectors for both children and adults with ASD. Speech and language therapists work as an enabler at each life stage in identifying areas of need and supporting individuals, their families and carers. This includes assessing and supporting changes in environments to accommodate the needs of the adult and the child.

Table 5: SLT as a member of different teams may include the following:

Age Group	Teams
0 - 2 years	Family/carers, Health Visitor and Health Team and the specialist Child and Adolescent Mental Health Services (CAMHs) team who include child psychology, child psychiatry, clinical psychology, paediatrician, occupational & physical therapy, audiology, Social Services team, voluntary and independent sectors
3 – 4 years	Family/carers, Nursery Staff, Health Team and Child and Adolescent Mental Health Services and the Education Team (includes teachers, educational psychologist, specialist teachers), Social Services team, voluntary and independent sectors
5 and 18 years	Family/carers, Education Team, Health Team and specialist Child and Adolescent Mental Health Services, Social Services team, local authority, voluntary and independent sectors
19 years upwards	Family & carers Holistic care involves a wide range of statutory organisations, specialist support services within organisations and social groups such as: ❑ Parenting supports ❑ Higher Education providers ❑ Joint Learning Disability/Mental Health Teams ❑ Specialist dedicated services ❑ Social Services teams ❑ Local Authority – e.g. specialist residential, education ❑ Specialist employment services ❑ Voluntary and independent sectors ❑ Police and probation services ❑ Criminal justice system ❑ Forensic and secure services ❑ Employers and business/commerce ❑ Ethnic and faith groups ❑ Relationship guidance

Parents and caregivers are involved from the beginning and are key to the management so they can be supported and have the opportunity to acquire skills and strategies for managing children and adults with ASD. Specialist programmes may be devised targeting areas of need. Social Stories have been shown to be an effective approach for improving social skills and understanding appropriate behaviour (Quirmbach et al, 2008). SLTs can provide support for the

© RCSLT 2009

National Autistic Society 'Early Bird Help' project and the Hanen project 'More than Words'. These provide group training and individual home visits to educate, train and support the primary care givers. (RCSLT Clinical Guidelines 2005, Division TEACCH, www.teacch.com,)

As part of a multidisciplinary team, SLTs are part of the diagnostic team and contribute to comprehensive programmes for children and adults through direct or indirect methods to ameliorate and affect changes in the behaviours of individuals with ASD. Individuals with Asperger's Syndrome may not be diagnosed early in life and may not get a diagnosis until adulthood. Adults, particularly those with higher functioning autism and Asperger's syndrome, can find it hard to access speech and language therapy services. These individuals have specific needs at times and need support at different periods so open access to SLT and other support services is important (Ignored or Ineligible- National Autistic Society, 2002).

The policy of inclusion of children with ASD in mainstream schools has had an impact for individuals with ASD, teachers and fellow pupils. While some children cope with good support, studies have found that social isolation, loneliness and bullying are commonplace for pupils with ASD who attend mainstream schools (Connors, 2000). A recent survey reported 40% complained of bullying (Corbett & Perepa, 2007). In addition, there is a high incidence of exclusion; 20% was reported in Corbett & Perepa's survey (2007). SLTs work with the individual and those in their communicative environment to facilitate social communication, interaction, learning and emotional coping strategies. The main interventions reported for education in the UK are 'Treatment and Education of Autistic and Related Communication Handicapped Children' (Division TEACCH, www.teacch.com), 'Early Intensive Behavioural Intervention' (EIBI) and 'Applied Behavioural Analysis' (Humphrey & Parkinson, 2006).

The communication difficulties and problems of social interaction encountered in childhood can continue into adulthood and vulnerable individuals need care and support to cope in society. There is recognition that a holistic approach to care is needed by all involved in care and a move to Person Centred Planning (PCP) is being adopted in the UK with the aim of bringing choice and control for the individual in their daily life. Through tools such as Planning Alternative Tomorrows and Hope (PATH), Magil Action Planning (MAP) and Circle of Friends (CoF), the individual's aspirations are identified and action taken to best meet their needs by working across all health, education and social boundaries. A Total Communication (TC) model has been used in child and adult services to promote effective communication in a social setting (Goldstein, 2002).

The speech and language therapist will be working as part of multidisciplinary team, including people from health, social, education and voluntary organisations. They will also be including within the management process the individual's family members and others in their communication environment. There are time implications for the education and training that SLT's provide to other professionals and family members. Working as part of a multidisciplinary team necessitates taking on team roles and attending meetings which also have time implications.

Augmentative and Alternative Communication

Augmentative and Alternative Communication (AAC) refers to any system of communication that is used to supplement or replace speech, to help people with communication impairments to communicate. It covers a range of high technology and low technology systems, including those involving no equipment, such as eye pointing, to high tech voice output communication aids. In

© RCSLT 2009

ASD, a number of different AAC approaches are used. One system is the Picture Exchange Communication Card System (PECS), which has been used in facilitating communication with some effect when the approach is supported by ongoing SLT training (Howlin et al, 2007). Sign language, interactive communication boards, communication cue cards, conversation books, and voice output communication aids have all been used with people with ASD.

Cultural diversity

Individuals with ASD who have English as a second language may need help to access services and, once seen, it will be important to ascertain a full speech and language profile. An interpreter may be required to conduct the SLT assessment to ensure it is both accurate and reliable and to facilitate understanding of therapy and implementation of treatment strategies. There are time and cost implications when working with interpreters/co-workers; for example, in taking a case history and completing a full assessment in all languages spoken by the child and family. Timings of services need to be culturally sensitive; for example, not offering appointment times which coincide with religious observations (Communicating Quality 3).

Those who come from black and minority ethnic (BME) communities may experience discrimination in terms of their ethnicity (Corbett & Perepa, 2007). Ability to function can be exacerbated by second language issues along with the communication difficulties arising from ASD.

8. What is the evidence for SLT interventions for Autistic Spectrum Disorder?

All of these studies consider speech and language interventions to develop or improve language and communication skills in individuals with autism. The studies investigate different speech and language interventions for predominantly young children with autism. One study investigates older children aged 7-12 years and another investigates teenagers and young adults aged 17-25 years.

Details of the studies

All of the studies were published in English from 1988-2008. Ten of the studies were conducted in the USA, two in the UK, one in Australia, one in Singapore and one in Netherlands. Two studies were systematic reviews and synthesised results from studies worldwide. The number of children who took part in the studies ranged from 4 to 61. The studies cover a range of interventions and associated factors including timing of the intervention, computer-based interventions, acceptability of treatment, and delivery of intervention.

Study quality

The quality of the 20 studies was mainly good. The two systematic reviews were of good quality. The three randomised controlled trials (RCTs) of the studies were of good/excellent quality. The controlled clinical trial was of good quality. The case series, comparison, retrospective, and longitudinal studies were of fair quality. The results from these studies should be interpreted with caution due to the limitations of all clinical trials, i.e. lack of randomisation introducing bias. Additionally, many of these studies only investigated small samples, which limits their generalisability.

© RCSLT 2009

It is worth noting that the findings from the non-UK papers need to be interpreted cautiously due to generalisability of findings to the UK population.
It is also worth noting that the findings from the older papers need to be interpreted cautiously as these findings may not be applicable to the current situation.

Consideration of Speech Language Therapy interventions

The studies examined a range of components of speech and language therapy intervention and their effect on language and communication outcomes. These included early interventions, behavioural interventions, who to deliver interventions and computer-based interventions.

Early interventions

Eight of the studies can be classed as early interventions aimed at preschool children. All of the interventions aimed to increase and improve children's language. The studies investigated a variety of different speech and language interventions to improve communication and language skills in autistic preschool children. Additionally, one longitudinal study considers the developmental outcomes of children diagnosed with autism at age 2-3 years, at age 9.

One good RCT conducted in the USA compared the impact of joint attention (JA) and symbolic play (SP) interventions on 58 preschool autistic children (Earlier Kasari study). The longer-term impact 12 months after the intervention was presented in a further paper (Kasari et al, 2008). Expressive language gains were greater in the JA and SP groups than in the comparison group. For the children that started the intervention with the lowest language levels, the joint attention intervention improved their language outcomes significantly more than the symbolic play intervention. The findings from this study suggest that joint attention and symbolic play intervention can produce expressive language gains in autistic children. The study further suggests that implementing intervention based on a child's initial language skills could be beneficial.

The other early intervention RCT was also set in the USA and compared the effect of two communication interventions aimed at 36 preschoolers with ASD (Yoder & Stone 2006a;Yoder & Stone 2006b). The two interventions were responsive education and prelinguistic milieu training [RPMT] and the picture exchange communication systems [PECS]. Both treatments were delivered in 20-minutes sessions, three times a week for six months. The RPMT intervention facilitated the children's frequency of generalised turn taking and generalised initiating joint attention more than the PECS intervention. Increases in joint attention only occurred for children who had at least some initiating joint attention before the study. Contrastingly, the PECS facilitated children's generalised requests more than the RPMT for children with very little initiating joint attention before the treatment. Additionally, PECS was more successful than RPMT in increasing the number of different non-imitative spoken communication acts and the number of different non-imitative words used at the post-treatment period. The study findings suggest that both of the interventions can have a beneficial effect on the communication of autistic children. The findings further suggest that the intervention effect could be dependent on a child's initial skills.

One good controlled clinical trial in the USA compared the effects of three treatments for 61 preschool children with ASD (Howard et al, 2005). The children were assigned to treatments

© RCSLT 2009

groups according to their parents' preference. Twenty-nine children in the intensive behaviour analytic intervention group received 25-40 hours per week of treatment on a 1:1 adult:child ratio. Sixteen children received an intensive 'eclectic' intervention which used a combination of methods for 30 hours per week in 1:1 or 1:2 adult::child ratio. Another group of 16 children attended a non-intensive early intervention programme which consisted of a combination of methods for 15 hours per week in small groups. At follow-up the behaviour group had higher mean standard scores in all skills than the other two groups. The differences for all skills were statistically significant apart from for motor skills. At follow-up learning rates were also considerably higher in the behaviour group than the other groups. There were no significant differences between the mean scores of the eclectic and small groups group.

A UK study compared two early intervention programmes: the LUFAP and the ABA (Farrell, Trigonaki, & Webster, 2005). LUFAP was developed by Lancashire LEA and used a combination of delivery styles in particular Applied Behavioural Techniques and the TEACCH. The intervention was delivered to eight children in a mainstream school environment by Special Support Assistants supported by teachers and educational psychologists. The ABA programme was an intensive home-based programme based on the work of Oliver Lovaas. Nine children received a minimum of 30 hours of 1-to-1 support per week from as many as 5 therapists. Both groups made considerable progress on all measures indicating that both programmes were successful in helping the children to develop. All of the children though were still well below their chronological age and would require support throughout school. It was not possible to make any definite judgement about which programme was more successful as the ABA programme had started before the LUFAP and data for each child was collected at different times. When an average month's progress on socialisation, daily living skills and communication were calculated the averages were all higher for the LUFAP group. Interestingly, the ABA children had lower scores on socialisation which was a possible consequence of the home-based nature of the approach. Although the findings from this comparison study should be treated with caution they do demonstrate that autistic children who receive early intervention can make progress.

Another UK intervention for 10 preschool children aged 2-3 years focused on developing the pragmatics of language (Chandler et al. 2002). The intervention consisted of an individualised programme of home visits, modelling workshops and written information and lasted 18 months. Parents delivered the intervention in partnership with the therapist. After just six months parents noticed improvements in their children's expressive communication, and within 18 months all of the children had made substantial progress in social interaction and expressive communication. The findings from the small study suggest the possible benefits for autistic children of an individualised programme.

A small case series conducted in the USA investigated the effects of facilitating parents to use teaching strategies within their child's daily routines (Kashinath et al, 2006). Parents were taught to include two teaching strategies to target routines to address their child's communication aims. All of the parents were able to learn and use the teaching strategies competently and were able to generalise the strategies across their child's routines. The intervention had positive effects on the communication outcomes of each child and the parents perceived the introduction of the teaching strategies as beneficial to their children's communication.

Another case series based in the USA investigated the effects of a voice output communication aid (VOCA) and naturalistic teaching strategies on four children age 3-5 years with severe autism (Schepis et al, 1998). Teaching strategies provided opportunities for VOCA use within normal

© RCSLT 2009

classroom routines. All children showed increases in communicative interaction using VOCA's as the strategies were implemented. This small case series indicates that VOCA's could potentially be useful for children with autism.

One retrospective study considered the results from a larger RCT for a population subset of autistic children (Hancock & Kaiser 2002). The RCT investigated whether the enhanced milieu training (EMT) caused changes in children's language and, secondly and more importantly, if the changes were then generalised to interaction with their parents. The population subset was four autistic children and their mothers. During the intervention, which lasted 24 weeks, parents brought their children to the clinic twice each week, and then once each month during the six month follow-up period. All children showed positive increases for specific target language use at the end of 24 intervention sessions, and results were maintained through the six month follow-up observations. Generalisation to home setting was observed for three of the four children, with the greatest changes occurring immediately after the intervention than at the six month follow up.

A longitudinal study based in the USA investigated the development outcomes of children with autism from age 2 to age 9 to assess the impact of early identification of autism (Turner et al. 2006). At age 9, 88% of the sample still obtained a diagnosis of ASD. The majority of the children's cognitive scores improved significantly with more than 50% having scores in the average range at follow-up. Language outcomes were also encouraging at follow-up, with 88% of the sample demonstrating some functional language and 32% being able to engage in conversation. Predicted outcome status was from the following early characteristics: age of diagnosis, age 2 cognitive and language scores, and total hours of speech and language therapy between ages 2 and 3. The findings from this longitudinal study investigating 25 children demonstrate the importance of both early identification and early intervention for autistic children for their long-term developmental outcomes.

These studies together demonstrate that early interventions can be beneficial for autistic children.

Behavioural language interventions

Six of the studies considered behavioural language interventions. The most common interventions considered were discrete trial/structured, sign language and normalised/milieu behavioural language interventions.

A systematic review reviewed the comparative effects of structured training with normalised methods for improving language and communication skills in children with autism (Delprato, 2001). The review included 10 experimental studies investigating 63 young children aged 3-8 years. In the eight studies that investigated a language outcome, all found that normalised language training was more effective than discrete-trial training. The studies reviewed were small case series or comparison studies but the combined results suggest that further research into normalised interventions is justified.

Another systematic review considered the benefits of speech and language interventions for individuals with autism (Goldstein 2002). The review considered any communication treatment for autistic children aimed at improving their language; particularly interventions that involved sign language, discrete-trial training and milieu training. The review concluded that there is substantial evidence available to assert that effective interventions do exist that can teach communication skills to autistic children. Most of the studies in the review investigated only a small number of

© RCSLT 2009

children, but still nearly all interventions did improve the communication skills of the autistic children. The studies reviewed suggest that autistic children with some language and communication skills could benefit quickly from many of the approaches. Non-verbal children need more precise programming and will generally progress more slowly.

A good quality RCT in the USA, from 1988, investigated whether comprehension, production, and spontaneous use of language were greater, in 60 children with moderate to severe autism, following language training by sign-alone, speech-alone, simultaneous communication or alternating between speech and sign (Layton 1988; Yoder & Layton 1988). Children received 90 individual 40-minute daily sessions. When analysing the results the children were divided into high- and low-verbal imitators based on their initial verbal imitation performances. The high-verbal imitators did equally well in all four conditions and, as expected, performed better than the low-verbal imitators in all of the conditions. The low-verbal imitators performed equally well in all conditions apart from speech-alone condition on which they did the poorest. Children retained the word or signs that they learnt for three months after the treatment, regardless of their treatment group and their initial verbal imitation performance. The findings from this study indicate that a child's initial communication assessment could be beneficially used to select the most appropriate intervention for them.

One retrospective study considered the results from a larger RCT for a population subset of autistic children (Hancock & Kaiser 2002). The RCT was investigating whether enhanced milieu training (EMT) caused changes in children's language and, secondly, if the changes were then generalised to interaction with their parents. EMT is a hybrid approach to naturalistic early language interventions and incorporates aspects of both behavioural and social interactionist approaches to language interventions. During the intervention, which lasted 24 weeks, parents brought their children to the clinic twice each week, and then once each month during the six month follow-up period. Observational data indicated that all children showed positive increases for specific target language use at the end of 24 intervention sessions, and results were maintained through the six month follow-up observations. Generalisation to home setting was observed for three of the four children, with the greatest changes occurring immediately after the intervention than at the six month follow up.

One case series set in the Netherlands considered the impact of small-group training on question-asking skills in adolescents with ASD (Palmen, Didden & Arts, 2008). Nine students received weekly sessions from a trainer of verbal feedback, role-play during short conversations, a table game, and a self-management strategy, for six weeks. The amount of correct questions during tutorials with their personal coaches increased following the training. The students and their personal coaches found the training effective and acceptable.

Another case series based in the USA investigated the effects of a voice output communication aid (VOCA) and naturalistic teaching strategies on four children age 3-5 years with severe autism. Teaching strategies provided opportunities for VOCA use within normal classroom routines. All children showed increases in communicative interaction using VOCA's.

The findings from these studies suggest the behaviour interventions can be useful in developing the communication skills of autistic children. Naturalistic training is generally more effective than discrete-trial training.

© RCSLT 2009

Computer Interventions

Two case series studies investigated computer interventions for children with autism (Bernard-Opitz, Sriram & Sapuan 1999; Bosseler & Massaro 2003). One investigated children aged 3-7 years in Singapore and the other investigated children aged 7-years in the USA.

The first case series (Bernard-Opitz, Sriram & Sapuan, 1999) investigated the comparative effects of computer assisted interaction with traditional play interaction on the vocal imitation of 10 autistic children aged 3-7 years in Singapore. The children's parents delivered the intervention with the trainer. Each child received 10 sessions, twice a week. In the computer and personal instruction,s the trainers and parents modelled the sounds while the child then tried to imitate. The Speech Viewer used in the computer instruction provided interesting visual reinforcement when children produced the correct sounds. Participants demonstrated significantly greater vocal imitations in the computer assisted instruction condition, compared with the personal instruction condition. This trend was present in 9 out of 10 children and the effects were consistent across both parent and trainer. Overall, the enhancement of sound through visual feedback using the SpeechViewer seems promising for the non-verbal autistic population.

The other case series investigated computer assisted instruction for children aged 7-12 years in the USA (Bosseler & Massaro, 2003). The study consisted of two experiments involving eight and then six children. The first experiment tested whether autistic children could learn vocabulary and language from Baldi, a computer-animated tutor in a Language Wizard/Player and their reactions to Baldi. All children learned a significant number of new words and grammar and seven of the children appeared to enjoy working with Baldi. One child disliked working with Baldi and at his parents request was withdrawn from the experiment. The computer intervention in this study was generally acceptable to autistic children aged 7-12 years. The second experiment investigated just six of the eight children and investigated whether Baldi was responsible for the learning and if the learning could be generalised to interaction with a tutor. All students showed an increase in identification accuracy once training was implemented and demonstrated generalisation of learned vocabulary to new instances of vocabulary item, either immediately or after a few treatment sessions. This study demonstrates that the children could learn language and vocabulary from a computer-animated tutor and then generalise their knowledge from the computer program to an independent assessment by an instructor. The study did not consider whether the children could use the new vocabulary in spontaneous speech though. Findings from this small case series suggest that autistic children can learn new language and vocabulary from a computer-animated tutor and that this method of instruction is generally acceptable to autistic children.

Both of these studies demonstrate that computer instruction could be useful for autistic children and that this method of instruction is generally acceptable to the population.

Teacher implemented intervention

Three of the studies were delivered by teachers solely or as part of a larger team.

One case series based in Australia investigated a teacher implemented intervention for four children (Keen, Sigafoos & Woodyatt, 2001). The intervention was individualised for each child and teachers sought to replace communication behaviours that were unclear or inappropriate;

© RCSLT 2009

opportunities occurred naturally as part of the classroom routine. The results suggest that the intervention package delivered by teachers was effective in replacing prelinguistic behaviour with alternative forms of functional communication.

Another case series based in the USA investigated the effects of a voice output communication aid (VOCA) and naturalistic teaching strategies on 4 children age 3-5 years with severe autism (Schepis et al, 1998). The intervention was delivered by a teacher and three assistants who were taught to use the teaching strategies to provide opportunities for VOCA use within normal classroom routines. All children showed increases in communicative interaction using VOCA's as the strategies were implemented. The results from this study suggest that teachers with the help of assistants can implement interventions in the classroom with autistic children.

A UK case series compared two early intervention programmes delivered by teams, one involving teachers (Farrell, Trigonaki & Webster, 2005). The staff responsible for the day-to-day running of LUFAP were the project teacher, Special Support Assistants (SSAs) and a speech and language therapist. Each child had a full-time Special Support Assistants who undertook most of the work with the children. The programme was delivered under the direction of the project teacher and in collaboration with parents. The ABA team consisted of the children's parents, lead therapist, team of therapists, trained ABA supervisors from the UK and ABA consultants from the USA. Both groups made considerable progress on all measures. When an average month's progress on socialisation, daily living skills and communication were calculated, the averages were all higher for the LUFAP group. The rate of progress in communication for children receiving LUFAP was considerably higher than for the children who received ABA. Interestingly, the ABA children had lower scores on socialisation which was a possible consequence of the home-based nature of the approach.

The three small case series studies demonstrate that teachers could be effective in delivering interventions to autistic children solely or as part of a wider team.

Involving parents as therapists

Five of the studies involved the autistic child's parents as therapists.

A UK study compared two early intervention programmes delivered by teams, both involving parents (Farrell, Trigonaki & Webster, 2005). LUFAP was delivered under the direction of the project teacher and in collaboration with parents. The ABA team consisted of children's parents, team of therapists, trained ABA supervisors and consultants. Both groups made considerable progress on all measures indicating that both programmes were successful in helping the children to develop.

One UK intervention for 10 preschool children, aged 2-3 years, consisted of an individualised programme of home visits, modelling workshops and written information delivered by parents and therapists in partnership (Chandler et al, 2002). After just six months of the intervention, parents noticed improvements in their children's expressive communication and within 18 months all of the children made substantial progress in social interaction and expressive communication. Importantly, during the intervention parents also developed their confidence in dealing with their children.

© RCSLT 2009

An intervention comparing computer-assisted and personal instruction was delivered by parents and trainers (Bernard-Opitz, Sriram & Sapuan, 1999). Participants showed significantly greater vocal imitations in the computer-assisted instruction condition, compared with the personal instruction condition, and the effects were consistent across both parent and trainer.

A small case series set in the USA investigated the effects of facilitating parents to use teaching strategies within their children's daily routines (Kashinath et al. 2006). All of the parents were able to learn and use the teaching strategies competently and were able to generalise the strategies across their child's routines. The intervention had positive effects on the communication outcomes of each child and the parents perceived the introduction of the teaching strategies as beneficial to their children's communication.

One retrospective analysis in the USA investigated the impact on children's verbal communication following training from their fathers at home (Seung et al, 2006). After the training there was a decrease in the ratio of parent to child utterances and an increase in the use of imitation by the parents and the number of single words and different words produced by the children.

Together these small studies suggest that parents can work effectively with therapists or by themselves to improve the language and communication outcomes of their autistic children.

Acceptability of treatment

A number of the studies considered the acceptability of the intervention to the autistic individual and, for younger children, the child's parents.

Children aged 7 -12 years in the computer instruction intervention generally enjoyed working with Baldi, a computer animated tutor (Bosseler & Massaro, 2003). Another case series considered the acceptability of small-group training to adolescents with ASD (Palmen, Didden & Arts, 2008). The students found the training effective and acceptable.

Studies considering the acceptability of the treatment to parents of children with autism generally found parents to very positive. A case series computer intervention found that mothers found the sessions helpful and would recommend them to other parents with autistic children (Bernard-Opitz, Sriram & Sapuan,1999). A retrospective study on EMT found that parents' rating of their satisfaction with the training were very positive. The only aspect that parents were not completely satisfied with was the time requirement involved in the training, with parents wanting more sessions for longer time periods. A small case series facilitated parents to use teaching strategies within their children's daily routines (Kashinath et al, 2006). This intervention had positive effects on the communication outcomes of each child and the parents perceived the introduction of the teaching strategies as beneficial to their children's communication.

Summary

The studies demonstrate that there are a variety of different approaches that can improve language and communication skills in individuals with ASD. A number of the studies provide evidence that interventions for preschool children can achieve good results. Consideration needs

© RCSLT 2009

to be given to who delivers the intervention. A number of studies suggest that parents can usefully be involved in delivering interventions. Interventions that involve teachers in the delivery also seemed promising. Interventions delivered by teachers in a school environment could possibly help to develop children's socialisation more than interventions delivered in the child's home. Additionally, there is some evidence to indicate that introducing interventions as part of a child's daily routine can be effective. Computer-based interventions appeared promising for children with autism especially as they provide the predictability and patience autistic individuals require. Many of the programmes were individualised for each child, indicating the differences between children with a diagnosis of autism. A few of the studies found that interventions were more effective for children that start the study with some speech than for non-verbal children. Further research is required to identify which interventions are most effective for autistic children with different abilities.

References

Bernard-Opitz, V., Sriram, N., & Sapuan, S. 1999. Enhancing Vocal Imitations in Children with Autism using the IBM SpeechViewer, *Autism*, **3**, 2, 131-147.

Bosseler, A. & Massaro, D. W. 2003. Development and Evaluation of a Computer-Animated Tutor for Vocabulary and Language Learning in Children with Autism, *Journal of Autism and Developmental Disorders*, **33**, 6, 653-672.

Chandler, S., Christie, P., Newson, E., & Prevezer, W. 2002. "Developing a Diagnostic and Intervention Package for 2- to 3-Year-Olds with Autism: Outcomes of the Frameworks for Communication Approach", *Autism*, **6**, 1, 47-69.

Delprato, D. 2001. Comparisons of discrete-trial and normalized behavioral language intervention for young children with autism, *Journal of Autism & Developmental Disorders*, **31**, 3, 315-325.

Farrell, P., Trigonaki, N., & Webster, D. 2005. An exploratory evaluation of two early intervention programmes for young children with autism, *Educational and Child Psychology*, **22**, 4, 29-40.

Goldstein, H. 2002. "Communication Intervention for Children with Autism: A Review of Treatment Efficacy", *Journal of Autism and Developmental Disorders,* **32***, 5, 373-396.*

Hancock, T. B. & Kaiser, A. P. 2002. The Effects of Trainer-Implemented Enhanced Milieu Teaching on the Social Communication of Children with Autism, *Topics in Early Childhood Special Education*, **22,** 1, 39-54.

Howard, J. S., Sparkman, C. R., Cohen, H. G., Green, G., Stanislaw, H., Howard, J. S., Sparkman, C. R., Cohen, H. G., Green, G., & Stanislaw, H. 2005. A comparison of intensive behavior analytic and eclectic treatments for young children with autism, *Research in Developmental Disabilities*, **26**, 4, 359-383.

Kasari, C., Freeman, S., & Paparella, T. 2006. Joint attention and symbolic play in young children with autism: a randomized controlled intervention study, *Journal of Child Psychology and Psychiatry*, **47**, 6, 611-620.

© RCSLT 2009

Kasari, C., Paparella, T., Freeman, S., & Jahromi, L. 2008. Language outcome in autism: randomized comparison of joint attention and play interventions, *Journal of Consulting & Clinical Psychology*, **76**, 1, 125-137.

Kashinath, S., Woods, J., Goldstein, H., Kashinath, S., Woods, J., & Goldstein, H. 2006. Enhancing generalized teaching strategy use in daily routines by parents of children with autism, *Journal of Speech Language & Hearing Research*, **49**, 3, 466-485.

Keen, D., Sigafoos, J., & Woodyatt, G. 2001. Replacing prelinguistic behaviors with functional communication, *Journal of Autism & Developmental Disorders*, **31**,4, 385-398.

Layton, T. L. 1988. Language training with autistic children using four different modes of presentation, *Journal of Communication Disorders*, **21**, 4, 333-350.

Palmen, A., Didden, R., & Arts, M. 2008. Improving question asking in high-functioning adolescents with autism spectrum disorders: effectiveness of small-group training, *Autism*, **12**, 1, 83-98.

Schepis, M. M., Reid, D. H., Behrmann, M. M., Sutton, K. A., Schepis, M. M., Reid, D. H., Behrmann, M. M., & Sutton, K. A. 1998. Increasing communicative interactions of young children with autism using a voice output communication aid and naturalistic teaching, *Journal of Applied Behavior Analysis*, **31**, 4, 561-578.

Seung, H. K., Ashwell, S., Elder, J. H., Valcante, G., Seung, H. K., Ashwell, S., Elder, J. H., & Valcante, G. 2006. Verbal communication outcomes in children with autism after in-home father training, *Journal of Intellectual Disability Research*, **50,** 2, 139-150.

Turner, L. M., Stone, W. L., Pozdol, S. L., & Coonrod, E. E. 2006, Follow-up of children with autism spectrum disorders from age 2 to age 9, *Autism*, **10**, 3, 243-265.

Yoder, P. & Stone, W. L. 2006a, A randomized comparison of the effect of two prelinguistic communication interventions on the acquisition of spoken communication in preschoolers with ASD, *Journal of Speech, Language & Hearing Research,* **49**, 4, 698-711.

Yoder, P. & Stone, W. L. 2006b, Randomized comparison of two communication interventions for preschoolers with autism spectrum disorders, *Journal of Consulting and Clinical Psychology*, **74**, 3, 426-435.

Yoder, P. J. & Layton, T. L. 1988, Speech following sign language training in autistic children with minimal verbal language, *Journal of Autism and Developmental Disorders*, **18**, 2, 217-229.

Literature synthesis-Autism

Study	Country	Study design	Subjects	Intervention
(Bernard-Opitz, Sriram, & Sapuan 1999)	Singapore	Comparison study	10 non-verbal children. 9 male, 1 female. Age range 3-7 years	Computer assisted instruction using IBM speech viewer was compared with traditional play interaction. Participants attended sessions twice

© RCSLT 2009

Study	Country	Study design	Subjects	Intervention
				weekly and received a total 10 sessions.
(Bosseler & Massaro 2003)	USA	Case series	8 children aged 7-12 years old. 7 boys and 1 girl	Vocabulary lessons using Baldi-Language Wizard player. Students were trained in roughly 10-to 30 minutes sessions twice to five times a week.
(Chandler et al. 2002)	UK	Case series	10 children, 9 boys, 1 female. Aged 2 to 3 years	Intervention focusing on pragmatics of language based on home visits, modelling, workshops, and written information, with parents acting as 'therapists'.
(Delprato 2001)	International	Systematic review	10 controlled studies with 63 children with autism. Range – 3-8 years with an overall median of 5 years	Studies compared traditional operant behavioural procedures with normalised interventions for teaching language to young children with autism.
(Farrell, Trigonaki, & Webster 2005)	UK	Comparison study	9 preschool children in ABA/Louvaas, Two girls and 7 boys. 8 preschool children in the LUFAP, Two girls and six boys	Study compares impact of two early intervention programmes. For the ABA/Louvaas, based on applied behavioural analysis technique, pupils received 30 hours per week of one to one support mainly at home. The Lancashire Under Fives Autism Project (LUFAP) amount of one to one support time was more flexible and integrated into classroom activities in a mainstream preschool. LUFAP used combination of delivery styles, in particular Applied Behavioural Techniques and TEACCH.
(Goldstein 2002)	International	Systematic Review	Children with autism	Compared communication interventions, in particular sign language, discrete-trial training, and milieu teaching procedures.
(Hancock & Kaiser 2002)	USA	Case series/longitudinal study -	4 Pre-school children	Twenty-four 15 minute sessions twice weekly of Enhanced Milieu Teaching by

© RCSLT 2009

Study	Country	Study design	Subjects	Intervention
		? see notes below		skilled therapists.
(Howard et al. 2005)	USA	Controlled clinical trial	61 preschool age children	29 children received behaviour analytic intervention for 25-40 hours per week. Adult to child ratio 1:1. 16 children received intensive “eclectic” intervention. This involved a combination of methods for 30 hours per week. Adult to child ratio 1:1 or 1:2. 16 children attended non-intensive public early intervention programmes which involved a combination of methods for 15 hours per week provided in small groups.
(Kasari et al. 2008;Kasari , Freeman, & Paparella 2006)	USA	RCT	58 children, 46 boys and 12 girls aged 3-4 years	Compared joint attention and symbolic play interventions. Both papers report the same study. The 2006 paper describes in detail the study methodology and initial outcomes. The 2008 paper details the longer term (12 months after the intervention) language outcomes.
(Kashinath et al. 2006)	USA	Case series	5 Preschool children	Parents taught to include teaching strategies within children’s daily routine to address communication strategies.
(Keen, Sigafoos, & Woodyatt 2001)	Australia	Case series	4 children. 3 boys and 1 girl aged 4-7 years	Teacher implemented intervention package to replace prelinguistic behaviours with functional communication.
(Layton 1988;Yoder & Layton 1988)	USA	RCT	60 moderate to severe autistic children aged 3-9 years	Language training by sign-alone or speech-alone, simultaneous communication or alternating between speech & sign. Treatment included 90 individual 40-minute daily sessions. Both of these papers report the same study and outcomes but are published in different journals.

© RCSLT 2009

Study	Country	Study design	Subjects	Intervention
(Palmen, Didden, & Arts 2008)	Netherlands	Case series	9 high-functioning adolescents with ASD. Aged 17-25 years. 7 male, 2 female	Weekly small group training consisting of feedback and self-management lasting about an hour for 6 weeks. Adolescents in groups of 3 for training.
(Seung et al. 2006)	USA	Retrospective study	8 children and their fathers. Age range 4-7 years. Six boys and 2 girls	In-home father training consisting of expectant waiting and imitation with animation.
(Schepis et al. 1998)	USA	Case series	4 children. 3 boys and 1 girl. Age range 3-5 years	Use of voice output communication aid and naturalistic teaching.
(Turner et al. 2006)	USA	Longitudinal study	25 children aged approximately 9 who had received a clinical diagnosis of autism (n=18) or PDD-NOS (n=7) under the age of 3. 21 male, 4 female	Follow-up evaluation of developmental outcomes.
(Yoder & Stone 2006a;Yoder & Stone 2006b)	USA	RCT	36 preschoolers with ASD. Aged 18-60 months. 31 boys and 5 girls	Child received either Responsive Education and Prelinguistic Milieu Teaching or Picture Exchange Communication System. Treatment was for 6 months and delivered in 20-minute sessions 3 times a week. Both of these papers report on the same study with each focusing on slightly different outcomes.

9. References Cited

1. Fombonne, E., 2003b, The prevalence of autism. *Journal of the American Medical Association*, **289**, 1–3.
2. Powell, J., Edwards, A., Edwards, M., Pandit, B., Sungum-Paliwal, S., Whitehouse, W., 2007 Changes in the incidence of childhood autism and other autistic spectrum disorders in preschool children from two areas of the West Midlands, UK, *Developmental Medicine & Child Neurology*, **42,** 9, 624-628.

3. All-Party Parliamentary Group on Autism Survey 2003.

© RCSLT 2009

4. Bartlett, S., Armstrong, E., Roberts, J. (2005) Linguistic resources of individuals with Asperger syndrome. *Clinical Linguistics & Phonetics*, **19**, 3, 203-213.

5. Baird,G., Cass,H., Slonims,V., 2003 Diagnosis of autism, British Medical Journal, **327**, 488-493.

6. Children Act 2004 www.everychildmatters.gov.uk

7. Connor, M., 2000 Asperger syndrome (ASD) and the self-reports of comprehensive school students, Educational Psychology in Practice, **16**, 3, 285-296.

8. Corbett, C & Perepa, P. 2007 Missing out? Autism, education and ethnicity. National Autistic Society. NAS 784.

9. Dale, P., Bishop, D., Price, T. and Plomin, R., 2003 Outcome of early language delay: I. Predicting persistent and transient language difficulties at 3 and 4 years. Journal of Speech, Language, and Hearing Research, **46**, 544–560.

10. Division TEACCH, 2009 www.teacch.com

11. Dworzynski, K., Ronald, A., Hayiou-Thomas, A., Rijsdijk, F., Happe, F., Bolton, P., Plomin, P., 2007 Aetiological relationship between language performance and autistic-like traits in childhood: a twin study. International Journal of Language Communication Disorders, **42**, 3, 273–292.

12. Every Child Matters: Change for Children 2003 www.everychildmatters.gov.uk

13. Fombonne,E., 2005 The epidemiology of pervasive developmental disorders. Journal of Applied Research in Intellectual Disabilities, 18, 281–294

14. Fombonne, E., 2003a Epidemiological surveys of autism and other pervasive developmental disorders: an update. Journal of Autism and Developmental Disorders 33, 365–382.

15. Fombonne, E., 2003b The prevalence of autism. Journal of the American Medical Association, **289**, 1–3.

16. Frith, U. 1991 Autism and Asperger syndrome. Cambridge: Cambridge University Press.

17. Gillberg, C. 1992 Autism and Autistic-like Conditions: Subclasses among Disorders of Empathy, The Journal of Child Psychology and Psychiatry and Allied Disciplines, **33**, 5, 813-842.

18. Goldstein H 2002 Communication Intervention for Children with Autism: A Review of Treatment Efficacy *Journal of Autism and Developmental Disorders,* **32, 5**, 373-396.

19. Gray, C. (2002) My Social Stories Book. London: Jessica Kingsley Publishers.

© RCSLT 2009

20. Heflin, L. J. & Simpson, R. I. 1998 Interventions for children and youth with autism: prudent choices in a world of exaggerated claims and empty promises. Focus on Autism and Other Developmental Disabilities, **13**, 194-211.

21. Hughes, J. 2007 Autism: The first firm finding = underconnectivity?, Epilepsy & Behavior, **11**,1, 20-24.

22. Howlin, P. 2002 Outcomes in Neurodevelopmental and Genetic Disorders. Eds Howlin and O. Udwin. Cambridge University Press: Cambridge.

23. Howlin, P., Gordon, R., Pasco, G., Wade, A., Charman, T. 2004 The effectiveness of Picture Exchange Communication system (PECS) training for teachers of children with autism: a pragmatic group randomised controlled trial, Journal of Child Psychology and Psychiatry, **48**, 5, 473-481.

24. Jolliffe, T. & Baron-Cohen,S. 1999 The Strange Stories Test: A replication with high-functioning adults with autism or Asperger syndrome. Journal of Autism and Developmental Disorders, **29**, 395-404.

25. Jones, G. 2002 Educational Provision for Children with Autism and Asperger Syndrome: Meeting Their Needs. London: David Fulton.

26. Knapp, M., Jarbrink, K. (2001). The economic impact of autism in Britain. Autism, **5**, 7-22

27. Knapp, M., Romeo, R, Beecham, J. (2007). Autism in the UK new cost estimates. Unpublished cited in Autism: the cost, pub: Autism NI (PAPA).

28. Mandell, D. S., Maytali, M. & Zubritsky, C., 2005 Factors associated with age of diagnosis among children with autism spectrum disorders. Paediatrics, **116**, 6, 1480–1486.

29. Melke, J., Botros, H., Chaste, P., Betancur, C., Nygren, G., Anckarsater, H., Rastam, M., Stahlberg, O., Gillberg, C., Delorme, R., Chabane, N., Mouren-Simeoni, M-C., Fauchereau, F., Durand, C., Chevalier, F., Drouot, X., Collet, C., Launay, J-M., Leboyer, M., Gillberg, C., Bourgeron, T., 2008 The PARIS study 11, Abnormal melatonin synthesis in autism spectrum disorders. Molecular Psychiatry, **13**, 1, 90-98.

30. National Research Council 2001 Educating Children With Autism. Washington DC: National Academy Press.

31. National Service Framework for Children www.dh.gov.uk/en/Healthcare/NationalServiceFrameworks/Children, **36** (Supplement), 303-309.

32. Quirmbach LM, Lincoln AJ, Feinberg-Gizzo MJ, Ingersoll BR, Andrews SM. (2008) Social Stories: Mechanisms of Effectiveness in Increasing Game Play Skills in Children Diagnosed with Autism Spectrum Disorder Using a Pretest Posttest Repeated Measures Randomized Control Group Design. J Autism Dev Disorder [epub ahead of print]

© RCSLT 2009

33. Rapin, I., 1997 Current concepts: autism. New England Journal of Medicine, **337**, 97–104.

34. Royal College of Speech and Language Therapists 2003 Communicating Quality 3. RCSLT: London.

35. Robinson, B., 1999 Genetic and environmental influences on nonverbal and language abilities at 18 and 24 months of age. Dissertation, Emory University, Atlanta, GA.

36. Ronayne, J. 2004 Information for Parents on Autism Spectrum Disorders, Child and Adolescent Directorate National and Specialist Child and Adolescent Mental Health Service, Michael Rutter Centre for Children and Young People. Autism and Related Disorders Clinic, The Maudsley Hospital, South London and Maudsley NHS Trust.

37. Ronald, A., Happe, F., Bolton, P. F., Butcher, L., Price, T. S., Wheelwright, S., Baron-Cohen, S. And Plomin, R., 2006 Genetic heterogeneity between the three components of the autism spectrum: a twin study. Journal of the American Academy of Child & Adolescent Psychiatry, **45**, 691–699.

38. Ronald, A., Happe, F. & Plomin, R., 2005 The genetic relationship between individual differences in social and nonsocial behaviours characteristic of autism. Developmental Science, **8**, 444–458.

39. Royal College of Speech & Language Therapists Clinical Guidelines, 2005 RCSLT, Speechmark.

40. Scottish Intercollegiate Guidelines Network, 2007 Assessment, diagnosis and clinical interventions for children and young people with autism spectrum disorders: a national clinical guideline. NHS Quality Improvement Scotland. July 2007.

41. Szatmari, P., 2003 The cause of autism spectrum disorders. British Medical Journal, **326**,173-174.

42. Division TEACCH, 2003 *Treatment and Education of Autistic and Related Communication Handicapped Children*, www.teacch.com

43. Wing,L., Potter, D. 2002 The epidemiology of autistic spectrum disorders: is the prevalence rising? Mental Retardation and Developmental Disabilities Research Reviews, **8**, 3, 151-161.

44. Wing, L. 1989a The diagnosis of autism. In C. Gillberg (Ed.), Diagnosis and treatment of autism (pp. 5-22). New York: Plenum Press.

45. Wing, L. 1989b Autistic adults. In C. Gillberg (Ed.), Diagnosis and treatment of autism (pp. 419-432). New York: Plenum Press.

46. World Health Organization International Classification of Diseases Tenth Edition (ICD-10) Mental and behavioural disorders. World Health Organization: Geneva.

47. http://www.nimh.nih.gov/health/publications/autism/symptoms.shtml

© RCSLT 2009