INTERNATIONAL REVIEW OF THE LITERATURE OF EVIDENCE OF BEST PRACTICE PROVISION IN THE EDUCATION OF PERSONS WITH AUTISTIC SPECTRUM DISORDERS

Sarah Parsons, Karen Guldberg, Andrea MacLeod and Glenys Jones
University of Birmingham
and
Anita Prunty and Tish Balfe
St Patrick's College, Dublin

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The National Council for Special Education was established under the Education for Persons with Special Educational Needs Act 2004 (EPSEN Act 2004) with effect from the 1st October 2005. The Council was set up to improve the delivery of education services to persons with special educational needs with particular emphasis on children.

Foreword

The National Council for Special Education (NCSE) was formally established in 2005 under the Education for Persons with Special Education Needs Act 2004 (EPSEN) to improve the delivery of education services to persons with special educational needs, with particular emphasis on children.

Commissioning, conducting and publishing research to provide an evidence base to support the NCSE's work are some of its key functions. It is now widely acknowledged that research evidence has a very valuable role to play in the development of policy and practice. Reports from the full NCSE research programme, including this one, will be key sources, amongst others, that will assist the NCSE in carrying out its work and in developing policy advice to the Minister for Education and Science on special education matters, another of the NCSE's statutory functions. The reports will also assist in identifying and disseminating to schools, parents and other appropriate stakeholders, information relating to best practice concerning the education of children with special education needs.

This research report was commissioned to provide the NCSE with an overview of the international literature on educational provision for persons with autistic spectrum disorders. The report updates our knowledge of the field, particularly in relation to how it has developed since the publication of the Report of the Task Force on Autism in 2001. The researchers have systematically compiled key lessons from a very broad range of international literature. They have also identified a number of recommendations arising, which the NCSE will now need to consider in carrying out its work and in developing its own policy advice to the Minister for Education and Science.

Pat Curtin,
Chief Executive Officer

Keywords

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Note on terminology and stages of schooling in Ireland

Pre-school: Irish children are entitled to enrol in primary schools from age four years. As a result, much of what is considered early childhood education in other countries is already incorporated in the formal school system in Ireland. The childcare sector is predominantly composed of private enterprise or voluntary/community agencies. Parents' fees remain the main source of funding. The Department of Education and Science (DES) has responsibility for funding the provision of services for children of preschool age with autistic spectrum disorders. Currently, there are 35 preschool classes for children with ASD attached to mainstream or special schools in Ireland.

Primary: Students attend primary school for eight years, usually starting at age five (the minimum age is four by September 1st of the school year). Most schools in Ireland at this level are vertical (accommodate all primary-aged pupils). There is, however, a small number of junior (four to seven) and senior schools (eight to 13). There is a very small number of privately run primary schools in the country. Special schools in Ireland are designated as primary schools but may enrol students in the age range four to 18 years. Currently there are 129 special schools catering for pupils within 14 categories of special educational needs (SESS undated). There are six special schools for pupils with ASD (figures supplied by the DES, 2008)

Post primary education: Children transfer to post primary school at age 12 or 13. There are three types of post primary schools (voluntary secondary, community and comprehensive and community colleges under the Vocational Education Committees). These terms reflect the guiding ethos of the school. Children remain in post primary education for five to six years and must remain until they reach 16 or have completed three years' post primary education. Some of these post primary schools offer post Leaving Certificate courses (PLCs).

Third level education: Third level colleges are post-compulsory educational establishments usually referred to as universities, institutes of technology or colleges of education.

Glossary

Term or abbreviation	Stands for or means
ABA	Applied behavioural analysis – an intensive, highly structured teaching programme using discrete trials and stimulus-response reinforcement techniques
AB Design	A study design that establishes a baseline (A) of responding or ability level before carrying out the intervention (B)
ADHD	Attention deficit hyperactivity disorder
ADI -R	Autism diagnostic interview – Revised [Lord et al, 1994]
ADOS	Autism diagnostic observation schedule [Lord et al, 1989]
Autism specific	School or class which provides only for pupils with ASD
AS	Asperger syndrome [see pp29-30 for further details]
ASC	Autism spectrum condition
ASD	Autism spectrum disorder [see pp29-30 for further details]
BPVS	British picture vocabulary scale [Dunn et al, 1981]
CARS	Childhood autism rating scale [Schopler et al, 1993]
DCSF	Department for Children, Schools and Families (formerly the Department for Education and Skills)
Discrete-trial teaching	A specific teaching technique based on ABA principles that involves prompting and reinforcing responses
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition [APA 1994]

DES	Department of Education and Science [Ireland]
DfES	Department for Education and Skills
DoH	Department of Health
EIBI	Early intensive behavioural intervention
FE	Further education
GARS	Gilliam autism rating scale [Gilliam, 1995]
GB	Great Britain
HE	Higher education
HFA	High functioning autism
IB	Intensive behavioural
ICD-10	International Statistical Classification of Diseases and Related Health Problems – 10th Revision [WHO, 1993]
IEP	Individual education plan
ICT	Information and communication technology
LA	Local authority
Mainstream school	Also known as general or regular schools; have a majority intake of children without disabilities or SEN
MLD	Moderate learning disabilities
MRC	Medical Research Council
Multiple Baseline Design	A study design that uses a varying time schedule for implementing an intervention. For example, the length of baseline measures for participants may differ across the group

	before an intervention is applied; this allows a clearer demonstration (AB designs) of whether a change in behaviour corresponds to the introduction of an intervention or treatment
NAPC	National Autism Plan for Children
NAS	National Autistic Society
NCSE	National Council for Special Education [Ireland]
NHS	National Health Service
NIASA	National Initiative in Autism: Screening and Assessment
PDD	Pervasive developmental disorder
PDD-NOS	Pervasive developmental disorder – not otherwise specified
Picture Exchange Communication System (PECS)	An established educational approach developed by Bondy and Frost (1994) that uses behavioural principles (such as prompting and reinforcement) to teach spontaneous communication skills using, objects, symbols or pictures.
Portage	A programme operated by some local authorities whereby advice and support is given to parents and pre-school children with special educational needs
Primary School	Also known as elementary or junior school
Secondary School	Also known as second Level, post primary or high school
SEN	Special educational needs
SENCO	Special educational needs co-ordinator
SENO	Special educational needs organisers [Ireland]
SIGN	Scottish Intercollegiate Guidelines Network

SLD	Severe learning disability
SNA	Special needs assistant
Special schools	Special schools cater specifically for the needs of children and young people with disabilities and/or special educational needs, including ASD. Many pupils with disabilities or SEN also attend mainstream schools.
TA	Teaching assistant
TD	Typically developing (without an ASD or other disability or SEN)
TEACCH	Treatment and Education of Autistic and related Communication-handicapped Children – a service, training and research programme for people of all ages with ASD. Founded in the 1970s by Eric Schopler, and still administered through the University of North Carolina at Chapel Hill (USA), the TEACCH approach to educational intervention uses "structured teaching" which includes the use of visual supports to sequence and support daily activities; appropriately structured physical environments and individualised plans for each child and their family.
ToM	Theory of Mind – broadly, a cognitive theory of autism which posits that the social difficulties experienced in autism can, at least in part, be explained by impairments in understanding that other people have thoughts or beliefs that may be different to our own, and that these thoughts and beliefs guide and explain behaviour.
UK	United Kingdom
VABS	Vineland Adaptive Behavior Scales [Sparrow et al 1990]

Introduction

The detailed and wide-ranging Report of the Task Force on Autism (Department of Education and Science, 2001) embodied key policies and practices on the educational provision of children with autistic spectrum disorders in Ireland. Since then, policy developments here have advanced considerably through the enactment of the Education for Persons with Special Educational Needs (EPSEN) Act (2004), the new provisions of the Disability Act 2005 and the formal establishment of the National Council for Special Education (NCSE) in 2005. Other factors in the context of educational provision for children with ASD include the involvement of the courts in debating and affirming whether the State has fulfilled its duty to provide an appropriate level and quality of education for children with ASD. The impetus for this has come largely from parents who have gone to court seeking a particular type of educational provision for their children with ASD. Partly because of these actions, educational provision for children and young people with ASD in Ireland has been the focus of persistent scrutiny and public debate.

Thus it is timely to consider the specific needs and experiences of these children and young people and examine recent evidence on best practice in educational provision. This literature review is intended to update knowledge in this area since the publication of the Report of the Task Force on Autism in 2001 and so focuses on published articles and reports dated 2002-08 only.

Background

Educational provision in Ireland: Current policy on the education of students with special needs in Ireland recognises the importance of a continuum of support and provision. Consequently, a range of services exists to meet the varying needs of children and young people across the autism spectrum. Numbers of children on the autism spectrum attending mainstream provision in Ireland have increased (2,571 in 2008-09 compared with 1,675 in 2006-07). At the same time, expansion has been rapid in the number of schools offering autism-specific classes – up from 87 classes in 2001 to 339 classes in 2008 (DES

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2001, 2008[1]). Since 2001, there has also been the appearance for the first time of autism specific classes in mainstream post primary schools (from 0 in 2001 to 36 in 2008). Overall, this suggests that more schools across the range of provision are enrolling children with ASD, and addressing their needs is increasingly being approached through "specialist" support (in autism-specific classes). This also includes pilot projects, extended school year (July provision) and the home tuition scheme offered by the Department of Education and Science. Compared with 2001, there are also more opportunities to acquire recognised qualifications in teaching pupils with ASD.

Research on educational provision/interventions: Definitions of subgroups within the autism spectrum are changing and widening so earlier research may not inform us of the current population of children. In other words, it may not be possible or appropriate to apply the reported effects of earlier research to children and young people being diagnosed now. The focus of the present review on literature dated 2002-08 ensures that only the most up-to-date evidence informs our recommendations, along with expert views drawn from recent best practice guidelines and policy documents.

Methodology

Two main "strands" of searching were implemented: First, systematic searching of electronic databases focusing on empirical studies (empirical strand) and second, collating articles, reports, reviews and guidance based on expert opinion/professional experience (in addition to or instead of empirical evidence – expert strand). Inclusion and exclusion criteria and search terms were systematically applied to bibliographic databases in the empirical strand and supplemented with "handsearching" of key journals. This identified 499 articles for possible inclusion. After applying the inclusion/exclusion criteria, 100 empirical papers were retained for review. For the expert strand, key selected reports or policy guidelines from the UK and Ireland only were included given their likely greater similarity in relation to educational provision and systems. In addition, literature relating to

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[1]DES (2001). *The Report of the Task Force on Autism: Educational Provision and Support for Persons with Autistic Spectrum Disorders*, Dublin: The Stationery Office.

DES (2008): Figures supplied by email by Special Education Section of the Department of Education and Science (DES), September 28th 2008.

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post-compulsory and continuing education (for adults) included non-peer-reviewed, practice-based articles, as well as recommendations for practice from reports with an evidence base, as there was little empirical research found for this age group.

Main findings

Since 2001, many research papers, guidelines and reports published have updated our knowledge base on whether, and how, particular interventions may benefit children with ASD. However, in the present review of research articles, plus key selected policy and expert guidelines, it is clear that many gaps remain in knowledge of the methods and interventions that demonstrate "best outcomes" for the person. It is notable that out of 100 empirical articles included, only 12 were rated as offering a high weight of evidence for this review. This underscores the difficulties in carrying out robust, meaningful and ethically appropriate research in the real-world contexts of children and families' lives, at home and beyond.

The rapid expansion of autism-specific provision in Ireland since 2001 is notable but, as with specialist provision in other countries, available evidence on its effectiveness is limited. The expansion of specialist provision is a response to the Report of the Task Force on Autism (DES, 2001), which recommended "a flexible continuum of educational options for pupils with ASD" (p360) and "appropriate opportunities for meaningful integration/inclusion" (p358). Special classes for pupils with ASD in particular continue to be established where the National Council for Special Education (NCSE) considers there is a need for specific and targeted support, reduced pupil-teacher ratios and to facilitate inclusion with peers. The ongoing evaluation of educational provision for all pupils is the responsibility of the Inspectorate under the Education Act (Ireland, 1998). While a formal evaluation of educational provision for children with ASD was carried out by the DES Inspectorate (DES, 2006), there is very little independent research in Ireland, the UK or beyond, on how special classes for pupils with ASD operate and their influence on individual pupil outcomes.

There was a dominance of research focusing on early intervention and behaviourally-based teaching approaches for children with autism. Of the 100 articles in the empirical

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strand, 49 per cent involved children of pre-school age and a further 33 per cent, children of primary school age (82 per cent focusing on younger children). This reflects the importance of early intervention for children with ASD coupled with the fact that children are diagnosed at a younger age and so enter intervention programmes much earlier. However, a corollary of this important focus is that the educational needs of older children tend to be relatively neglected, a concern that needs to be urgently addressed. Only 10 per cent of articles focused on the needs of post primary-aged children and young people. The research base for post-compulsory education is weaker still, with the needs of adults largely ignored within the literature (only 8 per cent).

Kasari (2002)[2] notes the importance of conducting comparison studies of different interventions to judge whether one type of approach or "treatment" is more efficacious than another, and for whom this is the case. In reviewing the recent research, there is insufficiently strong evidence to promote a specific type of intervention or approach for all children and families. Most comparisons of interventions include early intensive behavioural (IB) programmes. However, the studies that have robustly explored the comparative benefits of intensive behavioural interventions with other approaches report, on balance, mixed findings on the superiority of any one approach. These findings, along with the consensus view from the expert strand and policy documents, indicate that a range of interventions (eclectic provision) should continue to be funded and provided for families.

Given the lack of robust, empirical evidence in many areas of practice and provision, the views of experts (including parents) remain a vital source of information and guidance. This comes across strongly in the evidence reviewed for the expert strand where agreement was substantial across many key themes, not least the importance of statutory agencies working together to achieve the best outcomes for children, young people and adults with ASD and their families. The findings on multi-agency working in the expert strand are key in this respect. They highlight the need for clearly identified personnel responsible for linking in with other agencies to provide an essential "seamless" service to children and families. There is a notable lack of empirical evidence, however, to inform practice and

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[2] Kasari, C (2002). Assessing Change in Early Intervention Programmes for Children with Autism. *Journal of Autism and Developmental Disorders,* 32(5), 447-61.

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policy on how this can best be achieved (such evidence is more abundant beyond the field of educational provision for children with ASD – which was outside the scope of the present review).

Conclusion

Children and adults with ASD are not a homogeneous group with the same or similar needs. They are individuals and members of families and, as such, decisions on their education should be made with reference to their individual needs and preferences, while also taking into account the views of parents, practitioners and providers. Given the diversity of needs on the autism spectrum, one type of approach or intervention is unlikely to be effective for all. Consequently, a range of provision should be maintained so there is a better chance of being able to provide appropriately for this diversity of need. More research is required to establish the effectiveness of interventions and types of provision as well as the value and relevance of these in everyday contexts including the home, school and beyond.

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Recommendations

Key recommendations arising from empirical and expert strands

1. Evidence-based practice:

Further evidence is needed on the impact of specific educational settings and interventions across a range of ages and sub-groups within the autism spectrum.

2. ASD provision and pedagogy:

There is currently no evidence that a single intervention or solution will meet the needs of all learners with ASD, so a range of options (types of educational setting and interventions) should be available and chosen to fit the profile of the child or young person.

3. Training:

Training needs to be evaluated to establish what influence this has on practice and on outcomes for individuals with ASD. There is also a need to develop training pathways.

4. Working with families:

Parent/carer training should be regarded as a priority and mechanisms put in place to ascertain their needs and to make high quality training accessible to all.

5. Multi-agency approach:

Multi-agency responsibilities and protocols need to be formalised to ensure that services from education, social care, and health and support from the voluntary and independent sectors are well co-ordinated. Children and families should receive a "seamless service" where all those involved work effectively together and families are not abandoned when a service ends.

6. The autistic voice:

Children and adults with ASD are the main client and guidelines should be developed to ensure their views are sought and taken into account in everyday practice in schools and in decision making.

7. Transition planning and further and higher education:

Transition, between and within settings, should be recognised as a source of extreme stress and vulnerability for the individual and for their family. Detailed planning is required

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to prepare the child or young person for these transitions and to pass on key information and strategies from existing staff and parents to new staff.

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1.1 Introduction

The detailed and wide-ranging Report of the Task Force on Autism (Department of Education and Science, 2001) embodied key policies and practices on educational provision for children with autistic spectrum disorders (ASD) in Ireland. These recommendations included the importance of having a range of services for children and young people with ASD, priority of enrolment in mainstream schools, close partnerships with parents, multi-disciplinary and co-operative approaches between agencies and services, adequate training for all relevant staff and effective procedures for monitoring and evaluating the effectiveness of provision.

Since then, policy developments in Ireland have moved forward considerably through the enactment of the Education for Persons with Special Educational Needs (EPSEN) Act (2004) and the formal establishment of the National Council for Special Education in 2005. The new provisions of the Disability Act 2005 are also key in this context, most notably, Part 2, which deals with children aged 0 to five years. Thus, EPSEN and the Disability Act, when implemented in tandem provide a structured legislative framework in which the needs of children with disabilities or special education needs can be adequately assessed, supported and monitored across all levels of education (including early, third level and continuing education).

Other factors in the context of educational provision for children with ASD include the involvement of the courts in debating and affirming whether the State has fulfilled its duty to provide an appropriate level and quality of education for children with ASD. The impetus for court involvement has come largely from parents who in many cases have sought recourse through the courts for a particular type of educational provision (applied behavioural analysis [ABA] intervention programmes) for their children with ASD. Partly because of these actions by parents, the educational provision for children and young people with ASD in Ireland has been the focus of persistent scrutiny and public debate. Notably, in a landmark decision on the educational provision for students with ASD in Ireland, Mr Justice Michael Peart concluded (May 16th 2007) that the "eclectic" programme of education being provided by the State was "appropriate autism-specific educational provision" for a young boy with autism and declined to request the State to fund an

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ongoing ABA programme *(SOC v The Minister for Education and Science, The Minister for Health and Children, The Health Service Executive, Ireland and the Attorney General).*

Thus it is timely to consider the specific needs and experiences of people with ASD within the new legislative context and to examine recent evidence on best practice in educational provision. The Report of the Task Force (2001) noted the paucity (at the time) of empirically validated studies to support positive outcomes for people with ASD and "Information on a variety of empirically validated methodologies should be available and the relative value of different options should be explored from the professional and parental perspectives before making decisions on educational placement" (section 4.12, recommendation 10). In other words empirical evidence, along with expert views, is essential in deciding educational provision. This assumption underpins our review and is our main guiding principle.

This review is intended to update knowledge of best practice in educational provision for children and young people with ASD since the publication of the task force report in 2001. We focus only on the evidence/guidance published during 2002-08. Before turning to this, we summarise the map of educational provision along with recent key influences on policy and provision to set the literature review in the Irish context.

1.2 Educational provision for students with autistic spectrum disorders (ASD) in Ireland

Policy on the education of special needs students in Ireland recognises the importance of a continuum of support and provision. Consequently, a range of services exists to meet the varying needs of children and young people across the autism spectrum. There are no reliable studies on the prevalence of ASD here but the Task Force on Autism, given local and international studies, recommended that "as an initial target, provision be made for services for at least 20 per 10,000 with Autistic Disorder and for 36 per 10,000 with Asperger's Syndrome" (Department of Education and Science, 2001; p30). The National Council for Special Education in its implementation report (NCSE, 2006b) adopted this as its prevalence rate – equivalent to 0.56 per cent of the general population. Based on this evidence, expert estimates of prevalence rates and the 2002 census of population, the

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estimated number of Irish children aged 0 to 18 years with ASD would total 6,026 (NCSE, 2006b).

The number of children or adults within the autistic spectrum is hard to establish accurately in a given geographical area as many people are involved in the process and the reliability of methods to diagnose the conditions as well as professional expertise vary. The numbers diagnosed will depend on the expertise of those involved, the diagnostic assessment tools and procedures used. To enhance and standardise diagnostic practice across education and health trusts in the field of ASD in the UK, two major sets of guidance have been produced (see NIASA, 2003; SIGN, 2007).

Systematic, epidemiological studies have been conducted to establish ASD prevalence rates. In a Medical Research Council review in 2001, it was concluded that for children aged under eight, the rate was thought to be 60 children with an ASD per 10,000. This is very similar to the rate of 58 per 10,000 suggested within the NCSE's implementation report in 2006(b). A study in England, by Baird et al (2006), which looked at an entire population in the South Thames region, found a higher rate of 100 per 10,000, suggesting that perhaps one in 100 children have an ASD. It is known that the numbers being diagnosed is rising – largely as a result of increased awareness and the growth in specialist posts and assessment teams. It is also known that the expertise and experience of ASD of professionals working in different parts of the UK vary and thus so does the proportion of children diagnosed. It is likely that this is also true in Ireland and the numbers of children and adults diagnosed with an ASD here will vary from one geographical area to another.

1.2.1 Mainstream provision

Some students with ASD are educated in ordinary classes in mainstream primary and post primary schools (see Table 1.1 for figures) with the support of a learning support/resource teacher and in many cases, a special needs assistant. ASD is classified as a low incidence disability (Department of Education and Science and Science, 2005) and thus attracts discrete funding and individual support. A maximum weekly allocation of five hours' teaching support from a resource teacher may be made to schools for each student assessed with ASD. While these allocations are sanctioned on the basis of individual

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applications, the Department (2005) recommends that resources should be deployed in the manner that best meets the needs of the pupils with special educational needs. SNAs are recruited specifically to assist in the care of pupils with disabilities in an educational context. They may be appointed to special schools or mainstream schools to help make suitable provision for a pupil or pupils with special care needs arising from a disability (Department of Education and Science, 2002). Principals may deploy individual assistants to support several pupils with special needs. This may involve SNA deployment in non-teaching duties in more than one classroom (DES, 2005).

Table 1.1: Numbers of students with ASD who are enrolled in mainstream and special schools: non-autism-specific provision (figures supplied by the NCSE, 2008)

	MAINSTREAM PRIMARY SCHOOLS	MAINSTREAM POST PRIMARY SCHOOLS	SPECIAL SCHOOLS	TOTAL STUDENTS
2006-07	1,327 (71%)	348 (19%)	193 (10%)	1,868
2007-08	1,749 (68.5%)	548 (21.5%)	251 (10%)	2,548
2008-09	1,904 (70%)	667 (24%)	170 (6%)	2,741

From Table 1.1, a 4 per cent decrease is noted over the past three years in the proportion of pupils with ASD attending special schools, a 1 per cent fall in those attending mainstream primary schools and a 5 per cent rise in those identified in mainstream post primary schools. It seems more children are attending non-autism-specific provision than in 2006-07.

1.2.2 Specialist provision

Autism-specific provision includes special classes in special and mainstream schools, special schools for students with ASD and home tuition. These typically consist of six children and employ one teacher and two assistants. The Department of Education and Science reminded schools in an earlier circular (1999) that arrangements must be made for the appropriate integration into mainstream classes of children with special education needs attending special classes, according to their level of needs and attainments. Special schools for students with ASD are designated as primary schools but may enrol students

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aged four to 18. In addition to State schooling, educational centres operating applied behavioural analysis programmes and funded by the Department on a pilot basis, are available to children with ASD. These differ from schools in that such approaches are exclusively or largely implemented. According to data supplied in personal communication from the Department (May 6th 2009) there are 13 applied behaviour analysis centres in Ireland with 246 pupils (pupil age was not stated). Notably, this pilot scheme will not be expanded. The Department states:

> …[the] ABA pilot scheme was established in the absence of this network of special classes in our schools. Now that a national network of special classes catering specifically for children with autism is available in schools, new centres will not be brought into the pilot programme. (Department of Education and Science, in email communication with St Patrick's College, May 6th 2009)

In addition, existing applied behaviour analysis centres in the pilot scheme may have to attain special school status, subject to the demonstration of appropriate standards and conditions:

> The Department is committed to the current programme for Government to long-term funding for the centres … in the ABA pilot scheme subject to agreement with the Department on standards that will enable them to be supported as primary schools for children with autism. Agreements have been reached on the core conditions to enable the centres to be recognised as special schools for children with autism and discussion are ongoing in relation to existing contractual arrangements' (Department of Education and Science, in email communication with St Patrick's College, May 6th 2009)

Home-based programmes, under the Department funded home tuition scheme (2008), provide a "compensatory educational service" to children with a significant medical condition, children with special education needs waiting for appropriate educational

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placement and pre-school children with ASD. In 2007-08, about 500 children[3] with ASD received home tuition through this scheme. Those entitled to apply must be aged 2½ to five years and be assessed under the Disability Act by the Health Service Executive (HSE) as having an ASD requiring early educational intervention. Home tuition is for educational intervention only and may not be used for therapeutic supports such as speech and language therapy, occupational therapy or psychological services. These are a matter for the HSE.

Allocation of home tuition for children with ASD is limited to children with no school-based early intervention class available. The allocation for children with ASD up to aged three is 10 hours tuition per week. This increases to 20 hours a week once the child reaches three provided that s/he is not enrolled in an early intervention class. Home tuition ceases the summer following a child's fifth birthday, or earlier where a place in an ASD class is available. The home tuition provider should be a qualified teacher but if this is not possible, alternative qualifications are acceptable.

In Ireland, schools traditionally close for summer holidays during July and August. The July education programme is a Department funded arrangement for schools to provide further special needs education for children with autism and children with severe and profound general learning difficulties during July. Special schools and mainstream primary schools with special classes for children with autism may choose to extend their education services through this holiday month. Department funding also covers transport and escort services for the children. If schools are not participating in this programme, home tuition is offered as an alternative for those who qualify for additional support.

The scheme was provided originally for pupils with severe and profound general learning disabilities and was subsequently extended to children with ASD. More recently, post primary schools with special classes for ASD and individual children with autism in primary and post primary schools have implemented the scheme. If a school provides education

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[3] Note that this figure is for 2007-08; separate figures for 2007 and 2008 were not available. This means there could be double counting in some specialist provision categories as some of the 2007 children could be in an early intervention setting by 2008 or in school. Alternatively, there could be more than 500 children in early intervention settings by 2008.

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during July, it gets an additional grant and the principal, teachers and special needs assistants receive extra salary payments. Data from the Department (2008) indicated that 78 schools participated in the July provision in 2007, an increase from 21 schools in 2001. Numbers receiving home-based July provision also increased significantly in this period from 116 in 2002 to 1650 in 2007.

1.2.3 Growth in specialist educational provision for students with ASD

Recent data (Department of Education and Science, 2008; NCSE, 2008) indicates a growth in autism-specific provision (Figure 1.1) across all settings. Compared to 2001 figures, when the Report of the Task Force on Autism was published (Department of Education and Science, 2001), there are now 23 early intervention settings (three in 2001); 106 mainstream primary schools with special classes for students with ASD (23 in 2001); 45 special schools with special classes (25 in 2001); and 11 ABA centres (three in 2001). Of particular significance is the number of mainstream post primary (second level) schools which now have special classes for students with ASD (33 compared to 0 in 2001). It is notable that this type of autism-specific provision was unavailable in post primary schools in 2001 but the increase could, at least in part, reflect a response to a key recommendation of the Task Force report (there should be a "flexible continuum of educational options for pupils with ASDs at second level" p196; Recommendation No 10).

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Figure 1.1: Growth in autism-specific provision for pupils with ASD 2001-08 (Department of Education and Science, 2008)
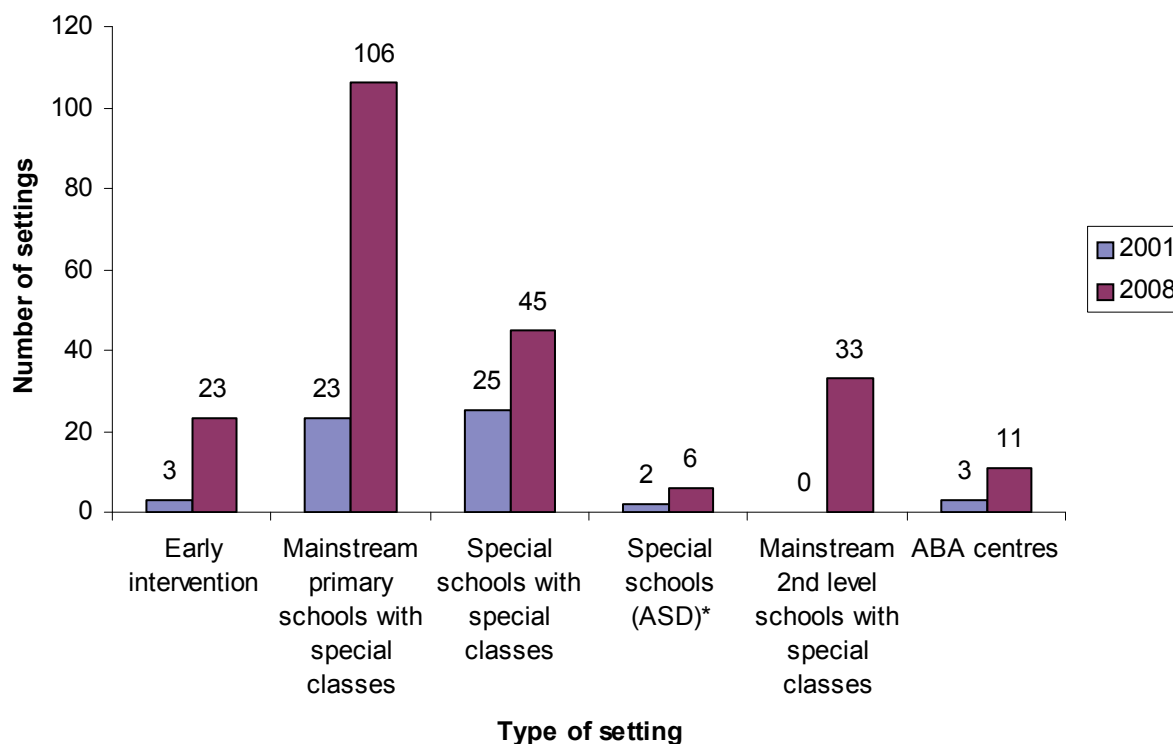
* In the Department of Education and Science database, the six special schools for students with ASD are also listed and counted in the special schools with special classes for students with ASD. In other words, they are counted twice. Note that the 2008 figure for ABA centres (11) is slightly lower than the 2009 figure (13) stated by the Department in recent personal communication (May 2009).

More specifically, the growth in the numbers of special classes for pupils with ASD since the Report of the Task Force on Autism (2001) is presented in Table 1.2. It is clear there has been a rapid expansion of classes set up specifically for pupils with an ASD, with a fivefold increase in mainstream primary schools, a doubling of specific classes in special schools and the appearance for the first time of autism-specific classes in mainstream post primary schools.

The expansion of the special class model is a response to the Report of the Task Force on Autism (DES, 2001) which recommended that pupil/teacher ratios should remain small and responsive to individual needs and that there would be appropriate opportunities for meaningful integration/inclusion. The ongoing evaluation of educational provision for all pupils is the responsibility of the Inspectorate under the Education Act (Ireland, 1998).

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While a formal evaluation of educational provision for children with ASD carried out by the DES Inspectorate (DES, 2006) outlined positive features of practice in special classes and identified areas for development, there is a lack of independent research in Ireland to show This is true for similar provision in the UK. Specific provision has been set up in response to situations where parents and/or the staff of some mainstream schools believe they cannot meet the needs of some pupils with ASD. Research is needed to explore how these classes operate (the degree of inclusion with mainstream peers and the interventions used) and to assess the outcomes for these pupils. In addition, research is required to consider how mainstream schools might be enhanced and supported to meet the needs of these pupils.

It is clear that in Ireland (and in the UK), most pupils with ASD attend mainstream schools which do not have a special class or unit. Staff in those schools also need information and training on ASD. Notably, there is already a well-resourced support base available in Ireland from the Special Education Support Service, including many autism-specific training materials (see http://www.sess.ie/resources). Similarly, the Department for Children, Schools and Families in England has recently created a DVD and web-based resource on the autism spectrum for all mainstream primary and secondary schools and for students on initial teacher training programme, as part of its Inclusion Development Programme (see www.standards.dcsf.gov.uk/nationalstrategies).

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Table 1.2: Number of special classes for pupils with ASD in 2001 and 2008 (figures supplied by the Department of Education and Science 2008)

	Class type					
Year	Early intervention settings	In primary schools (for pupils with Asperger syndrome only)	In mainstream primary schools*	In mainstream post primary schools	In special schools (incl ASD special schools **)	Total number of classes
2001	3	3	34	0	47	**87**
2008	35	5	162	36	101	**339**

* Note that these figures related to classes rather than schools, that is many schools will have more than one autism-specific class. This is why the figure for autism-specific classes in mainstream primary school (n=162 in 2008) differs from the total number of mainstream primary schools with autism-specific classes, as noted above (n=106 in 2008). ** This figure does not include ABA centres.

Figures relating to the actual numbers of children being educated across all types of provision in Ireland were not available. However, an estimated figure can be derived from the basis of there being six children per autism-specific class and multiplying this by the total number of classes in 2008, which comes to 2,034 children in autism-specialist classes. In addition to this, there are 2,741 children in non-autism-specific settings (see Table 1.1) plus 500 getting home tuition (see section 1.2.2), and 246 enrolled in applied behavioural analysis centres, making an overall estimate of 5,521 children in educational settings. The number was estimated at 6,026 in the NCSE implementation report (NCSE, 2006b), based on an age-span of 0-18 years. Thus the difference in total figures (n=505) could be accounted for (at least in part) by very young, recently diagnosed children who have not yet entered any formal system of tuition or education. Also, as noted in section 1.2, prevalence estimates can vary due to several factors. Overall, the estimated figure from the implementation report (NCSE, 2006b) appears to be appropriate, given the known (and estimated) numbers of children currently, and likely to be, accessing educational provision.

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1.3 Legislation

1.3.1 Education for Persons with Special Educational Needs Act 2004

The Education for Persons with Special Educational Needs Act (EPSEN) (2004) concerns provision for children aged 0 to 18 years. The definition of special educational needs, according to the Act, means a "restriction in the capacity of the person to participate in and benefit from education on account of an enduring physical, sensory, mental health or learning disability, or any condition which results in a person learning differently from a person without that condition" (Section 1[1]). The EPSEN Act fits into an existing legislative framework which includes the Education Act, 1998, the Education (Welfare) Act, 2000, the Equal Status Act, 2000-04 and the more recent Disability Act, 2005 under the overall umbrella of the Constitution and various international agreements and human rights provisions (NCSE, 2006b). The EPSEN Act makes specific provisions for the education of children with special educational needs:

1. Children with special educational needs shall, wherever possible, be educated in an *inclusive environment* with those who do not have such needs, unless inconsistent with the best interests of the child or with effective provision of education for peers.
2. People with special educational needs have the same right to avail of, and benefit from, *an appropriate education* as do their peers who do not have such needs; and to leave school with the skills necessary to participate, to the level of their capacity, in an inclusive way in the social and economic activities of society; and to live independent and fulfilled lives.
3. Parents should have a greater involvement in the education of their children with such needs.

To fulfil the obligations of the Act, the National Council for Special Education was formally set up in 2005 and its functions outlined in the Act. The NCSE prepared an implementation plan in 2006 (NCSE 2006b) setting out its estimate of the resources needed for implementing the Act, a proposed timetable and suggestions on how special educational needs could be met pending full implementation. Special educational needs organisers (SENOs) were appointed by the NCSE to perform the functions expressed by EPSEN. Specifically, the SENOs have responsibility for resource allocation functions such

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as applications for additional teaching and special needs assistant support for children with special educational needs from all schools. They are currently issuing decisions and explaining the reasoning behind these to schools directly.It was envisaged that all sections of the EPSEN Act would be implemented over a five-year timeframe that began October 1st 2005. (Although see below for an update on this position).

This Act has several implications for children with special educational needs and children and young people with ASD, as follows:

1. An assessment to determine if a special educational need exists; this assessment "shall include an evaluation and statement of the nature and extent of the child's disability... and an evaluation and statement of the services which the child will need so as to participate in and benefit from education and generally, to develop his or her potential" (EPSEN, 2004, Section 4(6). The Act outlines how assessments will be carried out, educational resources available and provisions for appeals.

2. A *timely* assessment that shall commence not later than one month after the principal has reached an opinion that the child is not benefiting from the school's educational programme. The assessment shall be completed not later than three months after the principal has reached that opinion. In the case of a child who is not a student, the relevant health board shall provide the services identified in the assessment as necessary to enable him/her to participate in and benefit from education.

3. An individual education plan (IEP) if the assessment establishes that the child has special educational needs. This shall be prepared within one month from receipt of the assessment. When preparing or reviewing the IEP, the principal or the special education needs organiser considers the provision to assist the student "to continue his or her education or training on becoming an adult" (Section, 15.1). In the case of the child who is a student, the NCSE shall ensure that the services identified in the IEP are provided so s/he can participate in and benefit from education.

4. A right to appeal decisions on educational provision pursuant to the EPSEN act 2004.

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In addition, the Act emphasises the importance of:

1. The co-ordination of health and education in the planning and delivery of services.
2. Transition periods from one setting to another.
3. All professionals and others working with children and young people with ASD being clear on the legislative requirements on the IEP process.

The Implementation Report on the EPSEN Act (NCSE, 2006b), which was submitted to the Minister for Education and Science in October 2006, identifies policy issues to be addressed and actions to be taken to ensure the Act is fully implemented. One such policy issue is that children with special educational needs will have "an enforceable right to an appropriate education in an inclusive setting" (p12). Actions that need to be taken include whole-school planning and delivery of inclusive education, effective teaching of children with special educational needs in inclusive settings; engagement with parents; SNAs to facilitate participation of such pupils; assistive technology and transport arrangements; and evaluation of progress and outcomes for them. A particular challenge for the Act's implementation will be the increase in the number of children designated with special educational needs, according to the broader definition of this term employed in the legislation.

A recent circular from the Department of Education and Science (2007) to primary schools provided an update on the current status of the EPSEN Act (2004) and the Disability Act (2005). The circular clarified that some sections of the Act had already commenced and the remainder to be implemented related mainly to the statutory assessment and individual education plan process. It was envisaged in this circular that all sections of the Act would be implemented over a five-year timeframe that began October 1st 2005. However, in the recent budget (October, 2008) a decision was made to defer implementation. The implementation of the sections of the Act relating mainly to statutory assessment and individual education plans (IEPs) will now be delayed indefinitely. The NCSE must now take important decisions on allocation of future resources for children and young people with special educational needs within policy parameters laid down by the Department of Education and Science, in order to provide an "appropriate" and "inclusive" education.

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1.3.2 Disability Act 2005

The Disability Act 2005 provides a legal framework for the provision of health and education assessment and services to persons with a disability to support them in their school, social, community and home settings. It is part of the National Disability Strategy launched in September 2004. The term "disability" in the Act is defined as "a substantial restriction in the capacity of the person to carry on a profession, business or occupation in the State or to participate in social or cultural life in the State by reason of an enduring physical, sensory, mental health or intellectual impairment". The Act defines "substantial restriction" as a restriction which "(a) is permanent or likely to be permanent, results in a significant difficulty in communication, learning or mobility or in significantly disordered cognitive processes, and (b) gives rise to the need for services to be provided continually to the person whether or not a child or, if a person is a child, to the need for services to be provided early in life to ameliorate the disability".

The Act provides for the assessment of health and education needs of persons with a disability, to enable government ministers to make available, "consistent with the resources available to them", services to meet those needs. These include preparation of plans and other services such as those provided by a public body which is available to or accessible by the public generally. There is also provision for appeals on non-provision of services. The Act enables "further and better provision" for their use by persons with disabilities of public buildings and employment in the public service to promote equality and social inclusion.

As for children and young people with ASD, the implications of the Disability Act include:

1. The right to apply for an assessment of disability, either by the person directly or a parent or other representative, which must begin within three months and be completed "without delay". "Assessment officers" will do this without regard to the cost of or capacity to provide any service identified in the assessment as being appropriate to meet the needs of the child.

2. A copy of the report must be given to the person assessed which must state whether or not the person has a disability, the health and education needs and the services considered appropriate to meet those needs. It must also specify the order

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and duration of the appropriate services and a statement of the period within which a review must be carried out.

3. Where an assessment identifies the need for an education service to the child who is enrolled in a school, the matter is referred to the principal of that school for the purposes of an assessment as a function of the NCSE under EPSEN (2004).

4. In addition to carrying out its functions under EPSEN, the NCSE also assists the Health Service Executive in assessing people over 18 years, the preparation of service statements (Section3(a)), consultation with the HSE and education service providers to facilitate provision of education services and assessment and review of the resources required for education provision for adults with disabilities.

5. There is also a section in the Disability Act on the requirement for public bodies, in so far as practicable, to take all reasonable measures to promote and support the employment of persons with disabilities (Section 47(1) (a)). Measures may include training or education of these persons for the purposes of qualifying them for specific posts or employment in the public body.

6. The co-operation and effective co-ordination of health and education is essential in the planning and delivery of services for children and young people with ASD in Ireland.

1.3.3 Sectoral Plan: Disability Act 2005

The Sectoral Plan for the Department of Health and Children and the Health Services (Department of Health and Children, 2006) is one of six sectoral plans for provision for persons with disabilities which are part of the National Disability Strategy launched in September 2004. Chapter 5 of this plan is of most relevance for this review as it sets out in detail the arrangements proposed for the implementation of Part 2 of the Disability Act 2005, which commenced for children under five years from June 1st 2007. Part 2 will be commenced in respect to children aged 5-18 in tandem with the implementation of the EPSEN Act (from October 2005). Part 2 provides a statutory entitlement to:

- An independent assessment of health and education needs.
- A statement of the services to be provided.
- The right to pursue a complaint through an independent redress mechanism if there is a failure to provide these entitlements.

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Arrangements for the implementation of Part 2 of the Disability Act cannot be considered in isolation from the arrangements for the EPSEN Act since the same health service staff, mainly in the areas of disability and mental health, will be called on to provide assessments and services under both Acts. However, the deferral of the EPSEN Act has implications for assessments and services for children with ASD. As explained in a circular from the DES (DES, 2007): "Section 8 of the Disability Act 2005 refers to the assessment of need process. Where an assessment officer (appointed by the Health Service Executive) carries out or arranges the carrying out of an assessment on a child and the assessment identifies the need for the provision of an education service to the child, he or she shall, in the case of a child enrolled in a school, refer the matter to the principal of that school for the purposes of an assessment under section 3 of the EPSEN Act and, in any other case, refer the matter to the NCSE for the purposes of an assessment under section 4 of the EPSEN Act." As EPSEN has been deferred, sections 3 and 4 will not commence. Therefore, "the principal and the NCSE are not statutorily required to carry out an assessment" (DES, 2007). It is stated in the circular that schools should continue to support children with special educational needs through the existing mechanisms.

Importantly, however, the responsibility for deciding on educational supports and services for individual children and schools rests with the NCSE, within policy parameters laid down by the Department of Education and Science. While health staff assess and provide services in health and care needs of children and young people, they have no responsibility for the allocation of educational resources or supports. In short then, the intention is for the EPSEN and Disability Acts to work together to provide a comprehensive legal framework for the provision of education, health and other services to children with a disability to support them in their school, social, community and home settings.

1.4 Teacher education

The Task Force on Autism (Department of Education and Science 2001) recommended ASD specific teacher education at pre-service and in-service levels and this has improved considerably. Teacher education in Ireland on ASD is provided through three accredited courses for qualified teachers at primary and post primary levels, a range of shorter

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courses on specific teaching approaches and methodologies and brief input at pre-service level.

The Graduate Certificate in the Education of Pupils with ASD for teachers working in special schools, special classes or as resource teachers in mainstream primary and post primary schools (Department of Education and Science 2008a) is a distance learning course run by St Patrick's College, Drumcondra, Dublin since 2001. It is one-year, part-time from September 2008 to June 2009, and consists of three modules. Up to 18 places are available annually and the course is delivered through distance learning modes, on-site learning at the college and considers teachers' practical engagement with pupils in schools.

St Angela's College, Sligo, (a college of the National University of Ireland, Galway – NUIG), offers a post-graduate certificate/diploma in special educational needs (ASD) in collaboration with the Special Education Support Service (SESS) for teachers of pupils with ASD (Department of Education and Science, 2008c). It offered up to 25 places for its first year 2008-09. This post-graduate certificate (one year)/post-graduate diploma (two years) can be obtained over a maximum of two years. It requires 23 (certificate) to 44 (diploma) days release from school over the two years.

A combined post-graduate diploma programme of continuous professional development for teachers involved in learning support and special education is offered each year on a part-time basis in seven colleges/universities in Ireland (DES, 2008d). This course, which provides 300 places for teachers throughout the country, aims to provide substantial theoretical and practical continuous professional development for teachers working with pupils with special educational needs, including children with ASD.

Since 2007, St Patrick's College Special Education Department and the Institute of Child Education and Psychology, Europe (ICEP) have jointly offered an online certificate/diploma in education (special/inclusive education) to mainstream teachers at primary and post primary level (Department of Education and Science, 2008b). Up to 150 places were available in 2008-09 to be allocated equally through two intakes (September 2008 and

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January 2009). Its aim is to develop teachers' knowledge and skills in working with pupils with special and additional learning needs in mainstream classrooms. Its modular format uses a blend of online and distance learning technologies and pedagogies. On completion of the first module on inclusive education, participants choose from a range of modules, including autistic spectrum disorders and challenging behaviour.

The Special Education Support Service, created by the In-Career Development Unit of the Department of Education and Science in September 2003, also develops and delivers professional development initiatives for teachers of students with ASD. It offers professional development and support for school personnel working with students with special education needs in a variety of settings including mainstream primary, post primary, special schools and special classes. Professional development and support in identified areas is provided through the development of expert teams of selected teachers (associate members). Currently, such a team is operating in ASD. The Special Education Support Service, in partnership with the Institute of Child Education and Psychology, part-funds teachers seeking online training. At present, courses on eight topics covering students with special needs, including ASD and applied behavioural analysis, are offered.

Finally, it is important to mention a new north-south initiative: the Middletown Centre for Autism, in Co Armagh, funded by the Department for Education (Northern Ireland) and the Department of Education and Science (Ireland) (DES, 2004). It aims to support the promotion of excellence in the development and co-ordination of education services to children and young people with ASD through:

- Training and advice.
- Research and information.
- Educational assessment.
- Learning support.

The centre hopes to achieve this through a multi-disciplinary approach in collaboration with local services. Its services were phased in during 2007, beginning with the training/advisory and information/research services. The educational assessment and learning support services are being developed and will become available following the

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completion of building works. However, the current economic climate in the Republic of Ireland has meant that all educational projects and programmes are being reviewed. At the time of writing, the funding required to expand the Middletown Centre to enable the capital project to proceed as planned cannot be provided by the government. This decision will be kept under review in light of changing financial circumstances.

1.5 Overall summary of educational context and policy in Ireland

There is a range of educational provision available for children and young people with ASD in Ireland. This reflects the policy on educational provision for pupils with special needs in Ireland, but provision for ASD also includes pilot projects, extended school year (July provision) and home tuition. A notable increase in autism-specific provision across all educational settings is evident, but particularly in special classes in mainstream schools. More opportunities exist for teachers to acquire recognised qualifications in teaching pupils with ASD. The Task Force Report (2001), court decisions, legislation and public debate relating to pedagogy for autism all provide important context for discussions about policy and practice in relation to educational provision for pupils with ASD. It is timely, therefore, to examine recent developments in the light of available evidence and make recommendations for future provision and practice of educational provision for pupils with ASD.

1.6 Research into educational interventions for children and young people with ASD

In addition to the policy and provision context in Ireland, it is important to set the context on research into educational interventions for children and young people with ASD. Here, we give a brief overview of relevant diagnostic categories and terminology and also highlight challenges involved in conducting research in this area.

1.6.1 Diagnostic categories and terminology

Autism spectrum disorder is an umbrella term introduced by Lorna Wing in 1996 (Wing, 1996) to encompass different subgroups within the autistic spectrum including autism and Asperger syndrome. The three main areas of difficulty which all people with autism share are known as the "triad of impairments" which are difficulties in three areas of

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development relating to social and emotional understanding, communication and flexibility of thinking and behaviour. The "spectrum" refers to the fact that while these are the core difficulties of ASD, each child or person diagnosed will experience them differently and may have varying degrees of associated learning disability. Asperger syndrome is sometimes referred to as a "high-functioning" form of autism because people with AS tend to have average, or above average IQ and tend not to exhibit early language delays. In addition, people with AS do not usually have an associated learning disability although they may have specific learning difficulties (e.g. dyslexia, dyspraxia).

The diagnostic category PDD-NOS (pervasive developmental disorder – not otherwise specified) is included and refers to children who share aspects of autism but do not show all the required features to meet the full criteria for a diagnosis of autism. The term atypical autism is synonymous with PDD-NOS. ASD can occur with any level of intellectual or learning disability and with other developmental, medical and mental health problems found in the general population (sensory impairment, cerebral palsy). Children with ASD are more likely than the general population to have epilepsy, hearing and visual problems, attention deficit hyperactivity disorder (ADHD) and to experience anxiety and depression. Evidence suggests they are more likely to have sleep problems and motor difficulties.

There is a growing consensus that the broad category of ASD (rather than using the subgroup terms of autism or Asperger syndrome for example) is the most appropriate for planning and delivering services to children affected (Department for Education and Skills: DfES, 2002; National Autism Plan for Children [NIASA], 2003). While the term ASD is useful, however, distinctions between sub-groups can be important as differences between individuals within these subgroups may have different implications for services. Those with a diagnosis of Asperger syndrome, for example, may be more at risk of mental health problems during adolescence. Debate and research into the distinctions between the subgroups within the autism spectrum continues and it is known that some children may not be placed within the correct subgroup at diagnosis. A detailed and thorough assessment of each child's educational needs is necessary and these needs should not be derived solely from a diagnostic category alone (DfES, 2002; NIASA, 2003).

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Debate in the UK in education authorities, schools and agencies considers whether to use the term ASD or autism spectrum condition (ASC), or simply autism spectrum. Some services have opted for the term ASC. Jordan (2007) discusses this and the need to balance a respect for the wishes of those on the spectrum who view autism as a different rather than disordered way of being, while not depriving some individuals of much-needed resources that may depend on the recognition of a disability. Recognising the tensions between using "condition" or "disorder" as part of the diagnostic label, the best solution might be to refer to children and adults on the autism spectrum. For this review, we recognise that ASD is the term used in the Irish context and so we use it throughout. It is important to acknowledge, however, that a wider debate exists on the appropriateness of this term.

1.6.2 Prevalence of ASD

As Jordan (2005; 2007) has pointed out, broadening the diagnostic category (from classical autism to ASD), to include a wider spectrum of ability and degree of autism, has led to an enormous growth in the numbers being "diagnosed" with an ASD. In addition, much greater awareness exists among professionals and more autism-specific posts and assessment teams which have led to improved identification and diagnosis. Prevalence figures are now close to one in 100 for the full spectrum (Baird et al, 2006).

A review of epidemiological studies by the Medical Research Council in 2001 suggested at least 60 per 10,000 children on the autism spectrum were under age eight, with 10 to 30 of these having more narrowly defined autism (MRC, 2001), which is close to the figure adopted by the NCSE implementation report in 2006. Baird et al in 2006, found an even greater number of children with ASD and suggest there might be as many as 100 per 10,000 (one in 100 children) with an ASD. Not all children with a diagnosis will need additional adult resources to support them in school or require a statement of special educational needs, but they are all likely to benefit from curriculum modifications and adjustments to the physical and sensory environment and staff and parents who understand ASD.

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1.6.3 Diversity of children and young people on the autism spectrum

A key difficulty in researching the effectiveness of interventions for those on the autism spectrum is the diversity within this population. Such children will vary in severity of their difficulties on the "triad of impairments", that is impairments in the domains of social behaviour and understanding, language and communication, and thought and behaviour. In addition, they will vary in intellectual ability, personality, sensory processing and family characteristics. This often leads to "spiky" or uneven developmental and cognitive profiles (Frith, 2003) which means that a high level of skill or functioning in one area (reading age; fluent speech) may not be matched by a similarly high level of competence in other areas. This highlights the importance of conducting a thorough assessment across all areas, taking information from parents and school staff into account, to determine the nature and level of a child's needs.

1.6.4 Educational interventions

Given the diversity within the spectrum and between individuals, other authors have concluded that no single educational intervention is likely to be appropriate and useful for all affected children, and there is no single intervention sufficient on its own to meet all the needs of a particular child with ASD (Jones and Jordan, 2008). Education needs to be individualised to allow for different needs and for different teaching goals at different times. Unlike most children who learn to apply and use skills across situations and contexts and can pick up skills incidentally, children with ASD often need to be taught skills explicitly and then taught to use these across situations.

Many children also receive more than one type of intervention simultaneously, although this is rarely reported in published research accounts. This makes it difficult to separate out the effects of a single element or type of approach and ignores the wider context in which learning opportunities take place. Many interventions also have several elements making it difficult to interpret the necessary "active ingredients" that lead to success.

Assessment of children on the autism spectrum is also complex and diagnostic information is often not independently confirmed or described. This can make it difficult to know if an intervention may, or may not, be useful for children with specific ability and/or diagnostic profiles. Diagnostic instruments have been developed with good levels of

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validity and reliability (such as the ADOS and the ADI-R; Lord et al, 1989; 1994, respectively), but their use also takes some time to filter through to wider research practice (it is worth noting here that many studies in the present review do not report independently verified diagnostic information for their participants).

Sample sizes also tend to be limited in many research studies as there is a relatively small population from which to recruit and the costs of research activity are high, particularly if long-term outcomes are being studied and comparison groups are included. Most though, examine relatively short-term gains with few studies including exploration of long-term outcomes. This often means the evidence on many approaches has limited generalisability to different age groups, contexts and children.

In addition, children with developmental disorders do improve over time and so design and outcome measures adopted by studies must be sufficiently sensitive and robust to control for maturation effects not attributable to the intervention. The difficulty is that many tend to follow AB designs (a baseline followed by an intervention) or an intervention only design, which cannot test for gains or progress specific to the intervention or in addition to natural maturation. This is because control or comparison groups or conditions are not included, which would enable researchers to judge whether the intervention led to any documented improvements. In the case of intervention-only designs, there is no starting point from which to judge progress and so it is not possible to know if gains are clinically significant.

Multiple baseline designs (where, for example, the start of the intervention is staggered across individual participants) are being used more frequently to overcome some limitations of AB or intervention-only designs. These offer more robust evidence in that they can (usually) temporally link improvements in skills or understanding with the onset of the intervention. Unfortunately, due to the procedural complexity that can be required to implement multiple baseline procedures, the number of participants tends to be small which, in turn, limits wider generalisability of the findings. Therefore, studies with larger sample sizes and more robust methodologies are rare in the field generally, and this is reflected in the literature included for this review.

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Independence in the evaluation may also be difficult to achieve as, very often, evaluations are carried out by personnel involved in delivering particular training programmes and/or who are strong proponents of a particular approach. In addition, these may be the same people who support parents over time and with whom they build relationships. Consequently, when parents are asked to evaluate programmes there may be an, albeit unintentional, vested interest in giving positive ratings. Thus studies with robust methodologies usually take independent, external observations or measures of the child's progress so that direct benefits can be assessed aside from the general benefits of receiving attention/support of any kind.

It is also important to remember that autism is pervasive and affects many areas of understanding and functioning. This makes the challenge to researchers even more profound. Other research in education or psychology tends to focus on a specific area (reading skills; anxiety reduction; self esteem), but within the field of autism, studies often focus on multiple domains and this can dilute the ability to develop and build on a coherent and clearly defined knowledge base.

Finally, as highlighted by the Task Force on Autism and reiterated in section 1.1, research evidence is only one source of information that a professional or parent might use to decide on how to work with a child. Practical knowledge of the individual and his/her response to previous interventions, ideas from current theories, previous experience with others and current social and cultural values, are important and will all contribute to the decisions made (Prizant and Rubin, 1999). Expert opinion is another source of guidance. Many recommendations in the literature are based on what appears to make good sense, by those experienced in the field, rather than on empirical evidence. For example, of the 28 recommendations from a working party convened to investigate practice in ASD in relation to diagnosis and assessment, 25 were based purely on "the expert Working Group advice" (NIASA, 2003, p9) and not on research findings. This was also the case in the Department for Education and Skills (DfES) Good Practice Guidance on ASD (DfES, 2002). We, therefore, draw on these sources of information, as well as empirical research evidence, to inform the recommendations for this report.

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1.7 Overall summary of research into educational interventions for children and young people with ASD

Definitions of the subgroups within the autism spectrum are changing and widening so earlier research may not inform us of the current population of children. In other words, it may not be possible or appropriate to apply the reported effects of earlier research to children and young people diagnosed now. This review of literature (2002-08) ensures that only the most up-to-date evidence informs the recommendations of this report, along with expert views drawn from recent best practice guidelines and policy documents. Educational intervention research for children on the autism spectrum is often limited by small samples, lack of objectivity and methodological design flaws. In part, these reflect of the difficulties in conducting "real world" research that also seeks to be robust, independent and replicable. All of the research included in this review contributes to knowledge, but not all of it provides a "high" weight of evidence. So the recommendations are based on accumulations of evidence from the empirical and expert strands. This highlights the basis for the recommendations as well as where the gaps in knowledge/evidence remain. They offer useful avenues for further research and review.

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2.1 Overview

As the Introduction notes, it was important to ensure a range of evidence was considered for this review to make it systematic and robust enough to provide a synthesis of empirically informed research, while remaining sensitive to publications based on expert opinion. Consequently, we implemented two main strands of searching: First, systematic searching of electronic databases focusing on empirical studies (empirical strand) and second, collating articles, reports, reviews and guidance based on expert opinion/professional experience (in addition to, alongside, or instead of empirical evidence) (expert strand). The terms "empirical" and "expert" will be used hereinafter to refer to the procedures and results from these two strands. This overall search process is summarised in Figure 2.1.

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Fig 2.1: Search strategies for the expert and empirical strands of the literature review

Expert Strand	Empirical Strand

Papers/documents drawn from known sources, relevant websites and practitioner journals

One-stage screening: papers identified in ways that allow immediate screening, for example "handsearching"

Two-stage screening: papers identified where there is not immediate screening (electronic databases)

Title and abstract screening (inclusion/exclusion criteria applied)

A second stage of selection to manage the size and scope of the review effectively; single case study papers excluded; review papers selectively included

Identification and acquisition of reports

Full document screening (duplicates removed)

Mapping of findings by keywords and description of main results/conclusions

Synthesis of main themes

Synthesis of main themes

Compare/discuss in the light of emerging findings from both strands

Recommendations and implications for practice and policy

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The NCSE tender document for this review explicitly requires a focus only on literature published since the publication of the Task Force Report (2001) and so the search was narrowed to publications during 2002-08 only. It is important to note that the tender document emphasises the importance of focusing on best practice in educational provision for persons with ASD *that demonstrate best outcomes for the person* (our emphasis). On the empirical strand we focused only on evidence that provided indications of individual or group outcomes for children with ASD. A summary of this review's four key tasks follows:

1. To provide a review of available international literature on educational provision for people with autistic spectrum disorders that demonstrates best outcomes for the person.

2. To identify the extent to which education and health services need to be co-ordinated to meet the needs of this cohort.

3. To draw on the findings, make recommendations on best provision for this cohort in Ireland to inform national policy that also considers the needs of educators.

4. To make proposals for the practical implementation of such recommendations in the context of the Irish education and health systems.

Given the considerable amount and range of published research and commentary on educational provision and approaches for children and young people with ASD, a method was needed to help identify key evidence of interest while at the same time keeping the review to a manageable size and scope (within the necessary time and resource constraints). The first step in this process was to define the terms carefully, thereby specifying the overall scope. Definitions of terms are summarised in Table 2.1.

2.2 Procedure: Empirical strand

The review's procedure is best described as "as systematic as possible" within the project's necessary time and resource constraints. We used, as a starting point, the excellent guidance from the Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre) at the Institute of Education, University of London; in particular the systematic review on inclusive practices for special educational needs by Rix, Hall, Nind, Sheehy and Wearmouth (2006).

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It was not possible to follow scrupulously the EPPI-Centre's full protocol. For example, we did not include a separate advisory group, nor apply independent quality assurance procedures more than once throughout the process (see section 2.2.3 for how this was applied). In addition, we did not grade all included papers according to weight of evidence criteria because it was not feasible for more than one member of the review team to read and assess all papers. Nevertheless, a few are flagged as offering a "high" weight of evidence (see section 2.2.4). All of these were read by at least two team members and the grading agreed.

2.2.1 Inclusion and exclusion criteria

These definitions were translated into lists of related search terms (see Appendix A1), agreed across all team members, to be applied systematically to electronic bibliographic databases. In addition, clear exclusion and inclusion criteria were specified for research articles identified under this strand (see Tables 2.2 and 2.3). Theses were automatically excluded from the review due to the time and resource constraints of accessing and reading these.

2.2.2 Bibliographic database searches

Five main databases were searched using "AND" and "OR" Boolean combinations across the sets of search terms (see Appendix A1 for further details). The databases were PsychInfo, ERIC, British Education Index (BREI), Australian Education Index (AUEI), and the ISI Web of Knowledge (covering the Social Science Citation Index – SSCI). These were chosen for their wide coverage of the research literature, their relevance to the topic area for the review and their powerful search engines enabling searches across sets of terms to be combined, thereby narrowing the list of possible articles for inclusion. Note that we attempted to run the search in other databases (Google Scholar, Education Online) but their search engines did not allow terms to be combined in a way suitable for this review.

Each search within each of the five databases was run in exactly the same way with combination of terms occurring in the same order (although in practice runs of the search, the order in which searches were combined did not alter the number and detail of the results). Titles and abstracts (where available) of the search results from each bibliographic

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database were exported to an Endnote database. The separate sets of results were then merged and the duplicates removed. The number of "hits" per database was:

- AUEI = 47
- BREI =29
- ISI Web of Knowledge =208
- ERIC =222
- PsycInfo =192

This produced 698 articles for possible inclusion with duplicates and records/links with no data removed from the list, the remaining total of article summaries (titles and abstracts) requiring closer inspection was 499.

2.2.3 Quality assurance

Before scrutinising the set of 499 papers it was important to check that inclusion and exclusion criteria were appropriately applied. Two team members (SP and AM) independently applied the criteria to a subset of 20 titles and abstracts. SP excluded nine plus one other (to be retained as background information). AM excluded 11 (plus the same paper as SP to be retained for background info). SP and AM independently agreed on all the other articles. This makes an inter-rater reliability of 90 per cent (18/20 = same decision). One-hundred per cent agreement was reached on further discussion where two papers were agreed to potentially offer important perspectives and so were retained in the set for scrutiny of the full paper. Throughout the review process, team members regularly consulted each other on decisions to include or exclude particular articles or reports.

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Table 2.1: Definitions of terms for establishing the scope of the review

Key term	Working definition
International	This was interpreted as widely as possible while also acknowledging that most relevant publications were likely to come from the US, UK and Australia. References from the Irish context were included where available.
Literature	Drawn from electronic databases (Australian Education Index, British Education Index, ISI Web of Knowledge, ERIC) plus "hand searching" of known websites and relevant reports.
Evidence	Peer-reviewed empirical studies published in academic journals (including the collection of data which could be qualitative or quantitative in nature) plus expert opinion from formally published reports and practitioner journals.
Best Practice	Based on Donabedian's (2003) normative definition of best or good practice which is drawn "…either from direct knowledge of the scientific literature and its findings, or from the agreed-upon opinions of experts and leaders, an opinion presumably based on knowledge of the pertinent literature as well as on clinical experience" (p62) Thus, our recommendations for best practice are based on accumulations of evidence from both empirical and expert strands. This highlights the basis for the recommendations as well as where the gaps in knowledge/evidence remain.
Education	Drawing directly from the Report of the Task Force on Autism (2001) we interpret this as an education service for people with ASD encompassing provision "…from the earliest age through to third level and continuing education" (section 1.3). Relevant research includes specific interventions or evaluations, either

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	naturally occurring or researcher-manipulated (focusing on learning; behaviour; communication, social and emotional understanding and life skills); training for teachers and classroom assistants; and studies/discussions of inclusion (type of placement) for children and young people with ASD. In recognition of the importance of early years/pre-school provision and because some of this may take place outside formal State-provided educational contexts, research is included on school- *and* home-based educational provision.
Autistic spectrum disorders	From the National Autism Plan for Children (NIASA, 2003), the term ASD is taken to mean the group of pervasive developmental disorders (PDD) (World Health Organisation, 1993; American Psychiatric Association, 1994) characterised by qualitative abnormalities in reciprocal social interactions and in patterns of communication, and by a restricted, stereotyped, repetitive repertoire of interests and activities. These qualitative abnormalities are a pervasive feature of the individual's functioning in all situations although they may vary in degree. The review will include all subgroups identified within the spectrum such as Asperger syndrome, autism, atypical autism and high functioning autism, and will encompass children and young people with ASD at all levels of intellectual ability and severity.
Outcomes	We draw on the definition used by Rix et al (2006) in their review of inclusive practices for children with special educational needs. *Outcomes* is used to mean an impact upon aspects of the learning and participation of children and young people with ASD (their attainment levels, progress, attitude, confidence, self esteem and independence skills).
Time and place	Only reports written in the English language and produced or published after 2001 are included (dated 2002-08 only).

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Table 2.2: Inclusion criteria for empirical strand

Inclusion criteria – studies *included* met *all* of the following:		
Scope	IC1	Focus on, and have specific reference to, children and young people with ASD
	IC2	Indicate outcomes for the child or young person
	IC3	Are concerned with educational provision of children and young people
	IC4	Take place in the home, community or in school/college-based settings
Study type	IC5	Are empirical, that is include the collection of (quantitative or qualitative) data OR systematic reviews of empirical data
Time and place	IC6	Are written in English
	IC7	Are produced or published after 2001 (dated 2002-08 only)

Table 2.3: Exclusion criteria for empirical strand

Exclusion criteria – *excluded* studies met <u>one or more</u> of the following:		
Scope	EC1	Not focused on children and young people with ASD
	EC2	Not indicating outcomes for the child/young person
	EC3	Not concerned with educational provision of children and young people
	EC4	Not concerned with educational provision that takes place in schools/colleges or in the home or community
Study type	EC5	Descriptions, development of methodology, commentary or opinion not based on empirical studies
Time and place	EC6	Not written in English
	EC7	Not dated 2002-08

2.2.4 Final selection of articles for inclusion

One team member (SP) then applied inclusion and exclusion criteria to all 499 titles and abstracts. During this "sweep" 334 articles were excluded a few of which were remaining

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duplicates. Most met at least one exclusion criterion, however, most frequently EC2 and/or EC3 while many met more than one exclusion criterion. This left 165 papers for "full paper" screening. Most of these were obtained for full screening although 11 were unavailable (including some inactive links that meant the articles were no longer traceable). Sixteen were review papers (mostly non-systematic) and 28 were single participant case study papers. We acknowledge the usefulness of both these types of articles for the present review (indeed some rigorous single case designs may offer stronger evidence than some papers involving small groups included here) but needed to keep the size of the review manageable within the funded time and personnel resources. A pragmatic decision was therefore made to exclude all papers with only single participants and to draw selectively on review articles which were felt to offer a particularly strong or important summary or comment on a particular theme within the review. The single case study, review and unavailable papers (excluding those with inactive links) identified in the search are listed in Appendix A5. With additional time and resources these would have made significant contributions and, indeed, could serve as a useful basis for a future review to further augment and strengthen the available evidence base.

Further papers were excluded upon full reading (if they met at least one exclusion criteria) and additional papers included through "handsearching", that is those which were either referenced by papers from the systematic database search and met inclusion criteria or were identified through searching specific journals or issues. In addition, a few were retained for inclusion even though they technically failed to meet all inclusion criteria. This was because (in our view) they gave insight or evidence on important issues or themes (specifically, the "voice" of children and young people with ASD; see section 3.1.8). Additionally, three non-peer-reviewed reports on empirical research were included in this section due to their focus on adults with ASD and the relative dearth of available research in this area.

The "voice" of children and young people is a relatively new and emerging field of research which emphasises the importance of ascertaining their views on their lives and, more specifically, on service provision including education. Traditionally, research has tended to overlook these views, favouring instead those of parents/carers or teachers,

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possibly because these have been considered more straightforward to obtain. Our own professional and research experience (and interests) unapologetically guide us towards inclusion of this emerging literature. We consider it essential to "best provision" that all stakeholder views are sought wherever possible.

The final total of empirical articles included in the review was 100. Different team members reviewed these and key details were summarised using standard pro formas (see Appendix A2). Reviewers were asked also to indicate the "weight of evidence" they felt each paper contributed to the review (graded low, medium or high). These were based on criteria used by Rix et al (2006) and were:

A. Soundness in answering the study question.

B. Appropriateness of design and analysis for the review.

C. Relevance of study focus for the review.

D. Overall rating on weight of evidence for the review.

These were helpful initial indicators in guiding us to form our recommendations but we do not report them for all papers included. This is because we acknowledge that our own research experiences, professional backgrounds and epistemological beliefs inevitably influence our decisions. It is likely that some of us would disagree on which papers constitute medium or low weights of evidence. (Others also acknowledge that judging weight of evidence in literature reviews is highly complex – see Gough [2007] for further discussion). It was also not possible for more than one team member to review each paper. We have therefore placed special emphasis on papers we consider especially noteworthy or important, and therefore offer a higher weight of evidence. These (usually) include a larger number of participants, more robust methodologies and analyses, and cover particularly important or central topics. They are identifiable in the text through the addition of a double asterisk after the citation, for example Aldred et al (2004**). Following one member's "high" rating, the paper was then read by a second member to agree the grading's appropriateness.

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2.3 Procedure: Expert strand

2.3.1 Inclusion criteria

Given the quantity of empirical articles identified for inclusion, a necessarily more pragmatic approach was adopted for this strand. Inclusion criteria were slightly less strict than for the empirical strand, and we focused only on those reports or policy guidelines (which may be based on empirical as well as expert evidence) that, in our professional opinion, were of central importance or relevance. These were:

1. Dated 2002-08 only.
2. Specifically concerned with people with ASD and/or discuss curriculum development/inclusive policies or practice for all children and young people.
3. Focused on educational provision (broadly defined as taking place in schools or colleges, in the home or in community settings, including childminders).
4. Published/available in English.
5. Permanent records, that is standalone published documents or downloadable pdfs/word documents from websites (note: this means web page contents were normally excluded unless available as standalone published documents).

In addition, policy guidelines were drawn from the UK and Ireland only. This was due to the likely greater similarities between these national educational systems compared to others internationally (and therefore potentially higher relevance for the review and recommendations). We are aware of useful and detailed policy guidelines beyond the UK and Ireland (the guidance from New Zealand, Ministries of Health and Education, 2008), but we were unable to include these and do them appropriate justice in this time-limited review.

As with the empirical strand, documents were summarised using a standard pro forma (see Appendix A3).

The empirical strand search revealed few articles focusing on post-compulsory and continuing education. A more targeted search for literature in this area was conducted including peer-reviewed as well as non-peer-reviewed sources. Results remained low overall and this reflects we think, a genuine lack of evidence in the area rather than a

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failure of the search strategy. To partially address this imbalance, three non-peer-reviewed reports on empirical research were included due to their focus on adults with ASD. The section on post-compulsory education also draws on a wider set of sources than other sections to explore relevant research published in this area (including non-peer-reviewed practice-based articles as well as recommendations for practice from reports with an evidence base). Reports with no evidence base (personal or organisational opinions only) were excluded.

2.4 Acknowledgement of review limitations

We fully acknowledge that by seeking a robust, flexible and pragmatic approach to this review we have been unable to include or identify all articles and reports of relevance and importance. Any omissions are due to a combination of factors (idiosyncrasies of search engines, human error and time constraints) rather than a comment on the relevance or quality of the work of any individual or groups. Throughout, we have done our best to ensure transparency, fairness and objectivity, while also drawing on our own knowledge and experience to inform decisions.

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We report review results in two main sections following our two main strands: Empirical and expert. The first summarises findings from the empirical evidence across key themes. The second summarises findings from the expert evidence. This includes reports on good practice as well as policy guidelines. Key documents in this section are introduced and summarised briefly, before highlighting implications for practice for policy. These implications serve as a bridge between summaries of evidence and the recommendations in Section 5.

3.1 Empirical strand: Summaries of findings

Introduction/Overview

This section summarises our findings from the empirical papers, fuller detail and a critique of which can be found in Appendix A4. It is important to emphasise that the more detailed sections in Appendix A4 are central to this report and form the basis of many of our recommendations. For readability, however, we include summaries only in the following main text and readers can refer to the detail in Appendix A4 if they wish.

These papers cover pre-school educational interventions through to post-compulsory and higher education, from family and home-based education to provision in formal settings. Presentation is thematic and the section is structured to look at multi-component interventions first, followed by comparative studies and home-based interventions before focusing on social interaction, understanding and skills. We then outline studies that focus on specific learning approaches and tools, before turning to studies on the voices of children and young people, those describing training programmes for school personnel and those for parents. It should be noted that order of appearance is no indication of order of importance, quality or relevance. Papers considered of high importance or relevance are denoted by a ** following the citation. Not all sections contain evidence rated ** (high).

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Subsections are:

 3.1.1 Multi-component interventions

 3.1.2 Comparison of different types of interventions

 3.1.3 Home-based interventions and impact on parents

 3.1.4 Social interaction, understanding and skills

 3.1.5 Specific learning tools and approaches

 3.1.6 Voices of children, young people and adults

 3.1.7 School staff training

 3.1.8 Parent training/involvement

Each theme is subdivided into early years, primary and secondary where possible. Please note that the different themes/subsections have different numbers of papers and many have thematically based subgroups. Thus summaries are presented slightly differently for different themes. For a section with few papers, a short description of each is given before drawing out the main findings from those. Other themes, however, had substantial numbers of papers and so were summarised slightly differently, focusing the summary primarily on papers of medium or high weight of evidence. Number of papers reviewed for each theme is in brackets after the subheading.

A "mapping" summary of the main features of empirical papers for each section and subsection is included in Table 3.1 at the end of this section (pp68-70); this includes the age-group of participants (or stage of schooling or provision); number of participants included; geographical area in which the study took place, and the number of studies graded as offering a high weight of evidence. Table 3.1 shows nearly half (49 per cent) of empirical articles reviewed focused on children of pre-school age while only 8 per cent considered those in post-compulsory educational, or adult, contexts. Just over half the articles (59 per cent) originated in North America, with 26 per cent from the UK and 3 per cent from Ireland. More robust methodologies including multiple-baseline designs or comparison groups featured in just over half the studies (57 per cent), with a further 6 per cent utilising randomised controlled designs. Only 12 papers (12 per cent) were graded as offering a high weight of evidence for this review.

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3.1.1 Multi-component interventions (n=7 studies)

Multi-component intervention programmes usually have a wide focus in the areas of development they address and incorporate a range of teaching techniques, targeting different skills across different contexts (home and school). Such programmes are premised on the idea that outcomes for children can be enhanced by use of several techniques that can be adapted to a child's individual needs, and used flexibly according to naturally occurring opportunities for learning. These aims are laudable but the studies included here highlight the difficulties involved in evaluating such programmes. Studies included were:

1. Perez-Gonzalez and Williams (2006) aimed to develop and test individualised learning programmes for three children with autism in Spain, focusing on behavioural procedures for teaching spoken functional language across different contexts.

2. Panerai, Ferrante and Zingale (2008) compared the effectiveness of the TEACCH programme with the normal integration of children with disabilities into mainstream schools.

3. Stahmer and Ingersoll (2004) evaluated a multi-component pre-school education programme (Children's Toddler School, CTS) involving use of a range of teaching methods and techniques informed by applied behavioural analysis.

4. Boulware, Schwartz, Sandall and McBride (2006) evaluated the effectiveness of a comprehensive early childhood programme incorporating different behavioural strategies alongside naturalistic teaching techniques in an inclusive setting.

5. DiPietro, Luiselli, Campbell, O'Malley Cannon, Ellis and Taras (2002) evaluated the success of a pre-school centre-based behavioural treatment programme based on parent surveys and data on attendance at mainstream school and percentage of time spent in "inclusive" settings.

6. Dyer, Martino and Parvenski (2006) conducted a qualitative case study of a behavioural intervention programme consisting of different 1:1 treatment components, most of which were based on applied behavioural analysis.

7. Schwartz, Sandall, McBride and Boulware (2004**) studied the effectiveness of the Project DATA (Development Appropriate Treatment for Autism) programme; a

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federally funded model project for developing a school-based programme for young children with autism.

All studies, with one exception, offered a low weight of evidence to the review due to problems in separating out intervention effects from other variables. In other words, it is not possible to judge if the specific programme was effective and, even if it was, which components contributed (or not) to its success. Moreover, there are concerns about the lack of objectivity in these evaluations, with research often conducted by personnel who helped deliver the programmes and who are therefore likely to have a vested interest in reporting positive outcomes. Nevertheless, two studies reported impressive gains in functional communication and behaviour.

The Schwartz, Sandall, McBride and Boulware (2004**) study, despite its limitations, was considered important to this review because it offered a good example of educational research in which outcome measures were closely aligned with intervention aims. It also provided a model for synthesising research and teaching delivery, showing how data and research on interventions can inform teaching and planning and vice versa. Based in the US, the authors studied the effectiveness of the Project DATA (Development Appropriate Treatment for Autism) programme – a federally funded model project for developing a school-based programme for young children with autism. The project consists of five components: a high quality early childhood environment, extended instructional time, social and technical support for families, collaboration across services and transition support.

At the time of the study, 48 children had participated in the project for a mean of 16 months. They were aged three to six when they got involved and all had independent diagnosis of autism or PDD-NOS (pervasive development disorder – not otherwise specified). They all attended one of three pre-school classrooms, each with a morning or afternoon session at the centre. The extended-time component of the school programme meant children received about 20 hours a week of school-based services.

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To evaluate project effectiveness, the authors collected information on family and consumer satisfaction and children's developmental progress in functional skills (use of speech to communicate, ability to follow complex directions, motor imitation, toilet training during daytime hours, symbolic play and co-operative play with peers). Children made functional gains across all these skills and their social validity was confirmed via parental satisfaction as expressed through interview and via family demand for the programme.

Although never designed as a research project, the programme has been data driven and has collated data indicating participant progress and parent satisfaction. Furthermore, the research approach is one in which data about children's learning have guided every programme component and this data has also enabled decisions to be made on staffing, programme configuration and policies, leading to the practice and policy responding to evidence rather than a rigid curriculum.

Implications for research and practice

1. There is a need for further research on multi-component intervention studies which should be designed to control for and examine which teaching approaches work, how intense they should be and how long services should be provided for (Kasari, 2002).

2. More robust research designs are needed when researching multi-component interventions. Studies should be designed to reduce threats to internal validity by, for example, random assignment and avoiding observer bias. They also need to give thorough descriptions of child and family characteristics so that these can be studied to understand the variability in programme outcomes (Baker and Abbott-Feinfield, 2003).

3. Positive aspects of the above studies include use of a variety of measures for measuring change. This practice should continue given the heterogeneity of the autism population and the comprehensive nature of programmes.

4. More clarity is needed in describing different aspects of interventions so that one can determine the active ingredients, including treatment frequency and intensity.

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5. Regardless of the intervention, implementation across home, early childhood education, school and community settings is important to outcome further studies that address this are needed.

3.1.2 Comparison of different types of interventions

Research studies in this subsection compare different types of interventions in order to make informed decisions on their effectiveness. Two subsections under this theme examine, first, interventions for pre-school children including intensive behavioural programmes, special nursery placement, the Portage programme and an eclectic programme (eclectic programmes are those that adopt a mix of different interventions). Second, it compares different pre-school interventions to develop children's play.

3.1.2a Comparison of different types of interventions: Pre-school (n=5 studies)

Five studies were summarised in this section and all included intensive behavioural (IB) programmes as one intervention group. Four were given a high weight of evidence for the review due to the numbers of children involved, research duration and relatively robust research designs. The studies reflect the importance of early intervention with pre-school children and, in particular, to current use of intensive behaviour programmes with children at this age. Taken together, they highlight the importance of comparing interventions in order to make informed decisions on their effectiveness. Findings relating to the benefits of intensive behavioural approaches compared to other interventions are mixed, highlighting the main message from this section: one particular type of intervention is unlikely to produce the best outcomes for all the children included.

Reed, Osborne and Corness (2007**) compared three interventions. The first was an intensive behaviour approach (an applied behavioural analysis home-based intervention with 1:1 teaching); the second was a special nursery placement where teaching was conducted in groups and the third was a group receiving the Portage programme who had a mixture of 1:1 and group teaching. Findings suggested none of the three interventions was of all-round greater benefit to children than the other two. Each produced differential effects on specific aspects of functioning. Crucially, none of the interventions produced "recovery" to TD levels of functioning. Magiati, Charman and

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Howlin (2007**) conducted a two-year follow-up study of community-based early intensive behaviour intervention and "eclectic" specialist nursery provision "…emphasising structure, visual cues, individualised teaching and close liaison with parents" (p806). Standardised measures in several domains were taken pre- and post-intervention. At follow up, group differences were not significant: home-based early intensive behavioural intervention and eclectic provision at an autism specialist nursery showed comparable outcomes after two years.

The Howard, Sparkman, Cohen, Green and Stanislaw (2005**) study showed very different findings. It compared an intensive behaviour treatment (IBT) and eclectic treatments for young children with autism. At follow up, the intensive behaviour group had higher mean standard scores in all skill domains except motor skills and their learning rates were substantially higher than for either of the other two groups. But children in the IBT group were diagnosed at a younger age and began treatment earlier than those in the other two programmes. Given that age at the start of treatment may be an important factor in outcomes, this needs to be noted although the analysis adjusted for the parents' level of education and for the children's age at diagnosis. The IBT group also received interventions in multiple settings which was not the case for the other two groups and could have affected the results.

Remington, Hastings, Kovshoff et al, (2007**) compared the progress of pre-school children with autism (diagnosed according to the ADI-R) across two groups: one receiving a home-based, intensive behaviour intervention (23 families) and the other getting standard provision from the local authority (21 families). The authors claim that results from these measures showed statistically significant gains for the former at 12 and 24 months compared to the local authority group on three domains (IQ, mental age and Vineland daily living skills). Conclusions should be rather more modest than this, however. These analyses showed that five children in the intervention group and three in the comparison group made clinically significant gains, which shows limited difference between the two groups. In addition, those children benefiting most from the early behavioural intervention were shown to have had higher IQ, mental age and communication and social skills scores

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at the outset, suggesting gains were likely to have been influenced by this existing higher ability rather than, or as well as, the early intervention.

Farrell, Trigonaki and Webster (2005) in the UK conducted an exploratory evaluation of two early intervention programmes for young children with autism. It involved two interventions: ABA/Lovaas and LUFAP (Lancashire Under Fives Autism Project). Findings concluded that the mean age equivalent level score remained a long way behind chronological age and the children were therefore likely to need long-term support. Data from a reduced sample indicated that LUFAP children did particularly well in communication and socialisation. The applied behaviour analysis group scored less well on the socialisation scale of the Vineland. Study limitations were that the two groups of children were not directly comparable. The children in the ABA group had lower scores on the VABS and Bayley at the start and so their difficulties were more challenging.

Implications for practice

1. Taken together, these studies suggest that current research evidence does not support the view that one particular type of intervention or approach is likely to produce the best outcomes for all children with ASD.
2. Given the diversity of children with ASD, a range of support and interventions is needed. It is unlikely one single approach or solution will ever meet the needs of all children with ASD, so interventions should be chosen to fit the learner's profile and the context for learning.
3. There is evidence for the effectiveness of intensive behaviour approaches in teaching specific skills in particular contexts, but less evidence on their long-term outcomes or the intensity of the input required.

3.1.2b Comparison of different types of interventions for developing play: Pre-school (n=5 studies)

All five studies here focused on facilitating play skills in young children with autism and, more specifically, on skills relating to the core deficits of autism – namely symbolic play, joint attention and/or social initiations:

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1. Bernard-Opitz, Ing and Kong (2004) highlight the importance of assessing children's levels of functioning when considering interventions. In their comparison of adult-directed, discrete trial teaching (an intensive behaviour approach) with a child-centred, naturalistic play intervention (where responses of the adult *follow* rather than *direct* the child's actions), the authors found two children who started the intervention with the lowest cognitive levels (and received the least parental involvement) showed no improvement. Other children showed improvements in play and communication and reductions in severity of autistic behaviours across both types of intervention, suggesting that both more and less structured approaches can be effective.

2. Wong, Kasari, Freeman and Paparella (2007) reached similar conclusions in their comparison of a targeted intervention for symbolic play skills compared to one for joint attention skills. Overall, children had an easier time learning play skills than joint attention skills but those with higher cognitive and language scores mastered the skills more quickly than children with lower scores.

3. Kasari, Freeman and Paparella (2006**) implemented a randomised controlled intervention study involving 58 children aged three to four, comparing activities focusing on joint attention and initiation with those involving symbolic play. Compared to a control group, both intervention groups showed significant and specific improvements, providing encouraging evidence that children with autism can successfully learn core skills when given support via more child-centred methods. In addition, these skills showed generalisation to a caregiver uninvolved in the intervention. Notably, the authors suggest the control group may have shown lack of progress within these two domains of behaviour because their standard intensive behaviour programme was more adult-directed.

4. Colozzi, Ward and Crotty (2008) compared simultaneous prompting procedure in 1:1 and small group instruction to teach play skills to pre-school students with pervasive developmental disorder and developmental disabilities. Findings suggested individual variation among students and that small group instruction may be more conducive to skills acquisition. Given the small sample, further studies are needed to generalise findings.

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5. Kok, Kong and Bernard-Opitz (2002) compared the effects of structured play (teacher directed with massed trials being used for teaching) and facilitated play (incidental teaching method) approaches with eight pre-schoolers with autism. There was more evidence of appropriate communication under the structured play condition for six of the eight children while three showed more communicative interactions under the facilitated play condition. The authors noted that the findings were in line with discussion of a needed continuum of intervention approaches. They also reflect some advantage in providing structure as well as facilitation in playgroups.

Implications for practice

1. Structured and less structured approaches focusing on the core deficits of autism can facilitate play and joint attention skills in pre-schoolers with autism.
2. Language and cognitive levels must be taken into account when deciding which interventions may be effective and appropriate.
3. There is evidence that child-centred approaches appear more effective than adult-led approaches.

3.1.3 Home-based interventions and impact on parents (n=3 studies)

This section reviewed studies that covered home-based interventions and their effect on parental stress levels. The three papers here investigated:

1. Parental perceptions of involvement in home-based intensive behaviour programmes (applied behavioural analysis) (Dillenburger, Keenan, Gallagher and McElhinney, 2004).
2. Evaluation of the progress and outcomes of children with ASD participating in parent-managed home-based intensive behaviour programmes (Lovaas) (Bibby, Eikeseth, Martin, Mudford and Reeves, 2002).
3. Exploring the relationship between time intensity of early interventions and parental stress levels on child outcomes (Osborne, McHugh, Saunders and Reed, 2008).

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Dillenburger et al (2004) showed positive outcomes for family life, parents and the child. The research design, however, undermined the possibility of drawing independent conclusions on the programme's effectiveness. The second study (Bibby et al, 2002) found highly variable results across the children, with some showing progress on some measures and others a regression in IQ or other types of functioning over the 12 months. Interpretation of the findings is significantly clouded by the high variability levels of the "treatment" within and across the included families, as well as the usual limitations of an AB design and lack of information on treatment fidelity or quality. Bibby et al concluded it was not possible to compare data across the 85 families as different assessment measures had been used, hours engaged in applied behavioural analysis programmes differed and intervention fidelity and therapist supervision varied considerably. Results from Osborne et al (2008) showed that across the intervention groups, those receiving more hours of intervention showed greater improvements on intellectual, educational and adaptive behaviour measures compared to those receiving fewer hours. However, for the high-intensity group, this was substantially reduced by higher levels of parental stress. In other words, parental stress levels appeared not to influence outcomes for children receiving less input, while the high intensity group did best when parental stress levels were lower.

Implications for research and practice

1. There is insufficient evidence to prescribe home-based intensive behaviour interventions for all children with ASD and a range of interventions and support must continue to be provided for pre-school children and their families.
2. Assessment of abilities is important in considering intervention approaches.
3. The effects on parental stress of particular interventions must be studied further, as does the link between parental stress and child outcomes.

3.1.4 Social interaction, understanding and skills

In this subsection a range of studies examines interventions aiming to improve the social understanding and communication of children on the spectrum. The first group (Group a) focuses on social interaction, understanding and skills. Most of the studies used structured techniques across multiple baseline designs and included small numbers of children (three to eight) in centre-based settings. The second (Group b) looks at visual techniques or

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video modelling procedures to facilitate play and/or social initiations and interactions to pre-school and primary age children with autism. The third (Group c) focuses on including peers (with or without autism) to facilitate social interaction and communication skills for, and with, children with autism. The fourth group (Group d) involved grouping or pairing children with autism with peers with special educational needs or autism to facilitate play and/or social communication skills.

3.1.4a Social interaction, understanding and skills: Pre-school (n=5 studies)

The pre-school studies dealt with:

1. Identifying classroom settings and events to determine how they affected the social behaviours of children with autism spectrum disorder (these included varying group sizes, contexts in which the adult or child-directed the activities and setting events with varying levels of teacher engagement) (Boyd et al, 2008).
2. The effects of prompting and social reinforcement on establishing social interactions with peers (Gena, 2006).
3. Incidental teaching of age-appropriate social phrases (McGee and Daly, 2007).
4. Using pivotal response training to facilitate learning of specific grammatical morphemes (*-ing, -ed*) (Koegel, Carter and Koegel, 2003a).
5. Using discrete trial and pivotal response training techniques to facilitate two joint attention skills (Jones, Carr and Feeley, 2006).

They found structured, behaviourally-based instruction techniques had been successful in teaching specific skills to young children with autism. However, generalisation of the findings is limited due to small sample sizes and methodological constraints. None of the evidence here was given a high weighting.

Nevertheless, two studies offer some promise: Jones et al (2006) investigated use of structured approaches for facilitating joint attention skills and recorded significant improvements in target skills. This study highlights the importance of focusing on age-appropriate skills relating to core deficits of autism at an early age. Boyd et al (2008) explored the naturally occurring contextual variables that promoted social interactions between young children with ASD and their typically developing peers. This observational

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study documented some important results: there were more social interactions with, and a higher rate of social initiations by, the children with ASD when groups were small or 1:1, in child-directed settings and activities; and with lower adult involvement. In other words, this study helps to identify possible *precondition*s for social interventions.

Implications for research and practice

1. It would be useful to conduct further studies that aim to identify naturally occurring variables and contexts that enable children with ASD to interact socially as this would be of great use to practitioners when planning the day's structure and different activities, including the balance between adult-led and child-initiated activities in pre-school.

3.1.4a Social interaction, understanding and skills: Primary (n=2 studies)

The two studies in this category focused on:

1. Social emotional skills training (Yang, Huang, Schaller, Wang and Tsai, 2003).
2. A social behaviour learning strategy (Bock, 2007).

The first (Yang, N-K et al, 2003) included six children with autism (four in the experimental and two in the control group) attending mainstream primary schools. The former received behaviourally-based training targeted at functional social and emotional classroom behaviours including: attention skills, imitation and following instruction, greeting skills, emotional recognition and emotional expression. Although the authors suggested all four children in the experimental group significantly improved positive social behaviours over time, this conclusion is overstated due to the small number of participants and use of inappropriate statistical analyses.

By contrast, the US study by Bock (2007) is noteworthy for its potential in facilitating social skills and understanding for primary-aged children with Asperger syndrome in naturalistic contexts. Four boys with Asperger were taught to implement a strategy to facilitate social interactions. The strategy offers a structured series of questions (scripts) that students are encouraged to ask themselves when thinking about social situations. This multiple baseline design showed the strategies were easy to implement and led to significant

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improvements in social behaviours. Crucially, script use was under the children's control and no highly structured, adult-led intervention was required. This makes it a potentially useful approach for mainstream classroom contexts.

Implications for research and practice

1. Given the positive findings from the Bock (2007) study, it would be useful to extend the sample beyond high functioning children to consider if this approach can also be beneficial for older children and for those with learning disabilities. This would need to include consideration of whether adaptations would need to be made for them.

3.1.4a Social interaction, understanding and skills: Post Primary (n=4 studies)

Four studies with secondary pupils focused on:

1. A structured social skills programme based on five social skills for co-operative working (Webb, Miller, Pierce, Strawser and Jones, 2004).
2. Social skills training with a typically developing peer (Broderick, Caswell, Gregory, Marzolini and Wilson, 2002).
3. Social communication skills during groupwork sessions at a community-based youth group (Mackay, Knott and Dunlop, 2007).
4. A social skills training programme using the conceptual framework of cognitive behavioural therapy (CBT) (Bauminger, 2002).

These all involved children with Asperger's or high functioning autism) and focused on providing insights into social skills and behaviours, as well as strategies for practising and implementing them. Methodological and/or reporting limitations, however, mean the relative value of the different strategies employed is difficult to judge. This also highlights the difficulty in conducting robust psycho-educational interventions for older children and young people.

Bauminger's (2002) social skills training, using principles of cognitive behavioural therapy, offers particular promise by taking a multidimensional approach to learning and embedding this within children's everyday settings and routines. Moreover the level of

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input required from teachers was modest (three hours a week). Results showed children made observable improvements in social understanding and spontaneous behaviours, although further research is needed to verify this and examine if learning was maintained over time.

Implications for research and practice

1. Teaching programmes focusing on an understanding of intentions and emotions can be successful for children with Asperger's or high functioning autism.
2. There is a notable lack of research on the needs of young people with ASD and learning difficulties at this age. Further studies are needed.
3. The field would benefit from greater exploration of which age appropriate skills could be targeted (and how) with this post primary age group.

3.1.4b Social interaction, understanding and skills: Visual supports and video modelling (n=7 studies)

Studies on visual supports and video modelling investigated:

1. Teaching pre-school children with ASD to request entrance into playgroups using a peer-mediated visual strategy for initiation, embedded within ongoing pre-school activities (Johnston, Nelson, Evans and Palazolo, 2003).
2. Teaching contextually appropriate affective responding to pre-school children with autism at home and in the context of play activities using *in vivo* modelling or video modelling (Gena, Couloura and Kymissis, 2005).
3. Using video modelling to teach specific actions on toys and sensory materials to two girls with autism (Hine and Wolery, 2006).
4. Using video modelling to teach pretend play to two children with autism (MacDonald, Clark, Garrigan and Vangala, 2005).
5. Teaching three different social behaviours (sharing with others, complying with teacher directions and social greetings) via computer-based instruction using video models (Simpson, Langone and Ayres, 2004).
6. Using video modelling to teach play with objects (Nikopoulos and Keenan, 2007).

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Studies employed visual techniques or video modelling procedures in interventions to facilitate play and/or social initiations and interactions to pre-school and primary age children with autism. They build on current good practice in the field, promoting use of visual support and video modelling and taking into account the relative strength in visual skills of children with ASD. These approaches also recognise the importance of developing observation skills in children and that observation and imitation may be important avenues for learning. The studies indicate that video modelling can present different social situations in a predictable and controllable way, thereby allowing extraneous features to be filtered out and thus potentially making learning easier for the child with autism.

However, they provide limited evidence for the review since they all had small sample sizes, with no control groups. One cannot therefore generalise from these. Some studies found more success than others in terms of generalisation of children's skills. Most found variation between individual children, but it was not possible to isolate the factors that explain greater generalisation in some studies than others or why some children responded better than others. Despite this, they show promise on use of visual techniques.

Implications for research and practice
1. Although these studies show promise, more robust studies are needed using control groups and measuring for generalisation in order to assess the extent to which these approaches can be effective.
2. While they indicate visual support and video modelling can be useful to teach certain skills further studies are needed to identify which understandings and skills these are particularly suited to teach. It is also important to ensure that the skills and understandings taught using these approaches provide the basis for enabling children to participate in meaningful interactions in their naturalistic environments.
3. The studies highlight that generalisation of learning cannot be assumed and that children may need to be explicitly taught to generalise these same skills from the video modelling condition through to different settings and contexts. Further studies could explore whether videotaped samples or models involved in scripted

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actions can be transferred to learning and understanding in the naturalistic setting of the classroom or home.

3.1.4c Social interaction, understanding and skills: Peer Facilitation: Typically Developing (TD) peers: Pre-school (n=2 studies)

Two studies involved typically developing peers in facilitating social interactions of pre-school children aged three to five with autism. These investigated:

1. The use of "Circle of Friends" – "… an educational approach that facilitates the inclusion of children with disabilities into the school community by engaging their peer group in supporting the individual proactively" (Kalyva and Avramadis, 2005; p253).
2. An intervention package based on peer imitation consisting of a four-step programme giving every child the chance to be a leader (whether typically developing or developmentally delayed) and cueing the other children to imitate the leader (Garfinkle and Schwartz, 2002).

The pre-school studies offer limited evidence for the review given small sample size and, in the case of Kalyva and Avramadis, inappropriate group-based statistical analyses. Moreover, Garfinkle and Schwartz report highly variable rates of responding suggesting low effectiveness of the intervention.

Implications for research and practice

1. The studies offer limited evidence on how to facilitate interaction between typically developing peers and the child with autism, and do not provide enough evidence for conclusions on the kind of interventions that might facilitate interaction.
2. Further research on interventions that facilitate interactions with peers is needed for conclusions to be drawn on their effectiveness. Learning through interacting with peers is an important area of development for all children, and those with ASD need interventions that can explicitly support them in this.

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3.1.4c Social interaction, understanding and skills: Peer Facilitation: Typically Developing (TD) peers: Primary (n=6 studies)

Six studies involving primary age children dealt with:

1. Comparing peer training and systematic instruction with written text cues on general social interactions and specific social-communication skills (Thiemann and Goldstein, 2004).

2. Using pivotal response training to support social interaction between children with ASD (Harper, Symon and Frea, 2008).

3. The effects of participation in "Integrated Play Groups" on symbolic and social play (Yang, Wolfberg, Wu and Hwu, 2003).

4. Effectiveness of "co-operative learning" on social engagement. This is a particular method of small group working that emphasises specific elements such as being clear about learning outcomes as well as each group-members' responsibilities in contributing to these (Grey, Bruton, Honan, McGuiness and Daly, 2007).

5. Increasing peer involvement with children with ASD using a strategy of finding out more about autism, discussing strategies for befriending students with autism and helping to involve them in activities, and thinking about the strengths and preferences of the target child with ASD in their class (Owen-DeSchryver, Carr, Cale and Blakeley-Smith, 2008).

6. Increasing initiations and joint attention of children with autism in interactive play sessions with their peers through encouraging peers to apply four simple principles: get close, follow his/her lead, talk slow and simple and make it fun (Whitaker, 2004).

Thiemann and Goldstein (2004) and Harper et al (2008) reported variable rates of responding among small groups of participants. Yang, T-R et al (2003) and Grey et al (2007) offer limited evidence due to small numbers of participants, AB designs and lack of specificity in description and analysis.

Of potentially greater merit are studies by Owen-DeSchryver et al (2008) and Whitaker (2004). Both described less structured, more naturalistic approaches to involving peers, and reported improvements in social interactions. Although they have limitations, these methods were described more clearly, required very modest training for the peers and so

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have greater potential for wider use and applicability. In addition, both approaches encouraged peers to understand more about autism and *follow the lead* of the child with ASD. Taken together, findings suggest a need to tailor interventions according to a child's individual strengths and preferences.

Finally, it is important to note briefly the ethical issues that arise when involving peers in intervention studies such as these. Although every safeguard may be taken, there are concerns about the pressure children may feel to "do a good job" coupled with the possible difficulties in withdrawing from interactions (if the study is being carried out during normal play time). Moreover, peers may be exposed to challenging behaviours and this may cause longer-term fear and worry (as was the case for one child in Whitaker, 2004).

Implications for research and practice
1. We can draw the tentative conclusion that studies involving naturalistic interactions between peers are more promising than structured ones.
2. It is possible that interventions explicitly training typically developing peers to interact with children with ASD might be misplaced and that it is more beneficial to aim for attitudinal change, educating these peers to understand the child with ASD and for this further understanding to then hopefully influence the nature and level of interaction.

3.1.4d Social interaction, understanding and skills: Peer facilitation: peers with special educational needs or ASD: Primary (n=2 studies)
Two studies focused on:
1. Pairing children with autism with peers with autism in planning, playing and reviewing play sessions (Loncola and Craig-Unkefer, 2005).
2. Grouping children with autism with peers with special educational needs to use pivotal response techniques to enable interaction (Kuhn, Bodkin, Devlin and Doggett, 2008).

These papers provide evidence that social interactions and behaviours can be facilitated through pairing children with ASD with other children with ASD or with other special

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educational needs. The approach described by Loncola and Craig-Unkefer (2005) offers particular potential through working with pairs of children with ASD for short periods of time on "ideas" about how to play together.

Kuhn et al (2008) used pivotal response techniques and showed that while both children with autism showed increases in responses to prompts following the peer training, only one showed an increase in initiations and these behaviours differed depending on which children were in the "trained group". The authors suggest the configuration of the peer groups (social and cognitive abilities) in relation to the profiles of children with autism is important in determining how successful the groupings are likely to be in facilitating social interactions.

Implications for research and practice
1. Pairing children with autism with other children with autism or other special educational needs can be useful, particularly for enabling children to discuss or explore strategies on how to play together.
2. The configuration of peer groups is likely to be important in determining how successful they are, so this is an area for further research.

3.1.5 Specific learning tools/approaches
This section reviews papers that investigate the impact of specific learning tools and approaches. The first group (Group a) looks at structured and systematic instruction to teach a range of skills, including reciprocal imitation skills and play. The second (Group b) describes studies that focus on strategies to develop specific cognitive skills. The third (Group c) researches the impact of social stories. We then review a group of studies looking at picture-based learning approaches (Group d) and computer-based approaches (Group e).

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3.1.5a Structured or systematic instruction: Pre-school (n=4 studies)

Four papers used structured or systematic learning tools and approaches for pre-school children. These examined:

1. Teaching reciprocal imitation skills to young children with autism using a naturalistic behavioural approach with a focus on object imitation. The study looked at whether increases in imitation led to collateral changes in the children's language, pretend play and joint attention behaviours (Ingersoll and Schreibman, 2006).

2. A play-based intervention called Tabletop Identiplay in the UK, assessed whether this increased specific play behaviours, whether these play behaviours were evident across different play contexts and whether improved play behaviours led to an increase in social interaction (Thomas and Smith, 2004).

3. The effectiveness of a combination of correspondence training and activity schedules on on-task and play correspondence behaviours, exploring the generalisation of behaviour change and assessing the social validity of the strategy among relevant consumers (Morrison, Sainato and Benchaaban, 2002).

4. The effects of enhanced milieu teaching on the social communication skills of pre-school children with autism. The study assessed children's acquisition, maintenance, and generalised use of language targets and social communication skills (Hancock and Kaiser, 2002).

Findings from these studies were promising although methodological limitations must be factored in. For the first study (Ingersoll and Schreibman, 2006), findings highlighted that children exhibited significant increases in their rate of spontaneous object imitation and maintained those across treatment phases – there were also significant increases in imitative language. The second study (Thomas and Smith, 2004) found children spent a greater amount of time engaged in social interaction after the intervention, showed by frequency of eye contact and increase in verbal communication. All children played more purposefully with the tabletop toys in the free-play session and children also spent an increased amount of time playing alongside other children in parallel play and/or playing with other children post intervention. In the third study (Morrison et al, 2002) all four participants' on-task and play correspondence behaviour increased while experimenter prompts decreased. Finally, Hancock and Kaiser (2002) found all children showed increases

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in their language use after the intervention. The authors reported generalisation to the home for three of the children. Parent ratings of satisfaction were also very positive.

Implications for research and practice

1. Structured interventions can affect children's play skills.
2. Increasing children's imitation may be linked to development of language and communication.
3. Generalisation was shown in at least two of the above studies. Future studies could explore ways of isolating which factors might affect whether children can generalise.

3.1.5a Structured or systematic instruction: Primary (n=5 studies)

Of the five studies targeting primary-aged pupils none offered a high weight of evidence for a particular approach or technique. All incorporated teaching techniques based on behavioural principles including modelling correct responses and positive reinforcement. They specifically considered:

1. A multi-component training procedure to teach children with autism "helping behaviours" in the context of a private special school for children with autism (Reeve, Reeve, Townsend and Poulson, 2007).
2. Use of classwide peer tutoring in teaching ball-catching skills to children with autism in mainstream PE classes (Ward and Ayvazo, 2006).
3. Whether children with autism would demonstrate incidental and observational learning of words when structured instruction took place in pairs (Ledford, Gast, Luscre and Ayres, 2008).
4. The effect of introducing a structured reading programme (Edmark) on acquisition and understanding of sight words (Balfe, 2008).
5. A comparison of the effectiveness of 30-minute versus 120-minute distribution of "embedded instruction"; essentially, structured instruction consisting of questioning, modelling a response and offering social reinforcement for correct responding (Polychronis, McDonnell, Johnson, Riesen and Jameson, 2004)

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Despite limitations of sample size and design, two particular studies offer useful evidence. First, Ledford et al (2008) explored whether children aged five to eight with autism would demonstrate incidental and observational learning of words when structured instruction took place in pairs. Using a multiple probe across behaviours design, the results showed that each student successfully learned their target words and phrases and also learned their partners' words (observational learning) plus incidental information on the words and phrases. The findings therefore offer some support for the idea that small-group instruction for students with autism and learning disabilities can be effective, potentially offering a more cost-effective teaching strategy.

Second, Polychronis et al (2004) compared use of structured instruction for learning specific skills when spread across a 30- or 120-minute period. Only two children with autism were included (aged seven and 11) but results showed that trial distribution strategies were effective in promoting acquisition of target skills or knowledge. But the shorter (more intensive) 30-minute sessions were as, or more, effective than the longer ones. Generalisation to untrained stimuli also occurred and teachers were positive about the approach. Despite its limitations, this paper is useful because it considers teaching approaches that can be used within the context of mainstream classrooms. As such, it suggests short periods of structured learning can be embedded within normal classroom activities and may lead to successful learning. Whether this would be effective with more complicated or abstract tasks is unknown.

Implications for research and practice

1. Structured instruction can be successful in teaching specific tasks but should be used with other techniques.
2. The above studies confirm the potential benefits of children working in pairs and in small group instruction through structured instruction.
3. The study on length of instruction time is interesting and similar research could be beneficial in highlighting optimum teaching time for different skills.

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3.1.5a Structured or systematic instruction: post primary and post-compulsory education (n=3 studies)

The three studies in this section looked at:

1. The effects of "priming" classroom tasks on academic and responding behaviours of two pupils with autism (Koegel, Koegel, Frea and Green-Hopkins, 2003b).
2. The effect of an intensive habilitation programme in improving functional communication and reducing maladapative behaviours within a group of 11 young adults with ASD and severe learning difficulties (Polirstok, Dana, Buono, Mongelli, and Trubira, 2003).
3. Evaluating the impact of a residential programme based on the TEACCH model, focusing on programme quality as well its impact on participants (Van Bourgondien, Reichle, and Schopler, 2003).

Limitations in the research design of all three studies meant they provided limited evidence for the review overall. Nevertheless, they show potential implications for practice. The first (Koegel et al, 2003b) showed promising results for the approach of "priming" – a method where a low-demand version of a higher-demand task is presented to the child ahead of time and the child has plenty of positive reinforcement during task completion. The theory is that the student succeeds and gains confidence and skills so finding it easier to tackle the related, but more difficult, task in the classroom. Although the sample was very small with only two students, findings showed increases in appropriate behaviour and academic responding in the "primed" condition compared to "nonprimed" conditions. This approach seems relatively simple to implement and offers a potentially useful classroom strategy to assist learning.

The second study (Polirstok et al, 2003) reported statistically significant increases for all adaptive behaviours (except on the community living and coping skills scales of the VABS), and decreases in maladaptive behaviours following an intensive habilitation programme. It also reported significant gains in task compliance, with functional communication increasing most. This approach shows promise but more robust studies are required to confirm the findings and generalise them to different settings. The final study (Van Bourgondien et al, 2003) outlined findings related to environmental factors rather than to

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acquisition of skills. Participants in the treatment programme (based on the TEACCH model) were found to have more structured, individualised programming and positive behaviour management compared to control groups (based in a range of settings), and staff had a greater understanding of autism.

Implications for research and practice

1. Studies examining the effect of structured approaches should detail the interventions, give thorough information on participants, report clear dependent variables and use stronger designs.

2. Evidence suggests the structured approach of "priming" could be of potential benefit in the classroom but further studies are needed to explore and confirm this. This could include a more in-depth study on use of "priming" in post primary schools.

3.1.5b Strategies to develop specific cognitive skills (n=2 studies)

Two studies examined use of two particular strategies to develop specific cognitive skills:

1. Use of concept mapping as a learning tool (Roberts and Joiner, 2007).
2. Use of a video-based programme targeting "mindreading" (Bell and Kirby, 2002).

Roberts and Joiner (2007) investigated the use of concept mapping as a learning tool for supporting the retention and recall of subject specific knowledge for national curriculum science lessons for students attending a special school in the UK. Concept mapping involves developing a visual map showing "facts" (in boxes) and links between facts (using lines and arrows). The study showed promising results in that it promoted threefold increase in retention but due to wide variation of scores between groups did not reach statistical significance. Nevertheless it is promising because it employed a robust design and used a method that students could quickly be trained in, suggesting potential for transfer into the mainstream context.

Bell and Kirby (2002) investigated use of a novel video-based programme targeting "mindreading" skills (theory-of-mind abilities focusing on emotions and beliefs assessed using "false belief" tasks). Children were more able to pass false belief tasks at a higher

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level after the teaching, with some generalisation. But the small sample size, limitations of the AB design and children having clear difficulties with the tasks along with low levels of engagement mean conclusions drawn are limited.

Implications for research and practice

1. Concept mapping could be useful in mainstream settings. Further studies would benefit from a design that could isolate factors that might enable practitioners to determine for which children and subject areas it might be most beneficial.

3.1.5c Social stories (n=3 studies)

Three studies, examining the effect of social stories (one involving pre-school children and two children of primary age) investigated:

1. The effect of social stories on prosocial behaviour of pre-school children with autism spectrum disorders (Crozier and Tincani, 2006).
2. Social stories and their effect on disruptive behaviours of three boys with autism (two aged seven and one 15) (Scattone, Wilczynski, Edwards and Rabian, 2002).
3. The implementation of "comic strip conversations" to teach children with autism how to better manage and maintain their interpersonal relationships and problem solve in social situations (Pierson and Glaeser, 2007).

Social stories, developed by Carol Gray (1994a), aim to help children manage their own behaviour by describing particular (usually familiar and frequently experienced) scenarios, what might happen and how the child should respond. They are developed with individual children's needs in mind and structured around their specific context (including people, situations and places). A comic strip conversation, also designed by Gray (1994b), is similar. In the third study (Pierson and Glaeser, 2007) students were encouraged to draw scenarios, reflect on their own feelings and (with a teacher) consider alternative strategies for social problem-solving. Alternative, appropriate behaviours were agreed and then reinforced throughout the day. There were positive findings for the use of social stories and comic strip conversations. In each of the three studies problematic target behaviours decreased following use of the scripts.

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This is encouraging because these interventions are much less intrusive and time/labour intensive than many. All studies implemented the interventions in naturalistic, everyday school environments. The approaches are also flexible in that they are purposely designed around a child's individual needs and circumstances. Limitations in design, including sample size, make it difficult to draw conclusions. Determining which specific elements of the social story approach are critical to their effectiveness is also problematic and studies did not report on follow up, so it is not known if treatment effects were maintained.

Implications for research and practice

1. The above studies show promising results for social story use, a positive due to the relative ease through which this approach can be implemented in classrooms. Further studies are needed to replicate findings and to isolate social story elements are critical.

2. Given that only two studies have so far investigated social story use with pre-school children, only further research can establish its effectiveness with this population.

3.1.5d Picture-based learning approaches: Precursor skills for understanding pictures or symbols (n=2 studies)

Two studies, looking at precursor skills for understanding pictures or symbols (both covering pre-school children), investigated:

1. Differential effects of simplified and typical verbal antecedents on acquisition of picture discrimination (Chavez-Brown, Scott and Ross, 2005).

2. The effect of aided language modelling on symbol comprehension and production (Drager, Postal, Carrolus, Castellano, Gagliano and Glynn, 2006).

The latter in particular represents an important area of study, but studies were limited in research design and can only be treated as preliminary. No implications for research and practice arise as a result.

3.1.5d Picture-based learning approaches: Picture exchange communication system (PECS) (n=5 studies)

PECS is an established educational approach developed by Bondy and Frost (1994) that uses behavioural principles (such as prompting and reinforcement) to teach spontaneous

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communication skills using objects, symbols or pictures. Of five papers on this intervention, two were given a high weight of evidence. These were:

1. Yoder and Stone (2006**) who compared PECS effectiveness for facilitating intentional communication with responsive education and prelinguistic milieu teaching (RPMT).
2. Howlin, Gordon, Pasco, Wade and Charman (2007**) conducted a randomised controlled trial (RCT) to see if PECS use would lead to increases in spontaneous communication.

The remaining papers were:

1. Magiati and Howlin (2003) whose UK pilot study evaluated PECS potential for supporting language and communication skills of children with ASD.
2. Ganz and Simpson (2004) who ran a small-scale evaluation of PECS with three children with ASD, one with autism and two with developmental delay and all with moderate or severe autistic characteristics according to CARS.
3. Charlop-Christy, Carpenter, Le, LeBlanc and Kellet (2002) who implemented a PECS programme with three boys with autism.

The Yoder and Stone (2006**) paper was particularly important in finding a differential performance on the two communication programmes: PECS appeared to be more effective for children with lower levels of intentional communication, while RPMT was more effective for those with pre-existing higher levels of intentional communication. The Howlin et al (2007**) study indicated modest success at best for PECS use. Children with ASD and language impairments learned to use the system effectively but there was no generalisation of this skill to spoken language and no maintenance of learned skills once the active intervention ceased.

These findings, however, need to be balanced against findings from an earlier study by Magiati and Howlin (2003) which showed an increase, over time, in children's use of PECS and in their PECS vocabulary. Typically, an initial rapid rise in the early stages was followed by a levelling off and non-significant change thereafter. This was especially the case for children with higher language ability at the outset. Unfortunately, the overall impact of

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these findings is limited since there was no comparison group and children could not serve as their own controls as baseline data before PECS start-up were not available for all of them.

Ganz and Simpson (2004) showed children could master the PECS system and used more intelligible spoken words, especially towards the end of training. Findings were limited, however, due to an intervention-only study design. Also, the research was funded by a grant to the first author (Ganz) and Bondy and Frost – the two people who developed the PECS system. This evaluation is therefore non-independent.

Finally, although a small-scale study, Charlop-Christy et al (2002) highlighted the importance of considering pre-intervention abilities for children using PECS. The three participant boys learned to use PECS effectively and showed substantial increases in spontaneous speech (without vocal prompts) following training. Social communicative behaviours increased and problem behaviours decreased. The few participants coupled with variations in where (and thus how – although this is not reported) the intervention occurred make wider conclusions difficult. Nevertheless, the authors classified these three children as "talkers" (rather than "nontalkers') because they could imitate behaviours and this may have facilitated their verbal communication. In other words, they already had within their repertoire the potential to imitate and produce speech and this may not be the case for other children. The authors noted that future research should try to identify the profiles of children who may become "talkers" (and so likely to benefit from PECS) and those who do not. The Yoder and Stone study goes some way to unpicking at least some aspects of what this profile might be.

Implications for research and practice

1. Widespread PECS use in classrooms should be carefully considered given the findings of the randomised controlled trial above.
2. These studies nevertheless confirm that PECS can be implemented and used within everyday school classrooms.
3. Many practitioners are using PECS with minimal training and these studies highlight the importance of assessing children's communicative levels before implementing

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such systems. There is, however, much confusion on PECS implementation and it should only be used by appropriately trained individuals.

3.1.5d Picture-based learning approaches: Other picture-based approaches (n=1 study)

Cihak (2007) explored whether nonverbal students with autism could acquire picture-reading skills and so develop visual literacy.

The findings provide good evidence for a systematic approach to helping nonverbal children with autism to learn picture reading – an important area of investigation for practitioners. Study limitations include the small sample size and lack of clarity on intervention length or intensity, leading to the conclusion that this is a preliminary study and no implications arise currently for practice.

3.1.5e Computer-based approaches (n=4 studies)

Four studies on computer-based approaches, spanning pre-school to post-compulsory education and adulthood, evaluated the following interventions:

1. Development of reading skills in eight children aged three to five (Williams, Wright, Callaghan and Coughlan, 2008).
2. Use of a computer-based language tutor (called Baldi) for facilitating vocabulary learning for children with autism (Bosseler and Massaro, 2003).
3. An individualised computer-based augmentative and alternative communication system and its use in enhancing the ability of three girls with Rett's syndrome to identify symbols (Hetzroni, Rubin and Konkol, 2002).
4. Assessing the effectiveness of computer-based software for teaching emotion recognition in adults with ASD (Golan and Baron-Cohen, 2006**).

These studies yielded positive results on the extent to which computers can aid instruction and affect a number of skills from vocabulary extensions and reading skills to emotion recognition. Participants were also motivated to use computers. This is promising for supporting learning in the classroom and more widely. Since most schools, classrooms and other provisions are well equipped with computer equipment, they are potentially easily accessible. Conclusions are necessarily limited beyond these small samples, however, and

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generalisation of learning to other settings needs to be explored in future research. It is particularly important to conduct studies that assess the extent to which learning through computers extends to other situations and whether what is being learnt has practical utility in understanding and responding in real life social situations.

Implications for research and practice

1. Findings are positive for use of computers, although studies indicate that computer-based interventions also need to focus specifically on enabling this learning to be generalised to new and different real-life situations.

3.1.6 "Voice" of children, young people and adults (n= 7 studies)

The experience of schooling and life more broadly from the perspectives of children, young people and adults with ASD is a neglected area of research. According to our criteria for the review, this topic should technically be excluded because outcomes for children and young people are not reported. We consider children and young people's views, however, to be essential to informing high quality educational and other service provision. Therefore we include below examples where these have been sought. Note that, due to the slightly wider search for reports on adults, some are not peer-reviewed journal articles. Six papers and one research report sought the experiences of children, young people and adults with ASD. These explored:

1. The everyday experiences of mainstream school in the UK for a group of young people aged 11 to 17 years (Humphrey and Lewis, 2008).
2. Sexuality and adults with autism, with particular reference to the experiences of four adults with autism (Pukki, 2003).
3. First-hand perspectives on what social supports and strategies were found effective by a group of adults with ASD/AS (Muller, Schuler and Yates, 2008).
4. Perceptions of students with AS about their lives within higher education (Madriaga, Goodley, Hodge and Martin, 2007).
5. A study of seven couples where one partner had AS (Thompson, 2004).
6. Access and barriers to self-advocacy, as perceived by individuals with ASD (Townson, Macauley, Harkness, Docherty, Dias, Eardley and Chapman, 2007).

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7. The needs and services for 10 to 18 year olds with Asperger syndrome in Northern Ireland (Jones, English, Guldberg, Jordan, Richardson and Waltz, 2007).

These papers highlight the important insights to be gained from harnessing the experiences of individuals with ASD and building on them to inform interventions. They provide strong evidence from the views of young people with ASD on the inclusiveness (or not) of mainstream educational provision, including higher education. Humphrey and Lewis (2008) highlight the difficulties that individuals with ASD can have with initiation (commencement of study) and the research signals the need for educators to see this as a key area. Findings from some highlight the importance of gaining the perspectives of people with autism to develop sex education that builds on an understanding of their specific needs.

Implications for research and practice

1. Practitioners and researchers need to find ways to harness the perspective of children, young people and adults with ASD and ensure these perspectives inform support, interventions and education.
2. Few studies examine interventions that support individuals with ASD to initiate and maintain relationships. This is a unique and important area worthy of further research.

3.1.7 School staff training (n=4 studies)

On staff training four studies focused on instructing school personnel in specific techniques for supporting children and young people with ASD. Three used structured, behaviourally-based approaches and one examined the use of social stories. This section has not been subdivided across age groups due to the small numbers of papers on this theme.

Papers focused on:

1. Training teaching assistants in use of discrete trials techniques to reduce difficult behaviours (stereotypy) in primary aged children with autism (Dib and Sturmey, 2007).

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2. Effectiveness of applied behaviour analysis teacher training in reducing challenging behaviour in students with autism aged two to 15 (Grey, Honan, McClean and Daly, 2005).

3. Training "paraprofessional" teaching staff in social story use to target specific problem behaviours in primary aged children with autism (Quilty, 2007).

4. Using a structured teaching approach to help young people with autism and severe learning disabilities, aged 12 to 14 years, access "mainstream" reading books (Browder, Trela and Jiminez, 2007).

We can conclude from the above four studies that training teachers and paraprofessionals can influence children's behaviour and development. It is clear that staff value relevant training but it is also important to know whether it *makes a difference* to teaching practices and, ultimately, the learning of children with ASD. These studies involved small numbers of participants and are thus limited when it comes to generalising findings to the population as a whole. Nevertheless, their design allowed the researchers to temporally link the intervention with changes in targeted behaviours. The studies show that more structured interactions with students appear to reduce stereotypy but it is not possible to know whether the methods they outline are more effective than others. The specific approaches do nevertheless demonstrate some potential for use in the mainstream or special classroom although evidence is limited on whether a reduction in stereotypy is linked to positive outcomes for the child in learning or engagement. There is also limited empirical evidence concerning type and length of staff training required to promote successful outcomes for children and young people on the autism spectrum.

Implications for research and practice

1. These studies provide evidence that training staff to use specific approaches can in turn affect children's learning and behaviour.

2. They lack carefully matched control groups, there is limited description of subject characteristics and small samples. These factors limit capacity to generalise from these findings on the impact of staff training. Further studies are needed using research designs that enable the field to draw more robust conclusions about the type of training that can make a difference to practice.

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3. The literature review found no papers that evaluate the impact on practice of generic autism training programmes on staff and indirectly on children's learning, development and behaviour. There is an urgent need for further studies on this topic.

4. Further research is needed on specific training needs of teaching staff in addition to more studies that independently evaluate the training received.

3.1.8 Parent training/involvement (n=12 studies)

Research papers in this section deal with parent training and involvement, focusing on parents and families with young (preschool/early years) children with autism. Generally, the findings highlight the importance of offering training to parents, who can be supported in learning specific skills that significantly help to improve social and communicative skills, and decrease problematic behaviours, in their children with ASD. These studies:

1. Evaluated a specific resource kit (Keyhole Rainbow Resource Kit) designed to "help families minimize the effects of autism and to ensure the educational and social development of children with autism through play" (McConkey, Milligan, Truesdale-Kennedy and Poulton, 2007).

2. Implemented a five-day intensive centre-based education programme for parents of five young children with ASD (aged three to five) using pivotal response training targeting functional communication (Koegel, Symon and Koegel, 2002).

3. Involved parents in a privotal response training programme and assessed the progress of 158 children in a community-based sample (Baker-Ericzen, Stahmer and Burns, 2007).

4. Carried out a parent-implemented imitation intervention with three mother-child dyads, focusing on reciprocal imitation training use that encourages parents to respond contingently to children's gestures and to model uses of objects (Ingersoll and Gergans, 2007).

5. Explored a more wide-ranging, naturalistic approach to parent-implemented intervention involving 17 children and their parents; a group of children aged two and their parents participated in an early social interaction project for 12 months (Wetherby and Woods, 2006).

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6. Ran a pilot randomised control trial of a parent-training intervention for pre-school children with autism, focusing on linguistic precursors such as joint attention skills and joint action routines. Parents were also given behavioural management advice and techniques to promote "compliance" with requests (Drew, Baird, Baron-Cohen, Cox, Slomins, Wheelwright, Swettenham, Berry and Charman, 2002).

7. Conducted a relationship-focused intervention with parents to enhance the social emotional functioning of 20 young children with ASD. Sessions focused on enhancing parental interactive strategies through using a responsive teaching curriculum (Mahoney and Perales, 2003**).

8. Aimed to increase the quality of parental adaptation and communication with their child through focusing on shared attention and parental sensitivity and responsiveness to children's behaviours and communication. This was a pilot randomised controlled treatment study of an intervention (Aldred, Green and Adams, 2004**).

9. Addressed the need for training for parents and siblings to take into account contextual information on families' routines, beliefs, support and patterns of social interaction (Moes and Frea, 2002).

10. Involved five mother-child dyads (children aged two to six) in a multiple baseline study of teaching two different strategies to parents which could be embedded within daily routines in and around the home (Kashinath, Woods and Goldstein, 2006).

11. Retrospective analysis of an intervention study to train fathers to facilitate social reciprocity with their children (Seung, Ashwell, Elder and Valcante, 2006).

12. Provided information on Asperger's and training in specific techniques for managing behaviour and improving social understanding (such as social stories and comic strip conversations) for parents of primary school age children (six to 12) with Asperger's (Sofronoff, Leslie and Brown, 2004**).

The key word from evidence summarised in this section is "fine-tuning". This is needed on a number of levels:

First, on the responsiveness of interactions between parent(s) and child – some of the strongest findings in this section came from well-designed interventions that helped

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parents to "fine-tune" their social and communicative interactions with their children (Mahoney and Perales, 2003**; Aldred et al, 2004**). Importantly, both studies noted significant qualitative improvements in interactions over time, alongside statistically significant improvements in language and cognition.

Second, on the context in which the intervention is carried out – Moes and Frea (2002) compared a standardised, home-based functional communication intervention with a contextualised approach that took into account family routines, beliefs and support systems. Both approaches improved communication and decreased problem behaviours but this effect was more pronounced in the contextualised condition and families also felt it was more sustainable.

Third, in relation to ongoing support and training with interventions or specific techniques, McConkey et al (2007) highlighted the importance of the continuing role of a key worker throughout their intervention and, notably, Sofronoff et al (2004**) found children whose parents received ongoing support fared better than those whose parents received a one-off training workshop. Other studies (Drew et al, 2002; Moes and Frea, 2002) note the self-reported difficulties of parents in implementing aspects of these interventions in the context of family life, suggesting that continuing support will be vital to their success.

Fourth, these studies focus on developmental areas that are pivotal in establishing higher level functioning, such as attachment, empathy, self-regulation and co-operation. They also enable parents to work on aspects of communication and social interaction that target the core deficits of autism that are developmentally linked to later language and cognitive functioning, such as joint attention, synchrony and joint action routines.

Finally, the study by Sofronoff et al (2004**) highlights the importance that parents attach to information on the psycho-educational aspects of ASD (teaching about the condition and the difficulties commonly experienced) and the ability to implement specific techniques flexibly.

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Implications for research and practice

1. These studies highlight the importance of providing training programmes that enable parents to develop further understanding of the autism spectrum, including how having an ASD can affect different developmental areas.

2. There is a need for further well-designed studies in the area of parental interaction with the child with an ASD, particularly for studies that use control groups and that measure development at several points over the period of an intervention.

3. These studies highlight the importance of naturalistic studies that take into account family characteristics. Individual contexts need to be appropriately considered for any intervention and how it may fit (or not) with family life.

4. The studies highlight the importance of continued and sustained support for parents and that there is some need for individualised support.

3.1.9 Summary of empirical strand

Of the 100 research studies reviewed, 12 were rated as offering a high weight of evidence for our purposes. These were clustered around research with pre-school children comparing early intervention approaches, PECS use, and the involvement of parents in supporting young children's development, most notably in early communicative behaviours. The robust, larger-scale methodologies of these studies for younger children highlight the importance of early intervention. This focus is also reflected in the evidence identified more generally: 49 per cent of empirical articles involved children of pre-school age and a further 33 per cent , children of primary school age (82 per cent focusing on younger children). Only 10 per cent focused on the needs of post primary-aged children and young people and 8 per cent on post-compulsory education and adults. Of particular note is Golan and Baron-Cohen's (2006) study investigating use of computer software for helping adults with ASD learn about emotions. This study represented a very rare example of robust research with adult participants.

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Although many studies had methodological and sampling shortcomings it is encouraging that just over half (57 per cent) adopted methodologies that could be described as "more robust" (utilising multiple-baseline designs and comparison groups). Adding the randomised controlled design studies to this, the figure approaches two-thirds of the included articles (63 per cent). However, many papers – including those with more robust methodologies – also involved small sample sizes: 48 per cent included 11 or fewer participants (from 14 of the 23 subsections, see Table 3.1). Consequently, there remains a general challenge within this broad field of research regarding small sample sizes and, therefore, the extent to which findings can be applied to larger groups of children.

Overall, there are many wide-ranging techniques and interventions described and evaluated in the research in the review, including behaviourally-based techniques as well as approaches to learning involving videos, pictures and computers. The diversity of learning approaches and outcomes, as well as profiles of participants, is notable; not all children included in the studies learned new information/skills, or benefited from the approach. There is no single intervention or technique that "stands out" from the others as offering a "better fit" for most children with autism; their individual profiles and needs are crucial for informing us about what may work and for whom. Sections 3.1.2 a+b summarising research that compares different types of interventions for pre-school children through robust methodological designs offers the strongest evidence of this. Taken together, these studies provided mixed results on the benefits of early intensive behavioural intervention compared to other interventions.

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Table 3.1: Mapping of key details of articles in empirical section

Section	Theme/sub theme	Age of subjects /stage of schooling				No of subjects	Geographical spread					Type of study design*				High WoE
		Early years	Primary	Post primary	FE/ HE adult	Range across studies	UK	IRL	USA Can	Eur	RoW	(1)	(2)	(3)	(4)	
3.1.1	Multi-component interventions	5	2	0	0	3-48	0	0	5	2	0	2	5	0	0	1
3.1.2a	Comparison of different types of interventions: Pre-school	5	0	0	0	17-64	4	0	1	0	0	0	0	5	0	4
3.1.2b	Comparison of different interventions for developing play: Pre-school	5	0	0	0	4-58	0	0	3	0	2	0	0	4	1	1
3.1.3	Home-based interventions and impact on parents	3**	0	0	0	22-65	3	0	0	0	0	1	2	0	0	0
3.1.4a	Social interaction, understanding and skills: Pre-school	5	0	0	0	2-7	0	0	5	0	0	1	0	4	0	0
3.1.4a	Social interaction, understanding and skills: Primary	0	2	0	0	4-6	0	0	1	0	1	0	0	2	0	0
3.1.4a	Social interaction, understanding and skills: Post primary	0	0	4***	0	9-38	2	0	1	0	1	2	0	2	0	0
3.1.4b	Social interaction, understanding and skills: Visual supports and video modelling	5	2	0	0	2-4	1	0	5	1	0	0	0	7	0	0
3.1.4c	Social interaction, understanding and skills: Peer facilitation: Typically developing peers: Pre-school	2	0	0	0	4-5	1	0	1	0	0	0	0	2	0	0
3.1.4c	Social interaction, understanding and skills: Peer facilitation: Typically developing peers: Primary	0	6	0	0	2-10	1	1	3	0	1	0	3	3	0	0

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Table 3.1 cont:

Section	Theme/sub theme	Age of subjects/stage of schooling				No of subjects	Geographical spread					Type of study design*				High WoE
		Early years	Primary	Post primary	FE/ HE adult	Range across studies	UK	IRL	USA Can	Eur	RoW	(1)	(2)	(3)	(4)	
3.1.4d	Social interaction, understanding and skills: Peer facilitation: peers with SEN or ASD: Primary	0	2	0	0	2-6	0	0	2	0	0	0	0	2	0	0
3.1.5a	Structured or systematic instruction: Pre-school	4	0	0	0	3-5	1	0	3	0	0	0	1	3	0	0
3.1.5a	Structured or systematic instruction: Primary	0	5	0	0	2-6	0	1	4	0	0	0	3	2	0	0
3.1.5a	Structured or systematic instruction: Post primary and post-compulsory education	0	0	1**	2	2-11	0	0	2	1	0	0	1	2	0	0
3.1.5b	Strategies to develop specific cognitive skills	0	1	1	0	3-10	1	0	1	0	0	0	1	1	0	0
3.1.5c	Social stories	1	2	0	0	3	0	0	3	0	0	0	1	2	0	0
3.1.5d	Precursor skills for understanding pictures or symbols	2	0	0	0	2-4	0	0	2	0	0	0	0	2	0	0
3.1.5d	Picture exchange communication system: PECS	1	4	0	0	3-84	2	0	3	0	0	1	1	1	2	2
3.1.5d	Other picture-based approaches	0	1	0	0	3	0	0	1	0	0	0	0	1	0	0
3.1.5e	Computer-based approaches	1	2	0	1	3-19	2	0	1	0	1	0	0	4	0	1

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Table 3.1 cont:

Section	Theme/sub theme	Age of subjects/stage of schooling				No of subjects	Geographical Spread					Type of study design*				High WoE
		Early years	Primary	Post primary	FE/ HE adult	Range across studies	UK	IRL	USA Can	Eur	RoW	(1)	(2)	(3)	(4)	
3.1.6	"Voice" of children, young people and adults with ASD	0	0	2	5	4-35	5	0	1	1	0	7	0	0	0	0
3.1.7	School staff training	0	2	2**	0	3-11	0	1	3	0	0	0	1	3	0	0
3.1.8	Parent training/Involvement	10	2	0	0	3-158	3	0	8	0	1	0	4	5	3	3
Totals	Column Overall	49	33	10	8		26	3	59	5	7	14	23	57	6	12
		100					100					100				

* Key for types of design

1 A "one-stage" design involving a survey, evaluation, interviews or intervention only

2 Designs that include baseline or pre-intervention measures followed by an intervention; in some cases this is followed by a re-administration of baseline and/or post-intervention measures (standardised assessments)

3 More robust designs which include multiple baseline measures or probes and/or repeated reversal/treatment conditions

4 Randomised controlled trial

** includes one study with mixed age groups (spanning more than one stage of schooling)

*** includes two studies with mixed age groups

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3.2 Expert strand

This strand of the review considers educational recommendations arising from policy and best practice documents for children and adults with ASD. Its sections are as follows: Section 3.2.1 summarises documents relating specifically to provision in Ireland. Section 3.2.2 overviews the eight documents used to inform the rest of the strand. Brackets indicate how the documents will be referred to within the text. Section 3.2.3 discusses key themes arising primarily on children, although some material is applicable to child and adult sectors. Section 3.2.4 summarises the additional documents used to inform the post-compulsory education (adults) section and Section 3.2.5 discusses key themes arising from these. Section 3.2.6 draws together priorities for research arising from the literature in this section and, finally, Section 3.2.7 briefly summarises this strand. Within each sub-section we draw out implications for practice and research based on consensus within the documents. These provide a transparent pathway from the evidence derived here to the key recommendations presented in Section 5.

3.2.1 Guidelines to support the education of students with ASD: Ireland specific

Inclusion of Students with Special Educational Needs: Post Primary Guidelines (Department of Education and Science, 2007a).

These guidelines aim to assist schools in providing appropriate education for students with special educational needs at post primary level within the current legislative framework. They are a manifestation of the advisory remit of the inspectorate under the Education Act (1998). The introduction states that in compiling them, emphasis was placed on the education and inclusion of students with special educational needs in mainstream post primary schools, although some elements may also be useful in special schools.

The Department of Education and Science (2007a) recognises the need for a continuum of provision for students with special educational needs. In recent years, a notable increase in the enrolment of students with special educational needs in mainstream post primary schools is evident. The allocation of additional teaching and care staff to schools to assist in the education of these students has also increased significantly. The guidelines

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recognise the challenge of including students with special educational needs at post primary level, they build on existing good practice and suggest how it can be developed in the future.

The guidelines advocate a whole-school approach to policy development and implementation; collaboration between teachers and others; and effective approaches to staff deployment and teaching methods. Schools are also advised to adopt flexible organisational arrangements on the placement of students with ASD in a designated special class or unit. It is recognised also that some students will need to spend most or all of their day in a separate designated classroom:

> School policy should be to create a situation where the students who are placed in a special class or unit are enabled, to the greatest extent possible, to be included in lessons in mainstream classes. They should be taught separately in the special class setting only when it is in their interests and at points in their timetable when they are unable to participate beneficially in lessons in mainstream (p53).

The guidelines also suggest that mainstream teachers may work in a team-teaching arrangement along with the resource teacher in the special class. In some schools with a special class, arrangements are made for "reverse integration" opportunities, where students from the mainstream setting are enabled to take some classes with students with special educational needs in the special class setting.

Guidelines on the Individual Education Plan Process (NCSE, 2006).

The Education for Persons with Special Educational needs (EPSEN) Act (2004) sets out a statutory framework for preparation and implementation of individual education plans (IEPs). Although the timetable for EPSEN implementation is yet to be agreed, national guidelines on the IEP process were published by the National Council for Special Education in May 2006 to "provide an opportunity for teachers, parents and schools to become familiar with the process well in advance of the terms of the Act coming into force" (pv). All children and young people with ASD will be entitled, under the Act, to an individual education plan. Guidelines for preparation, implementation and review of these

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are set out in this document but relevant training for personnel involved has yet to be addressed for newly trained teachers or those requiring in-service training.

Guidelines for Teachers of Students with General Learning Disabilities (NCCA, 2007).

Since 1999, the NCCA (National Council for Curriculum and Assessment) has been involved in writing these guidelines which are designed to support the teaching and learning of pupils with mild, moderate, severe and profound general learning disabilities in primary and post primary schools. A draft document was made available to all schools in 2002 and later revised on the basis of feedback and review. The official version has been released to schools and contains revised and new materials.

The guidelines are designed so that teachers can select what is appropriate for their pupils' personal strengths and individual needs across the range of subjects included in the national curriculum. Like all students with special educational needs, children with ASD should have access to the national curriculum and these guidelines offer a useful resource to that end. However, it is less clear to what extent the guidelines tackle the specific needs of students with ASD where these may differ from children other types of special educational needs who do not have an ASD (for example, in relation to different learning styles and uneven learning profiles as well as specialist approaches or techniques).

Special Educational Needs: A Continuum of Provision (Department of Education and Science, 2007b).

These guidelines, along with resource pack, aim to assist primary school teachers to identify learning needs and to develop and evaluate interventions to meet them. They offer a practical resource for teachers to support the individual education plan process. The guidelines acknowledge the central role of the class teacher, supported as appropriate by the school's special education personnel and by external agencies. A continuum of assessment and intervention processes are advocated to assist the teachers in supporting students' needs.

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Developing a Code of Behaviour: Guidelines for Schools (NEWB, 2008)

The guidelines for developing a code of behaviour for schools were issued by the National Educational Welfare Board (NEWB) under Section 23(3) of the Education (Welfare) Act 2000. They emerged from an inclusive consultative process involving people from a range of relevant backgrounds including teaching, child psychology, welfare and the law, in addition to parents and young people. Copies have been issued to schools and a summary will be made available to parents with a version for students. "The code of behaviour is the set of programmes, practices and procedures that together form the school's plan for helping students in the school to behave well and learn well" (p2). The guidelines should be used for:

1. Auditing an existing code of behaviour.
2. Regular review and updating of an existing code or developing a code for the first time.
3. Promoting ongoing discussion and reflection about behaviour and learning in the school.

Special consideration is given to those students who are more vulnerable to behaviour problems. Class teachers and relevant personnel should check that standards and rules are communicated so that students with special educational needs can understand. The code suggests teachers may need support in understanding how best to support this student population to conform to the school's behavioural standards and expectations. For some, visual prompts and more opportunities to practise and observe the rules may be required.

Department of Education and Science Ireland (2006): An Evaluation of Educational Provision for Children with Autistic Spectrum Disorders

This qualitative study was undertaken by inspectors within the Department of Education and Science. It aimed to evaluate educational provision for students with ASD. Five categories of educational provision were evaluated during 2002-04. The sample consisted of four applied behavioural analysis centres, two dedicated special schools for students with ASD, three such schools for students with mild, moderate and severe learning

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disabilities, 10 special classes for students with ASD in seven mainstream schools, and provision for individual children in ordinary classes in eight mainstream schools. The main areas considered were curriculum, information and communication technology, student assessment and knowledge of ASD. The authors used questionnaires to elicit information from parents, school principals and staff members and evaluated a selection of schools across the five categories by looking at teaching and learning and document analysis.

The main findings from this study were that parents were dissatisfied with services for early diagnosis of ASD, believing more prompt intervention was needed. There was geographical variability in the level and availability of support services provided for families. The report recommended that procedures and services be developed by health and education authorities to ensure early identification and intervention for children with ASD. The authors found staff members in all educational provision other than the applied behavioural analysis centres had recognised teaching qualifications and recommended that all those involved with teaching and learning programmes should have a recognised teaching qualification. The report further recommended: "All teachers who work full-time with pupils with ASDs should attend an autism-specific course of not less than 450 hours...." (p83)[4], which should include modules on behaviour management, and access to courses covering specific approaches such as TEACCH, ABA and PECS. It was also recommended that training emphasising development of collaborative practice when involved in the individual education plan process be provided for teachers and that all educational placements have access to adequate systematic, co-ordinated multidisciplinary support.

3.2.2 Guidelines to support the education of students with ASD: Summary of documents (UK)

In England, the **All Party Parliamentary Group on Autism (APPGA),** created in 2000, aims to have representation from members of all major political parties as a campaigning and

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[4] The figure of 450 hours of autism-specific training is based on the number of hours in the graduate certificate in the education of pupils with ASD distance education course offered by St Patrick's College, Dublin. In the course accreditation document this number of hours is stated as an "indicative time allowance" and includes lectures, tutorials, classroom tasks relating to the course (assessing a pupil as a requirement for an assignment), school placements, and independent learning time. However, it should also be noted that teachers are released for only three weeks or about 75 hours of face-to-face tuition for this course. The remainder of the course is completed in their own time while in many cases working in very challenging teaching situations.

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awareness-raising group to improve services for people with ASD and their families. Its **Manifesto Progress Report 2005 – *Manifesto 2003-2005: Two years on*** – contained a summary of key policy developments relating to the manifesto.

The **Welsh Assembly Government's Autistic Spectrum Disorder (ASD) Strategic Action Plan for Wales (Welsh Action Plan), consultation document (2008)** sets out the ways in which the Welsh Assembly plans to meet the needs of individuals with ASD and their families and carers.

The **Scottish Executive Report on Implementation and Next Steps (Scottish Executive Report – 2006)** reported on progress made in Scotland, following recommendations laid out in its autistic spectrum disorders needs assessment report (2001). The **Scottish Intercollegiate Guidelines Network (SIGN – 2007)** aims to offer an evidence base and recommendations on the assessment, diagnosis and clinical interventions for children and young people with autism spectrum disorders. Although the focus is clinical, the guidelines include educational interventions that may influence clinical outcomes – an indication of the need to recognise and address the overlap between health and education.

The Department for Education and Skills' First Report: Autism Research Co-ordination Group (Autism Research Group) (2006) provided an overview of research activity within the UK and made recommendations for policy and practice.

The **National Autism Plan for Children or NAPC (NIASA, 2003)** are guidelines developed by interdisciplinary group the National Initiative for Autism: Screening and Assessment (NIASA). The guidelines are intended to inform health, education and social services. They focus on best practice for identifying, assessing, diagnosing and supporting pre-school and school age children with ASD.

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Educational Provision for Children and Young People with Autistic Spectrum Disorders Living in England: a Review of Current Practice, Issues and Challenges (AET report – Jones et al, 2008) brought together a comprehensive review of current literature and the views of a sample of parents and professionals across England, intended to steer the work of the Autism Education Trust. The trust was created in November 2007 and funded by the Department for Children, Schools and Families in collaboration with the National Autistic Society, TreeHouse and The Council for Disabled Children, and local authority representation.

3.2.3 Guidelines to support the education of students with ASD: Children and young people – main themes

This section has been divided into early assessment and intervention; staff training; working with families; multi-agency approach; types of intervention; the autistic voice and transition to adulthood. These themes have been drawn from the documents previously described and reflect the consensus on areas of priority arising from this literature.

3.2.3a Early assessment and intervention

There is clear consensus that early assessment and intervention is central to maximising opportunities for recognising children's difficulties and needs and for improving their emotional, educational, social, and cognitive development and their health.

The Welsh Action Plan cites the 2002 special educational needs code of practice for Wales (2008) which advises the adoption of a range of strategies that recognise the various complexities of need, the different responsibilities to assess and meet those needs, and the associated range of variations in provision which will best reflect and promote common recognition of the continuum of these needs. NAPC (NIASA, 2003) reports evidence that targeted interventions should begin as early as possible and recommends that a co-ordinated care plan and intervention programme be available within six weeks of diagnosis. It suggests that relevant professionals should receive training to recognise possible "alerting signals" and that parents have regular opportunities during pre-school years to discuss their child's development.

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For pre-school children, NAPC (NIASA, 2003) points to evidence that 15 hours a week of specialist educational programmes is considered optimum to achieve lasting benefits, although it acknowledges the significant resource implications of this. SIGN (2007) provides three separate lists of "warning signs" for pre-schoolers, school-age children and adolescents. Both NAPC and SIGN recommend that a keyworker with specialist knowledge of ASD take on a co-ordinating role. APPGA (2005) stresses that the specific provision should take account of parental/carer choice. It proposes a target age of five for all children with ASD to receive diagnosis and a maximum of six months between initial contact from parent and confirmed diagnosis.

Implications for practice

1. Interventions to be made available as soon as possible following diagnosis.
2. Provision should take account of the child's specific profile as well as parental choice.

3.2.3b Staff training

The necessity for trained and knowledgeable staff is featured within all the recommendations, with the majority highlighting the lack of consistency that currently exists across all sectors.

The importance of well-trained staff is central to the NAPC guidelines (NIASA, 2003), which specify the need for regular training on a "continuous basis", both during and post qualification and proposes that a national multi-agency group be developed to establish national standards for ASD training at all levels. SIGN (2007) recommends that all providers review their current training to ensure staff have the required knowledge and skills. The AET report (Jones et al, 2008) proposes a co-ordinated strategy of sharing and disseminating training information along with a national audit and directory of accredited and non-accredited training. It suggests that research be undertaken to assess the impact of training on practice and evaluation of varying types of training, linked to the development of a set of guidelines for parents and professionals to determine the quality.

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The AET report (Jones et al, 2008) proposes that professionals be educated to value parent/carer involvement, highlighting an important, sometimes neglected aspect. APPGA (2005) makes a strong statement of intent that training in ASD become mandatory for staff working in all health, education, social care and criminal justice sectors. It says this should apply to all staff who support children or adults with ASD and be achieved by 2013, and further, that all staff should have received ASD awareness training on commencing their employment. This is an enormous task with significant resource implications, but its importance within the literature is clear.

Implications for research and practice

1. Development of a detailed "training pathway" for all staff supporting children or adults with ASD, indicating training routes from basic awareness-raising to accredited training and continuous professional development, depending on specific staff role.
2. Clear strategy for development of mandatory training for all staff working in specialist roles supporting individuals with ASD.
3. Research to assess how various models of training influence practice in order to establish an evidence base that can inform the development of training that responds to the needs of both parents and professionals at all levels and in all sectors.

3.2.3c Working with families

The literature reflects that family members are often important advocates for their child, as well as themselves being vulnerable, anxious and needing support. There is broad agreement that the key role they and other family members play should be more recognised with specific reference to parent training, both in terms of general awareness-raising and parent-led interventions.

NAPC (NIASA, 2003) argues that families need to be closely involved and providers need to be both transparent and culturally sensitive in their approach. The AET report (Jones et al, 2008) also specifies the need to engage traditionally "hard to reach" families and to identify and address the needs of Black and minority ethnic families. SIGN (2007) discusses the potential of parent-mediated programmes as a means of promoting family interaction

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and empowering parents, particularly for pre-school children. They also recommend that parents be provided with accessible and good quality information as a minimum, emphasising that the information provided should reflect the child's particular presentation of ASD. Local access to training opportunities for parents is cited as important throughout the literature, while APPGA (2005) go further to recommend that support and training be made available to carers, siblings and families and stress that parental/carer choice should be taken account of when considering interventions.

Implications for practice

1. Effective consultation with parents/carers to ensure their views and choices are acknowledged.
2. Development of protocols for Black and minority ethnic families at a strategic level so that providers can develop awareness of differing cultural needs.
3. Parents and family members to have access to locally available training, including practical/financial support where needed.

3.2.3d Multi-agency approach

The literature from all sectors recognises the need for agencies to collaborate effectively to deliver a "seamless service" and avoid the confusion, anxiety and overload that can result from multiple separate agencies attempting to support one family. Several documents set out a framework to support multi-agency working at all levels.

NAPC (NIASA, 2003) highlights the importance of multi-agency assessment as essential to understanding the child's needs in health, education and care and developing a plan of action to meet them. It also advocates that such assessment should include the needs and strengths of family members. It proposes that "medical, physical, psychometric, educational, communication, language and motor competency, behaviour and mental health" assessments are included, and that one person from each agency has a specialism in ASD. It emphasises that budget-holders must acknowledge the importance of joint-agency working and suggests they commit to this via a joint funding mechanism. SIGN (2007) concurs, suggesting that clinicians ensure they collaborate with educational and other types of providers to gain an accurate picture of the child's level of functioning in all

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settings. It specifies that arrangements should be in place for liaising with educational providers at the time of diagnosis. It does, however, indicate that the extent of effective multi-agency working within Scotland remains variable, possibly influenced by parent education and social class.

SIGN (2007) draws from the literature to assert that often, the competence of professionals is more important than their professions *per se*, and warns of the detrimental effect of taking a "piecemeal" approach to responsibilities that may well overlap. APPGA (2005) advocates that an ASD multi-agency team should be available in every locality, with a named senior manager in every local authority taking over-arching responsibility for commissioning and delivery for children and adults. This could potentially be useful in addressing transition needs and achieving a much needed "seamless service" between child and adult provision. It also advocates developing a compatible database that all relevant agencies can access.

The Welsh Action Plan (2008) argues that improvements in provision "will be delivered only by effective co-operation at local, regional and in some cases national levels between all those with an interest" (p1). It proposes a set of actions to map existing and future needs, an ASD co-ordinating group for every area and an "ASD champion" to work with key stakeholders.

Implication for practice
1. Commissioners from health, education and social care to commit practically and financially to joint-working (including joint financing initiatives).

3.2.3e Types of Intervention
There is general agreement that a range of approaches is needed to suit individual needs and preferences. Although interventions shown to be beneficial have some commonalities, there is to date insufficient evidence favouring any one specific approach and the literature calls for more research in this area.

NAPC (NIASA, 2003) suggests a range of interventions will be needed for children with ASD. It states that programmes should be ASD (and child) specific in planning but not

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necessarily execution. It also points to evidence that children with ASD benefit from learning with peers and the need to consider every child as an individual with differing requirements. A detailed summary of features agreed as good practice is given in Appendix A of the NAPC document (NIASA, 2003). SIGN (2007) recommends interventions that support general communication, such as use of visual augmentation, and those that support social communication, stipulating again that the exact nature of these needs to be informed by individual assessment. The AET report (Jones et al, 2008) also emphasises the individuality of children and young people with ASD, maintaining that "individual strengths and interests" form the foundation for effective interventions. It strongly recommends a range of approaches and provision to cater for differing individuals on the spectrum. APPGA (2005) proposes four possible provision models and adds that the appropriate one may be a combination of the four, tailored to the child's specific needs.

Implications for research and practice

1. Interventions should be child-specific, based on careful assessment of the individual, and reflecting their strengths, interests and preferences.
2. Interventions that support general and social communication are most likely to be beneficial for children with ASD.
3. A range of provision is needed to cater for the diversity of need, located in mainstream and specialist settings.

3.2.3f The autistic voice

Consideration of the need to access the views of children with ASD took two main forms within the literature.

First, there was broad recognition of the importance of gaining the child's perspective on their needs and wishes with some specific recommendations arising. The NAPC (NIASA, 2003) says the child's views should be incorporated with advocacy utilised where appropriate. SIGN (2007) recommends conveying accurate and sensitive information to the child or young person, taking account of their age, ability and cultural background. The AET report (Jones et al, 2008) echoes this, stressing awareness of the child's individuality.

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Second, three documents tackled more formal user representation. The Welsh Action Plan (2008) proposes that users and carers be represented on each ASD co-ordinating group and goes further to stress that practical help should be made available to ensure that attendance and involvement are actively supported – "trying is not enough" (p4). To this end it recommends fostering links with the voluntary sector. SIGN (2007) was alone in formally consulting young people with ASD by facilitating two focus groups and thereby eliciting information that could only be gained through a first-hand perspective. The young people agreed that an understanding of ASD within school was of benefit as it was important to them not to be considered "mad" or 'stupid', and for others to understand they may become confused, lose their patience or find it hard to concentrate. The Autism Research Group (DfES, 2006) stresses the need for research to incorporate the perspective and priorities of people on the spectrum and their carers.

Implications for research and practice

1. Good practice guidelines should ensure that the views of children and young people are sought in a way that is appropriate to their individual needs, so that their views and preferences are taken into account in service provision.
2. Professionals to work closely with advocacy and self-advocacy groups to ensure the views of all children with ASD are represented.
3. Individuals with ASD to be supported to take on formal roles that can inform the development of strategy, policy and provision. The practical and financial implications of this for both individuals and organisations must be considered but should not be a barrier to involvement.
4. Wider inclusion of the "user" perspective (individuals with ASD and parents/carers) and greater use of participatory/emancipatory approaches within research.

3.2.3g Transition to adulthood

Reference to transition within the literature tends to be relatively brief but the consensus is that transition *processes* should be well co-ordinated across services and that transition should be recognised as a time of additional stress for the young person with ASD and their family.

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NAPC (NIASA, 2003) strongly recommends further work to be undertaken on the needs of adolescents and adults with ASD. It posits the need for a multi-disciplinary co-ordination of resources and opportunities for adults with ASD. It also proposes a set of clear guidelines be drawn up on transition to secondary schools, school leaving and opportunities for further and higher education. SIGN (2007) highlights the additional stress upon children and families at times of transition and the need for services to plan ahead. The AET report (Jones et al, 2008) suggests good practice be shared in relation to transition across educational phases and settings.

Implications for practice

1. Policymakers to ensure that guidance is available to steer transition across phases.
2. Multi-agency working to include collaboration between child and adult services.

NB   Further recommendations on transition can be found in Section 3.2.5.

3.2.4 Guidelines to support the education of students with ASD: Post-compulsory education: Summary of documents (UK)

Here we consider recommendations and/or findings specifically on post-compulsory education. Due to the general lack of evidence for adults with ASD, efforts have been made to access additional documents considered relevant to this area. Recommendations emerge from policy documents, reports and articles available from sources other than peer-reviewed journals and these are summarised.

NB   Implications for research and practice below should be considered alongside implications from the section on children with ASD, many of which are intended to apply to both child and adult provision.

The **Learning and Skills Council's Equality and Diversity Strategy (LSC) (2002)** is a short guidance document for regional councils in England, making recommendations on their duties to students with disabilities and learning difficulties. The **Department of Health's** *Better Services for People with an Autistic Spectrum Disorder* **(Better Services – North, 2006)** clarifies existing government policy following the Valuing People White Paper (2001).

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Skill, the National Bureau for Students with Disabilities, promotes educational and training opportunities for students aged 16 and over. In its **2007 guidelines,** *Information: Adjustments for disabled students,* the charity outlined the "reasonable adjustments" that disabled learners in the UK can expect from providers. It made recommendations for general access arrangements and listed specific adjustments appropriate for a learner with autism or Asperger syndrome. **Clark (2003)** discusses the implications of the Special Educational Needs and Disability Act (2001) and other recent legislation on further education for learners with ASD.

Two reports from the **National Autistic Society** are included. Its report ***Autism: Rights in Reality*** **(Broach, Camgoz, Heather, Owen, Potter and Prior, 2007)** examined the experience of its members (mainly parents and carers) through a postal survey of 548 the society's members in England and Wales. Additionally, 41 adults with autism, Asperger syndrome or high-functioning autism were consulted via either postal survey, telephone interview or direct interview. The society's 2004 report, **A place in society: the importance of planning for life for people with autistic spectrum disorders** (A Place in Society) brought together evidence on current outcomes for adults with ASD in the UK, along with case study illustrations.

Powell's *Taking Responsibility: Good practice guidelines for services – adults with Asperger syndrome* **(Taking Responsibility – 2002)** was compiled from the Avon Asperger Syndrome Project and offers a comprehensive summary of the issues and needs of higher-functioning individuals. It includes a section on college/university which recommends that students be provided with a detailed "support pathway".

The **Aspect** *Consultancy Report: A National Report on the Needs of Adults with Asperger Syndrome* **(Beardon and Edmonds, 2007)** focused on a direct consultation with a group of adults with Asperger's regarding their diagnostic history, access to services and perceptions of the support they received. It is the largest consultation of its kind, involving 237 adults with the syndrome and through both its methodology and authorship, it offers a significant "user-led" perspective.

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Other research articles have been included because of their specific relevance to this area. **Martin's paper (2007)** is a brief study of how students with Asperger's used written personal statements to facilitate understanding and inclusion within college or university. This was a reflective rather than robust piece of research reporting on use of personal statements which were trialled with four students (three male, one female) in one further and one higher education setting. In a second study in **2006**, the same author consulted 170 higher education staff across 15 universities, to explore which strategies were helped students with Asperger syndrome to succeed. Eight students with the syndrome were also consulted. Methodology details were not included in this paper and the author provided a lengthy set of recommendations (30 in total), categorised as "Pre-entry", "On the Programme of Study" and "Transitions and Pre-exit support".

Priestley, Fitzpatrick, and Swift (2008) described how five learners with ASD were supported at mainstream college over 12 months and gave recommendations for practice based on their findings. The students were originally in a specialist day college for learners with ASD and high support needs whose staff undertook the transitional support. The article considered the project's achievements for students and staff and suggested areas for future development. **Robinson and Frignani (2003)** described a small art project within a specialist further education setting for students with ASD, outlining project outcomes and the wider educational achievements for those involved. A mixed ability group of 11 students was taught in three separate groups over one term. All had limited language and communication skills. Using a TEACCH approach, students created their own calendar. The activity was conceived and structured to provide opportunities for technical, sensory and cognitive development.

3.2.5 Guidelines to support the education of students with ASD: Post-compulsory education – Main themes

This section has been divided into transition; social skills curriculum; multi-agency approach; improving access to further/higher education: institutional considerations; the autistic voice and disclosure. As elsewhere, themes are drawn from the documents previously described and reflect the consensus on areas of priority.

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3.2.5a Transition

All emphasised the need for particular arrangements at times of transition, not only at the start and end of courses, but also during times of change within a programme of study.

The Learning and Skills Council (2002) highlights transition as one of two main considerations for students with ASD (multi-agency working being the second), while Skill (2007) discusses this in terms of deadlines, exams and other changes in routine, as well as the need for time to get used to the site. The Welsh Action Plan (2008) and the Aspect report (Beardon and Edmonds, 2007) emphasises that support needs to be available from the start of study. This merits particular consideration since support often depends on funding that takes time to put in place so that the vulnerable period of transition "in" is the very time students can be left without support. The National Autistic Society (2004) recommends that schools and further/higher education institutions work closely together to develop a transition curriculum. Priestley et al's study (2008) involved transition into mainstream college from a specialist day college. They undertook staged familiarisation as part of a long transition, which was shown to be effective with their "high-support" learners.

Implications for practice

1. Development of multi-agency protocol to ensure close communication between schools (and other local services) and further/higher education to ensure early identification of transition needs.
2. Support from course outset and early identification of other key transition periods, during the course of study and in preparation for exit.

3.2.5b Social skills curriculum

It is notable that much of the literature stresses the need for a broad range of educational options to be available, yet most further and higher institutions already offer a broad range of study options in content and delivery. This suggests that many courses are either not accessible to, or not appropriate for, students with ASD. Recommendations from this literature also highlight the need for courses to be tailored to interests and likes.

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All highlight "social skills training" as vital for independent living and social inclusion and therefore an important aspect of education for adults with ASD. However, the exact nature of what should be offered, or evidence of what is effective, remains unspecified. Clark (2003) describes this as "the other curriculum" that enables students with ASD to "cross cultures". North (2006) encourages service providers to focus on the natural talents and interests of individuals, and the Welsh Action Plan (2008) signals the value of leisure and support groups to develop social and communication skills. Priestley et al (2008) discuss the identification of varying interests of individual learners and the opportunity to pursue different areas of study as a key goal of their study. Powell's guidelines (2002) suggest that ASD-specific courses can be appropriate and also encourages providers to offer outreach options to those students for whom the setting represents a barrier to learning. He also specifies that institutions should offer support groups and befriending services to students with Asperger syndrome. This point is equally relevant for all students with ASD.

The diversity of need, as reflected in the necessity to offer an individually tailored approach, is commonly cited. Skill (2007) recommends a wide range of adjustments such as alternatives to team working, having information conveyed in a number of ways, and prompt access to pastoral support. It emphasises that the exact requirements will vary between individuals depending on specific circumstances. Beardon and Edmonds (2007) stipulate that generic support will not be sufficient and needs to be individually tailored. Martin (2006) discusses the need for a holistic approach which recognises social and pastoral needs, including support to arrange healthcare. This is specific to higher education where students may well be living away from home, although it is also pertinent to further education. Students accessing further education may also be living independently or with minimal support, and educational staff may be the people who see these students most regularly, and are so best placed to identify any welfare issues.

Implications for practice
1. To offer both breadth of provision and individual tailoring, mainstream courses need to be adapted as individual students require.
2. A holistic educational approach is needed that takes account of pastoral needs.

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3.2.5c Multi-agency approach

The need for a multi-agency model that encompasses health, education and social care was highlighted repeatedly as an essential means of enabling providers to audit current provision and thereby plan future developments appropriately. Findings from the literature echo those on child provision, but some specific considerations for adult services and the wider implications of educational and health needs often overlap

Powell (2002) says that for a student with ASD to succeed in further and higher education, their social abilities, self-organisation and practical skills will need to be considered. For this to be done effectively, a multi-agency assessment is necessary. He also recommends that a multi-disciplinary planning group should carry representation from all sectors to form a basis for joint initiatives, training and commissioning. Powell (2002) offers the Avon Asperger syndrome project as an example of good practice, citing that the research undertaken here (funded by the UK's Department for Health) resulted in the establishment of a college course and a social skills group for adults. This represents a case of successful crossover between education and health.

Likewise, the Scottish Executive (2006) describes its two "one-stop shops" which are pilot projects for adults with ASD and their families. These are examples of effective multi-agency working to offer a seamless service that aims to cater for health and educational needs specific to ASD. As indicated here, the educational needs of adults with ASD reflect a crossover between general educational provision and an approach targeted at developing social communication and confidence, and Clark (2003) proposes that this is essential for education to be effective and inclusive.

Implications for practice

1. Formalisation of multi-agency protocols to ensure that co-existing needs can be adequately met through a range of educational and therapeutic approaches.
2. Greater use of joint finance initiatives to ensure that adults with ASD receive a seamless service.

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3.2.5d Improving access to further/higher education

From the literature there is clear consensus that access to further and higher education remains limited for students with ASD and more needs to be done improve entry rates in both areas.

Better Services (North, 2006) reminds us of the imperative conferred on education services by the Disability Equality Duty and Disability Discrimination Act (both 2005 and Great Britain only) to make reasonable adjustments in order to facilitate inclusion. Powell (2002) couches this in terms of the need for the development of new and appropriate services, driven by a multi-disciplinary planning group. Clark (2003) highlights that improved provision within child services will result in parents and pupils having increased expectations of post-compulsory education and calls for a continuum of provision that reflects the continuum of need. The National Autistic Society (2004) proposes that institutions and schools form close links in order to identify potential need, and that further and higher policy should be developed to respond to this need.

Implications for research and practice

1. Educational providers to be better informed to anticipate the specific barriers to learning arising within their own organisation and identify ways in which provision can be adapted to suit the needs of individual learners with ASD.
2. Further and higher education to formalise links with schools in order to identify learners with ASD and develop effective transitional arrangements.
3. Further and higher education to offer a continuum of provision that reflects the continuum of need in learners with ASD.

3.2.5e Institutional considerations

Most documents cited some adjustments that should be implemented at institutional level in order to make provision appropriate for students with ASD. These are categorised below as physical adjustments and whole-team approach.

Physical Adjustments

The importance of some physical adjustments to accommodate sensory needs or anxiety was discussed in relation to individuals on all parts of the autism spectrum, regardless of

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intellectual ability. Recommendations varied from provision of a quiet space or a safe base to which students with ASD could retreat (Powell (2002); Priestley, Fitzpatrick and Swift 2008), to the availability of separate rooms for examinations (Skill, 2007). In Priestley, Fitzpatrick and Swift's study (2008), use of a quiet space was considered integral to the project's success and, in fact, facilitated links with other students.

Whole-team approach

Several papers indicated the need for the commitment and co-operation of the whole staff team (Martin, 2006; Martin, 2007; Priestley, Fitzpatrick and Swift, 2008). Not only do teaching staff need to be willing to offer flexibility, but all staff in contact with students must take a positive approach in light of needs students may have outside the classroom. Martin (2007) says this is not an ideal but should be seen as the responsibility of all staff within an institution. For the students in Priestley, Fitzpatrick and Swift's group (2008), being in the canteen to eat lunch with the wider student group was a major goal, achieved through the work of many staff. Such adjustments may require a significant culture shift for large institutions, where academic staff may ordinarily have very little contact with administration and catering staff.

Implications for practice

1. Further and higher educational institutions to consider how spaces can be adapted to be accessible to students with ASD.
2. Formal protocols to ensure that the support of students with ASD is recognised as the joint responsibility of all staff across the institution.

3.2.5f The autistic voice

Within the literature there is a strong imperative to move away from the deficit model of disability and promote the successes and potential of learners with ASD. This is particularly highlighted by authors and researchers with ASD.

Several documents here consulted directly with adults with ASD and reported on the potential and actual achievements of individuals with ASD. The Autism Research Group (2006) specifically recommends that research and methodology should be informed by the perspectives of individuals with ASD.

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Implication for research

1. The achievements and first-hand perspectives of adults with ASD to be regarded as priorities for future research in order to develop greater understanding of the diversity and potential that exists within the autism spectrum and move away from approaches that "medicalise" ASD.

3.2.5g Diagnostic disclosure

Diagnostic disclosure is significant within further and higher education. The literature indicates that individuals with ASD are often hidden within institutions and that students with ASD come to light gradually over the course of a year, as problems arise.

Beardon and Edmonds' (2007) consultation indicated that many learners preferred not to disclose if they felt they could manage without support. They stressed the need to encourage and incentivise disclosure since students who do not disclose at the outset of their studies are likely to be further disadvantaged by lack of support and appropriate approaches. Martin (2007) also discussed this, cautioning that students should not be (or feel they are) coerced into disclosing information and that this should follow negotiation with the student.

Implications for research and practice

1. Disclosure to be recognised as an important aspect of transitional planning to ensure students are given every advantage in moving on to the next stage of their education.
2. Further research to be undertaken to develop greater insights into the issues surrounding disclosure for individuals with ASD.

3.2.6 Guidelines to support the education of children and adults with ASD: Priorities for research

This section considers research on interventions in more detail and summarises recommendations for research.

There is general consensus within the literature that the current evidence base on specific interventions is insufficient and high-quality research is needed to explore a range of

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interventions and consider aspects such as timing of intervention, variations between sub-groups and comparative costs. Additionally, there is a dearth of research on the adult sector and as the diagnosed adult population continues to increase, an evidence base for the support needs of this group is urgently needed.

The **Autism Research Group (2006)** identifies causation, quality of life, economic impact and efficacy of interventions as research priorities. An analysis of the Institute for Scientific Information database of peer-reviewed published research in the same report showed the level of research activity in the UK to be relatively strong, although the data again highlighted a weakness in the area of interventions research. It underlines the need for a coherent strategy to underpin interventions research in order to develop a strong evidence base and enable high-quality research to inform practice. Two large research projects are mentioned in this document: The **£1.3m Pre-school Autism Communication Trial (PACT),** funded under the DoH/MRC initiative, is the first large-scale intervention study of its kind in autism. It will study the effectiveness of a treatment to enhance parent/child communication and the child's social and language development. It is a multi-site trial involving 144 children on three sites in Manchester, Newcastle and London. Led by Dr Jonathan Green in Manchester it was developed in collaboration with the National Autistic Society. The **Southampton Childhood Autism Programme (SCAmP)** is a collaborative evaluation of interventions taking place between 11 local authorities in southern England and the Department of Psychology at the University of Southampton.

NAPC (NIASA, 2003) suggests that single subject case designs could be used to assess efficacy and monitor side-effects, with a view to future research initiatives including published summated case studies. SIGN (2007) indicates the benefit of its focus group of young people with ASD in informing the guidelines with a first-hand perspective and offers this as an example of good practice. SIGN (2007) also proposes further research is needed on the importance (if any) of timing of interventions; whether specific interventions are more or less effective for specific sub-groups; best practice in management of transitions at all stages from pre-school to adulthood; and what constitutes effective training in ASD for professionals.

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More broadly, the AET report (Jones et al, 2008) proposes a number of areas for further research including relating outcomes to success at key stages; engaging with "hard to reach" families; comparative costs of educational provision and factors which relate to exclusion. The Welsh Action Plan (2008) identifies the prevalence and needs of older people as a research priority.

Summary of all implications for research from the expert strand

A coherent multi-agency research strategy is needed to encompass child and adult sectors and direct the quality and focus of interventions research. From the literature included here, research priorities should include:

1. Quality of life.
2. Diagnostic disclosure.
3. Factors relating to exclusion.
4. Comparative costs of interventions.
5. Variations in outcome dependent on timing/specific presentation of ASD.
6. Staff and parent training.
7. "Hard to reach" families.
8. User/carer perspectives.
9. Participatory and emancipatory methodologies.
10. Older adults.

3.2.7 Summary of expert strand

In summary, the expert literature agrees that more coherence and consistency is needed in educational provision for children and adults with ASD. At a strategic level, developing a multi-agency database and protocol to formalise joint working, as well as developing a training strategy to ensure that professionals in key roles have achieved minimum standards of training in ASD, would greatly assist this. Training should focus on both the common underlying traits of ASD and the range of interventions needed to meet individual needs, and should be available at all levels, including training that is appropriate and accessible for parents with ASD. Individuals with ASD should also have appropriate opportunities to develop their knowledge and should be actively consulted on their own needs and wider service development. More work is needed to ensure that adults with

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ASD have access to further and higher education and that programmes are available that address their social communication needs. Research must focus on the impact of specific interventions, the efficacy of different staff and parent training models and adult provision.

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4.1 Overall summary and conclusions

Since the publication of the Report of the Task Force on Autism (Department of Education and Science, 2001) there have been important policy and legislative developments in Ireland on educational provision for children and young people with ASD. Chief among these is the EPSEN Act 2004 and its emphasis on an inclusive environment for the education of children with special educational needs. In recent years, an increase is evident in numbers of children on the autism spectrum attending mainstream provision in Ireland (2,571 in 2008-09 compared with 1,675 in 2006-07). At the same time, the number of schools offering autism-specific classes has expanded rapidly – up from 87 classes in 2001 to 339 in 2008. Since 2001, autism specific classes have appeared in mainstream, post primary schools (from 0 in 2001 to 36 classes in 2008). Overall, this suggests that more schools across the range of provision are enrolling children with ASD, and addressing their needs is increasingly being approached through "specialist" support (in autism-specific classes).

As noted earlier in the introduction (Section 1.2.3), specific provision has been set up in response to situations where parents and/or the staff of some mainstream schools feel that they are not able to meet the needs of some pupils with ASD. This situation is by no means unique to Ireland and autism-specialist provision (in both mainstream and special school contexts) is common in the UK. Special provision for children with disabilities or SEN is often rated highly by parents, and there is no evidence (at least in Great Britain) that parents of children with autism are different or unique in this respect (Parsons, Lewis & Ellins, 2009; Parsons, Lewis, Davison, Ellins & Robertson, 2009). However, there is very little independent research in Ireland, the UK or beyond, on how autism-specific classes operate and their influence on individual outcomes. This was a clear, and somewhat surprising, gap in the evidence highlighted by our search of the literature and which urgently requires focused research attention. It is important to emphasise, however, that the current lack of formal, published evaluation evidence about autism-specific provision does not mean that such provision should be regarded as inappropriate or unwelcome (by teachers, parents or pupils). Rather, it is a good example of educational practice

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developing at the "coal face" for good reasons, and in response to specific needs, and outpacing formal research and evaluation.

Debate continues on the extent to which educational provision for children with ASD should be "autism specific" or whether, instead, there are common or general needs relevant to all learners (with special educational needs), which should underpin provision. Synthesising a range of views in this debate, Lewis and Norwich (2005) and Norwich and Lewis (2007) concluded that a simple, category-based specialist pedagogy for children (on the basis of special education needs group) is not sustainable. Instead, they argue, curriculum and pedagogy should be determined by general needs and informed by the unique learning needs of individual learners. Wider discussion of this is beyond this review's scope but interested readers are referred to Lewis and Norwich (2005) for detailed discussion. Thus, while the present review cannot offer evidence for, or comment on, this particular debate, it does offer evidence on which specific approaches may be of benefit and for whom.

The extent to which such specific approaches or interventions are embedded in wider educational curricula or assessments of attainment is often unclear from the information presented within journal articles. This makes it difficult to judge the extent to which these approaches to learning could or should have a place in educational provision generally and/or how they may fit within different contexts (mainstream, special or autism-specific provision). This underscores the earlier point on lack of empirical investigation and evidence of how educational provision for children with autism operates in the context of "real-world" classrooms, and how all those involved (teachers, parents and young people) view, and respond to, the support offered as well as the challenges faced.

Since 2001, many research papers, guidelines and reports have been published which update our knowledge of whether, and how, particular interventions may benefit children with ASD. In the present review of research articles, plus key selected policy and expert guidelines, it is clear many gaps remain in knowledge of the methods and interventions that demonstrate "best outcomes" for the person. Moreover, determining what might be a best outcome for an individual child is a complex judgment and one often not

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addressed in the reviewed evidence. Lack of follow-up data after the main study or intervention has limited the conclusions that might be made about this. Sometimes, statistically significant changes in behavioural or cognitive assessments may be demonstrated, or clear changes in behaviour observed. It does not always follow, however, that those changes are useful or appropriate in the child's everyday life, let alone a "best outcome" for the child. Such questions on research context and outcomes were important for informing our detailed critiques of the articles (see Appendix A5), and the complexity and variety of evidence reviewed precludes easy generalisations. What is clear, however, is that more quality research is needed across all stages and contexts of provision. In particular, there is a need for research on educational interventions and settings to explicitly address questions of social validity and longer-term outcomes. Qualitative research focusing on more nuanced aspects of behaviour and context may also have a great deal to offer in this respect. A focus on the search for such evidence could serve as a very useful follow-up to the present review.

It is notable that out of 100 empirical research articles reviewed, only 12 were graded as offering a high weight of evidence for the review. As noted in the Introduction, this underscores the difficulties in carrying out robust, meaningful and ethically appropriate research in the real-world contexts of children and families' lives, at home and beyond. Understandably, parents are keen to embark on interventions and/or specific educational (and other) programmes as soon as possible to achieve better developmental outcomes for their children.

This means it is often difficult to implement robust research designs in which the "active ingredients" of an intervention can be adequately teased out from maturation effects and other relevant inputs (such as statutory provision of speech and language therapy; inclusion in other educational, medical or dietary programmes). Good baseline data may be hard to obtain as children have often started out on an intervention before the research work is ready to start. In addition, these issues are exacerbated by a lack of specificity in reporting. Many (though not all) the research papers failed to include basic details on (for example) criteria used to determine autistic spectrum diagnoses; cognitive, linguistic and developmental profiles of the participants; the number of hours' input each child received;

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the exact context in which the intervention took place; the specific teaching approaches or procedures implemented and the fidelity of programme implementation.

These factors, coupled with the (usually) small numbers of participants and high variability in responding within and across interventions mean that judgments on effectiveness, generalisability and relevance of the described interventions should necessarily err on the side of caution. In summarising these reporting and design limitations we concur strongly with the findings of Kasari (2002) in her review of early intervention studies in autism research. Nevertheless, it is encouraging that just over half (57 per cent) of the articles included in the empirical strand adopted methodologies that could be described as "more robust" (utilising multiple-baseline designs and comparison groups); if the randomised controlled design studies are added to this, the figure approaches two-thirds of the included articles (63 per cent). However, many papers adopting multiple-baseline or comparison group designs (for example) also involved small sample sizes, as did many of the others with less robust designs. Across the 100 papers included in the empirical strand, 48 per cent included 11 or fewer participants (from 14 of the 23 subsections, see Table 3.1). Consequently, there remains a general challenge within this broad field of research on small sample sizes and, therefore, the extent to which findings can be applied to larger groups of children.

Kasari (2002) also notes the importance of conducting comparison studies of different interventions to judge whether one type of approach or "treatment" is more efficacious than another, and for whom this is the case. This is especially important for statutory agencies charged with decisions on the funding of provision using public money (where should funding best be targeted in the context of necessarily finite and ring-fenced resources?). In reviewing the recent research, there is insufficiently strong evidence to promote a specific type of intervention or approach for all children and families. Most comparisons of interventions include early intensive behavioural programmes and there have been some vociferous calls for statutory bodies to fund such programmes and offer them to families for "as long as necessary" (Keenan et al, 2007). However, the studies included in this review have robustly explored the comparative benefits of intensive behavioural interventions with other approaches (Section 3.1.2) report, on balance, mixed

findings with respect to the superiority of one approach over another. Based on these findings, in addition to the consensus view from the expert strand and policy documents (Spreckley and Boyd, 2007), it is clear that a range of interventions (eclectic provision) should continue to be funded and provided for families.

We acknowledge that this conclusion was also our starting point (see Section 1.7.4), based on our knowledge of the field and the reading of other recent reviews of the literature (Jones and Jordan, 2008). The findings of the present review have, therefore, endorsed this position rather than challenged it. The convergence of views around this point, however, should send a strong message to readers about a consensus of opinion on the need to offer and maintain a range of educational provision for children with ASD, which is best assessed in the context of the individual needs of the child rather than through their membership of a particular diagnostic group.

It is also important to acknowledge that this conclusion does not exclude the usefulness of intensive behavioural approaches for some children learning specific skills. Moreover, there is important common ground between advocates of early intensive behavioural programmes and those arguing for the use of a wider range of learning techniques (while also realising that these are not necessarily dichotomous voices in the debate). All those involved in discussions on education for children on the autism spectrum (as well as those with non-autistic special educational needs or disabilities) want good quality provision that offers the best outcomes for the child and most would agree – regardless of specific paradigm – that early intervention is important. Moreover, behaviourally-based techniques often inform one or more of the approaches in "multi-component" (eclectic) interventions and so there is certainly an openness to considering a range of options for the children involved. Thus, it is important to be open-minded about the kinds of techniques, learning approaches or interventions that may best suit an individual child. In other words, it is the child, not the paradigm, that should be the starting point for deciding what might work best for individuals and their families.

Nevertheless, finally, the searches conducted for this review and the evidence ultimately included highlight the continued dominance of research focusing on early intervention

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and behaviourally-based teaching approaches. Of the 100 articles included in the empirical strand, 49 per cent involved children of pre-school age and a further 33 per cent , children of primary school age (82 per cent focusing on younger children). This reflects the importance of early intervention for children with ASD coupled with the fact that children are being diagnosed at a younger age and so are entering intervention programmes much earlier. In other words, it is essential to know what works best for children and their families from an early age in the hope that developmental functioning and outcomes can be significantly enhanced. This is a laudable pursuit and should clearly remain a research and practice priority. However, a corollary of this important focus is that the educational needs of older children tend to be relatively neglected, a concern that needs to be urgently addressed. Only 10 per cent of articles focused on the needs of post primary-aged children and young people. The research base for post-compulsory education is weaker still, with the educational needs of adults being largely ignored within the literature (only 8 per cent of the articles fell into this category and the percentage only reached this level because the basis for inclusion was widened for this group, due to the general dearth of evidence available).

The dominance of intensive behavioural approaches in the research literature, especially in studies carried out in the US is undoubtedly influenced by the publication of the seminal work by Lovaas (1987) which stated that 47 per cent of the children undergoing intensive early behavioural intervention achieved "normal functioning". In the present review, and elsewhere (SIGN guidelines, 2007; Rogers and Vismara, 2008) evidence suggests these approaches continue to useful in teaching specific skills under specific circumstances. However, the claims of the original Lovaas study and follow-up (McEachin et al, 1993) have been subject to much scrutiny and criticism, including in a recent review by Shea (2004) who suggests that:

> It is time for advocates and professionals to stop citing the figure of 47 per cent and the concepts of 'normal functioning', being 'indistinguishable from average children' and having recovered from autism. The reports of the initial research are not consistent with these interpretations; further over three decades since the research began, other studies have consistently fallen short of the 47 per cent figure (p363).

In addition, Rogers and Vismara (2008) in a recent review of early intervention in autism (for children aged five or younger), suggest that while evidence is good for the effectiveness of intensive behavioural approaches, important caveats or shortcomings also need to be considered. In particular, they argue that it is not clear which elements of an applied behavioural analysis programme (for example) might lead to success; whether it is appropriate for all children on the autism spectrum; and whether the changes observed in these children lead to greater independence and vocational and social independence in later, adult life. Given the diversity of the population of children on the autism spectrum and the range of interventions, Rogers and Vismara (2008) suggest the key question for research is:

> Which teaching approaches appear most effective for teaching specific skills given certain profiles of the child and contextual characteristics? (p30).

They also suggest other approaches to intervention may be as effective as intensive behavioural programmes but these "have not been rigorously evaluated" – something that also requires urgent attention (and funding) from a research perspective.

Given the lack of robust, empirical evidence in many areas of practice and provision, the views of experts (including parents) remain a vital source of information and guidance. This comes across strongly in the evidence reviewed for the expert strand, where there was substantial agreement across many key themes not least the importance of statutory agencies working together to achieve the best outcomes for children, young people and adults with ASD, and their families. The findings on multi-agency working in the expert strand are key in this respect,highlighting as they do the need for clearly identified personnel whose responsibility it is to link with other agencies to provide an essential seamless service to children and families. There is a notable lack of empirical evidence, however, to inform practice and policy on how this can best be achieved (although we note that such evidence is more abundant beyond the field of educational provision for children with ASD. The inclusion of such evidence, however, was outside the scope of the present review).

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In summary, then, drawing across the empirical and expert strands of evidence, it is possible to make some conclusions on main findings and highlight significant remaining gaps or questions to be addressed.

4.2 Summary of main findings: What we know

1. There is some evidence for the effectiveness of intensive behavioural approaches in teaching specific skills in particular contexts, but less evidence on long-term outcomes of these approaches or the intensity of input required.

2. Findings of studies comparing interventions are mixed on whether applied behavioural analysis or similar home-based early intensive behaviour programmes are more effective than others. Two studies in particular (Reed et al, 2007**; Magiati et al, 2007**) suggest one type of intervention was not of all-round greater benefit to children than another. A third study (Howard et al 2005**) suggested better outcomes for children taking an intensive behavioural programme compared to those receiving "eclectic treatments" for young children with autism. A fourth study (Remington et al, 2007) compared home-based early intensive behavioural intervention with standard statutory provision and found only modest evidence at best for the greater effectiveness of the former over the latter. Taken together, these studies suggest one particular type of intervention or approach is unlikely to produce the best outcomes for all children included.

3. The importance of early intervention is underscored by the amount of research evidence targeting pre-school children. Those focusing on early communicative behaviours seem to offer particular promise (Kasari et al, 2006**; Aldred et al, 2004**; Mahoney and Perales, 2003**) through targeting pivotal skills or behaviours at the core of autism.

4. Parents can make important contributions to educational interventions for their children but they need to be equipped with good psycho-educational information in order to do so (Sofronoff et al, 2004**). In addition, family contexts and wishes

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(Moes and Frea, 2002) as well as parental stress levels (Osborne et al, 2008) need to be adequately taken into account when designing and implementing programmes.

5. Practitioners need specialised knowledge and understanding of ASD, and need ongoing training across agencies. Training should focus on enabling practitioners to work in partnership with families and the young people themselves to plan how to meet needs. It is important to note the considerable progress In Ireland in the last few years in provision of training routes from basic awareness raising to accredited training and continuous professional development. This has been achieved in the main through the work of the Special Education Support Service along with colleges of education and funding has been provided by the teachers education section, of the Department of Education and Science. More information on training and resources available at
http://www.sess.ie/sess/Main/autismAbout1.htm

6. Well-known interventions (such as PECS, Lovaas and applied behavioural analysis) may not be as effective as initially thought when examined through the lens of robust research methodologies (Reed et al, 2007**; Magiati et al, 2007**; Howlin et al, 2007**).

7. There is evidence for the effectiveness of a range of different tools or techniques to facilitate learning for children, young people and adults with ASD. Both structured and less structured approaches, using different modes of presentation (information and communication technology, pictures, videos) have proved useful for promoting specific learning outcomes, albeit for small numbers of participants each time.

8. There is a diversity of needs among children and young people with ASD. It is essential to consider the individual profiles (language and communication, cognition, sociability, flexibility) and needs of children, young people and adults when deciding the suitability and appropriateness of interventions. Some approaches may be more beneficial than others depending on learning disabilities

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and severity of autistic symptoms (Bernard-Opitz et al, 2004; Wong et al, 2007; see Sections 3.1.5a-e for more details).

9. More naturalistic, child-centred and -led approaches may offer more promise than adult-directed, prompt-dependent procedures for use in mainstream educational classrooms, but more research is required to establish efficacy and optimum implementation strategies (Kasari et al, 2006**).

10. There have been notable increases in specialist autism provision in Ireland and in the UK generally in recent years (within mainstream and special schools). Whether this is because these settings are seen to offer a more "appropriate and inclusive" education and/or because staff in mainstream contexts lack relevant and specific knowledge and skills in supporting students with ASD, is unclear. More research on the effectiveness of placement in autism-specific classes and units is required, together with data on how these operate in practice regarding inclusion and the curriculum offered and which children with ASD seem to be most appropriately placed within them.

11. Findings on young people's views and experiences of mainstream schools (Humphrey and Lewis, 2008) are of special importance, in particular around the need for friendship, places of refuge and sufficiently skilled and aware teaching staff who can differentiate teaching for particular needs, where necessary. Note, however, it is unlikely that these requirements are ASD-specific and may instead reflect the needs of children requiring additional support in schools, for whatever reason (see Lewis et al, 2007).

12. Adults with ASD can benefit from targeted educational interventions; effective approaches tend to be holistic and focus on emotional and social well-being and independence skills, so they can make use of the skills, strengths and interests they have in employment and leisure.

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13. Research that directly accesses user-perspective can provide important data that does not emerge in practitioner-led research.

4.3 Summary of main gaps: What we have yet to find out

1. There is a relative dearth of published empirical research on the specific Irish context of educational provision for children with ASD (July provision, home tuition, individual education plans). Cultural, legislative and practice-related factors are all likely to influence provision. Good quality research is required to describe, map and test their importance and impact.

2. Related to point 1, many policy and best practice guidelines emphasise the importance of joined-up working across statutory agencies throughout all stages of schooling (and beyond) but there is limited published research on how this can be most effectively achieved, especially within the Irish context. Research is needed to describe and document progress and best practice as well as the barriers encountered (which can be significant). A systems-based approach to exploring and analysing this would offer some useful insights.

3. Few studies investigate the effects of training on the practice of practitioners and parents. Further studies are needed to investigate specific training needs of practitioners and parents and how these are best addressed. Training programmes should also be independently evaluated.

4. Independent evaluation of interventions is notably lacking in much of the published research evidence. It is a significant limitation of publicly funded research when evaluations are conducted by personnel involved directly with implementing the programmes and/or the centre providing services to children and their families.

5. The focus on early intervention means the needs of older children, young people and adults are, in comparison, substantially under researched. This is particularly true of those attending post primary and post-compulsory educational contexts.

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Where there is research involving older students, this tends to focus on those with Asperger's or high functioning autism and correspondingly higher-level cognitive skills such as theory of mind, empathy and emotions. As a result, little is known of what constitutes appropriate provision, or an effective intervention, for older children, young people and adults with more severe learning disabilities and/or autistic characteristics. What, for example, might a social skills teaching or training programme look like for them?

6. Related to point 5, research of early communicative behaviours for young children with ASD suggests some approaches could offer much potential for the later development of related skills, but it is much less clear how older children would respond to similar interventions. That is, even though for example joint attention behaviours are developmentally appropriate as an intervention target for young children with autism, these skills could remain significantly impaired in older children thereby limiting the relevance or potential effectiveness of programmes for "higher-level" skills or understanding for older children.

7. Most research on educational interventions uses standardised measures and quantitative data to evaluate efficacy and outcomes. While these offer important evidence qualitative research and/or measures on aspects of educational provision or interventions is significantly lacking. Qualitative research can offer important insights into (for example) contextual factors that may influence outcomes (such as environmental conditions, skills of the therapist or teacher, timetabling of lessons, reactions and support from classmates). Crucially, qualitative measures are also needed to judge the relevance and usefulness of skills learned during interventions – for example whether behaviours or language are used in contextually appropriate and meaningful ways.

8. Related to point 7, establishing the views and experiences of children/young people and adults with ASD, and their families, is a vital area where qualitative methodologies could offer considerable strength and value. This is a substantially under researched aspect of educational provision. Children, young people and

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adults can comment meaningfully and insightfully on their experiences when given supportive and sensitive opportunities to do so (Humphrey and Lewis, 2008).

9. There is a need for research to include follow-up studies and longer-term outcomes to judge the relative effectiveness of different programmes or interventions. This is an issue, especially for research funders and educational providers, where investigating longer-term benefits or drawbacks represents a real and substantial financial cost (partly explaining the lack of studies which include longer-term outcomes). Smaller-scale studies focusing on specific components with few participants offer useful evidence of potential effectiveness but, once demonstrated, there needs to be greater consideration of extending research programmes to larger numbers of participants over longer periods of time.

10. Greater collaboration between researchers and practitioners is needed to establish what works best for children and young people in real-world classrooms. There tends to be a lack of consideration of wider factors in research studies focusing on specific techniques, and (sometimes) a lack of objectivity and rigour in classroom-based studies. Ideally, a greater synthesis between applied and basic research strands is required.

11. Related to point 10 more empirical research is needed on what constitutes an inclusive education for children and young people with ASD. Best practice and policy guidelines have much to offer here but there is a lack of collaborative, innovative and authentic research that combines rigour with important qualitative and contextual information from the perspectives of all key stakeholders, including children and young people.

In conclusion, children and adults with ASD are not a homogeneous group with the same or similar needs. They are individuals and members of families and, as such, decisions on their education should be made with reference to their individual needs and preferences, while also taking into account the views of parents, practitioners and providers. Given the diversity of needs on the autism spectrum, one type of approach or intervention is unlikely

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to be effective for all. Consequently, a range of provision should be maintained to ensure a better chance of being able to provide appropriately for this diversity of need. Ongoing research is required to establish the effectiveness of interventions and types of provision as well as the value and relevance of these in everyday contexts including the home, school and beyond.

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5.1 Introduction

Analysis of the findings from the empirical and expert strands, and identification of the gaps from the literature review, inform our set of seven key recommendations on education of children on the autism spectrum. These offer clear guidance for practitioners and policy makers on how available evidence on best practice might inform their practice and policies.

The recommendations are summarised in Table 5.1 and are cross-referenced with the relevant review section. Key recommendations are given in bold type, with the numbers of the paragraphs in the review that form the basis for these recommendations. Empirical sections of evidence that include studies given a high weight of evidence to the review are marked with **. Please note that where recommendations arise from the expert strand, they are cross-referenced with the relevant section rather than to specific sources. So, there may be only one reference point indicated, but the recommendation may stem from multiple sources.

In some cases, empirical evidence to support the recommendation is lacking. Instead, it may be based only or mostly on evidence from the expert strand (Recommendation 5: Multi-agency working). This approach is consistent with other reviews included in the expert strand evidence, for example the National Autism Plan for Children (NIASA, 2003) contained 28 recommendations of which 25 were based on expert opinion. Similarly, the SIGN guidelines (2007) used a "good practice points" category more than any other (including different gradings of empirical studies) to support its recommendations. This category was based on the clinical experience of the guideline development group. In other words, there remains a lack of empirical evidence in many areas of practice and so expert views remain essential inputs into the process of developing guidance and recommendations.

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Table 5.1: Recommendations cross-referenced with evidence sections

Recommendations	Evidence Base	
	Empirical Strand	**Expert Strand**
Key Recommendation 1: Evidence-based practice **Further evidence is required on the impact of specific educational settings and interventions across a range of ages and sub-groups within the autism spectrum.** • More empirical research is needed on what constitutes an effective and appropriate education for individuals with ASD in terms of setting and interventions • There is a need for robust designs that allow for differentiation of variables and identification of salient factors This research needs to: • Examine the effectiveness of provision • Evaluate the process and outcomes of interventions and to determine for whom these are best suited • Study a range of age groups and subgroups • Take into account family characteristics and individual contexts • Obtain the perspectives of children and young people with ASD	3.1.1** 3.1.2a** 3.1.2b** 3.1.4c 3.1.3 3.1.4a 3.1.4b 3.1.4c 3.1.4d 3.1.5a 3.1.5b 3.1.5c 3.1.6	3.2.3e 3.2.5f

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Key Recommendation 2: ASD provision and pedagogy	3.1.1**	3.2.3a
	3.1.2a**	3.2.3e
There is currently no evidence that a single intervention or solution will meet the needs of all learners with ASD, so a range of options (types of educational setting and interventions) should be available and should be chosen to fit the profile of the child or young person.	3.1.2b**	3.2.3f
	3.1.3	3.2.5a
	3.1.5a	3.2.5b
	3.1.5b	3.2.5d
	3.1.5c	
	3.1.5d**	
	3.1.5e**	
	3.1.6	
	3.1.8**	

- Early intervention should remain a priority
- A detailed assessment of the child, considering their individual profile and the needs and wishes of his/her family, are essential in making informed decisions about educational provision
- Interventions that focus on early communicative behaviours are important
- Both structured and less structured teaching approaches, using different modes of presentation (information and communication technology, pictures, videos) have proved useful for promoting specific learning outcomes
- The needs of older children are under researched
- Learning through interaction with peers is crucial
- For adults, support is needed to continue their education, to find and maintain employment, and to develop friendships and follow leisure pursuits
- There is also a need to focus on the emotional and social wellbeing of children and adults with ASD

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Key Recommendation 3: Training Training needs to be evaluated to establish what influence this has on practice, and on the outcomes for individuals with ASD. - Practitioners and parents need specialist knowledge and understanding of the specific needs of children and young people with ASD - Training should also focus on enabling practitioners to work in partnership with families to plan how to meet needs - It is a priority to ascertain training needs before training is provided - Studies should examine the influence of training on practice and evaluate outcomes for individuals with ASD - There is a need to continue to develop training pathways from basic awareness raising to accredited training and continuous professional development - A comprehensive ASD training strategy could include mandatory training for some staff in key roles in ASD - The extensive resources available through the Special Education Support Service in Ireland and the recently launched DVD and internet resources produced by the DCSF in the UK on the autism spectrum for all staff working in early years settings could contribute strongly to such a strategy (www.nationalstrategies.standards.dcsf.gov.uk/node/116691)	3.1.5d** 3.1.7 3.1.8**	3.2.3b 3.2.5d

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Key Recommendation 4: Working with families **Parent/carer training should be regarded as a priority and mechanisms put in place to make high quality training accessible.** • Parents need accessible information on educational settings and interventions • It is important to reach families that do not access available opportunities and services; a study on what the barriers are to access, and how to meet the needs of this group, would be very beneficial • Professionals need to provide opportunities for sharing practice and strategies across home and school	3.1.8**	3.2.3c
Key Recommendation 5: Multi-agency approach **Multi-agency responsibilities and protocols need to be formalised to ensure that services from education, social care, and health, and support from the voluntary and independent sectors, are well co-ordinated. Children and families should receive a seamless service where all those involved work effectively together.** • There is limited published empirical research on how effective multi-agency collaboration for children with ASD can be most effectively achieved • Commissioners from health, education and social care need to commit practically and financially to joint working (including joint financing initiatives) and to set up effective keyworking or named person systems		3.2.3a 3.2.3d 3.2.3g 3.2.5a 3.2.5c 3.2.5d

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| Key Recommendation 6: The autistic voice | 3.1.6 | 3.2.3e |
| | | 3.2.3f |

Key Recommendation 6: The autistic voice

Children and adults with ASD can provide important insights on support that is effective, and guidelines should be developed to ensure their views are sought and taken into account in everyday practice in schools and in decision-making.

- There is a need for more qualitative methodologies in this area
- Advocacy and self advocacy groups can offer important insights
- Individuals with ASD should be supported to take on formal roles that can inform the development of strategy, policy and provision
- The achievements and first-hand perspectives of children and adults with ASD need to be regarded as priorities for future research to inform policy and practice

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Key Recommendation 7: Transition planning and further and higher education **Transition, between and within settings, should be recognised as a source of extreme stress and vulnerability for the individual and their family. Detailed planning is required to prepare the child or young person for these transitions and to pass on key information and strategies from existing staff and parents to new staff.** - Practitioners and parents need guidelines to inform good transition practice - These guidelines should include information about all agencies involved with a child or young person - There is a need to formalise and enhance the links between schools and further and higher education providers - Further and higher educational institutions need to consider how their settings and programmes can be adapted to be accessible to learners with ASD	3.1.6	3.2.3g 3.2.5a 3.2.5d 3.2.5g

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Appendix A: About the authors

Tish Balfe (M Ed (ASD); BCABA) is a lecturer in the Special Education Department in St Patrick's College Drumcondra. She has many years' experience teaching students with autistic spectrum disorder and has worked as a consultant with the Institute of Child Education and Psychology (ICEP) in developing special educational needs courses for teachers.

Selected publications include:

Balfe, T (2008). Using the structured whole word reading programme Edmark to help struggling students with Autistic Spectrum Disorders and Severe Learning Difficulties to read, *The SLD Experience, Spring (50).*

Balfe, T (2003) Children with Autistic Spectrum Disorders: How they Think and Learn, *REACH Journal of Special Needs Education in Ireland*, Vol 16 (2), pp118-126.

Balfe, T (2001) A Study of the Induction Experience and Needs of Teachers New to Autistic Spectrum Disorders in the Republic of Ireland, *Good Autism Practice (GAP)*, Vol 2 (2), pp75-86.

Karen Guldberg (BA (Joint Honours); PGCE; PGCert; MA; M Ed; PhD) is a lecturer in Autism Studies, School of Education, University of Birmingham. Karen taught children with autism for many years and now delivers training programmes for practitioners. Her research focuses on educational intervention for children with autism and the training needs of practitioners.

Selected publications include:

Guldberg, K (2008). Adult learners and professional development: Peer to peer student learning in a networked community. *International Journal of Lifelong Education, 29(1): 35-49.*

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Guldberg, K and Pilkington, R (2007) Tutor roles in facilitating reflection on practice through online discussion, *Journal of Educational Technology and Society,* 10(1), 61-72.

Glenys Jones (M Ed, MA, PhD) is a chartered psychologist and a lecturer in the Autism Centre for Education and Research at the University of Birmingham. She has been engaged in research into educational interventions and provision for children and adults on the autism spectrum for over 25 years and has contributed to many sets of national guidance.

Selected publications include:

Jones, G, English, A, Guldberg, K, Jordan, R, Richardson, P and Waltz, M (2008). *Educational provision for children and young people on the autism spectrum living in England: a review of current practice, issues and challenges*, London: Autism Education Trust.

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Andrea MacLeod (BA (Hons); M Ed) is lecturer in Autism Studies at the School of Education, University of Birmingham. She has been involved in a number of research and educational projects related to the autism spectrum and has a particular interest in outcomes for adults on the autism spectrum.

Selected publications include:

MacLeod, A and Green, S (2009). Beyond the books: Case study of a collaborative and holistic support model for university students with Asperger syndrome. *Studies in Higher Education,* 39(1): 1-16 (in press).

MacLeod, A and Johnston, P (2007). Standing out and fitting in: Report on a support group for individuals with Asperger syndrome using a personal account. **British Journal of Special Education,** 34(2): 83-89.

MacLeod, A (1999). The Birmingham community support scheme for adults with Asperger syndrome. **Autism: the International Journal of Research and Practice,** 3: 177-192.

Sarah Parsons (BSc (Hons) Psychology; PhD) is a senior research fellow in the School of Education, University of Birmingham. She has significant research experience in disability related projects and has particular interests in use of innovative technologies for children with autism and the views and experiences of disabled children and their families.

Selected publications include:

Parsons, S, Lewis, A, and Ellins, J (2009). The views and experiences of parents of children with autistic spectrum disorder about educational provision: comparisons with parents of children with other disabilities from an online survey. *European Journal of Special Needs Education*, 24 (1), 37-58.

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Parsons, S, Mitchell, P, and Leonard, A (2004). The use and understanding of virtual environments by adolescents with autistic spectrum disorders. *Journal of Autism and Developmental Disorders.* 34(4), 449-466.

Anita Prunty (Dip Teach; BA [Hons] Psychology; M Ed [Educational Psychology]; EdD) is an educational psychologist and lecturer in the Department of Special Education, St Patrick's College, Drumcondra. Her research experience and interests include the IEP process for pupils with ASD, teacher education and ASD, inclusive practices in schools and positive approaches to behaviour management.

Selected publications include:

Rosenberg, MS and Prunty, A (2008). Comprehensive School-Wide Discipline: Providing Positive Behaviour Support to All Students. *REACH, Journal of Special Needs Education in Ireland*, Vol 22(1), pp35-47.

Prunty, A (2006). What Affects Teachers' Confidence in Dealing with Challenging Behaviour in Schools? *REACH, Journal of Special Needs Education in Ireland*, Vol 20(1), pp20-28.

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Appendix A1: Agreed search terms for systematic empirical strand

Subject area* and link to inclusion criteria	Specific terms	
Terms for ASDs **(IC1)**	Autistic spectrum disorder/s or conditions (ASD/s) (Classic) Autism Autistic Atypical autism Asperger(s) syndrome (AS) High functioning autism (HFA)	Pervasive developmental disorders (PDD) Pervasive developmental disorder not otherwise specified (PDD-NOS) Rett's syndrome/disorder Childhood disintegrative syndrome Kanner's autism/syndrome
Terms for children and young people **(IC1)**	Infant Toddler Preschooler Young children Child Middle childhood Pupils Youth Students	Pre-adolescents Learners Adolescents Teenagers Young people Young adults Girl(s) Boy(s) Individuals

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Terms for indication of outcomes (IC2)	Learning	Engagement
	Behavior/behaviour	Motivation
	Participation	Attitude
	Improvement	Drop-out
	Gains	Confidence
	Outcomes	Self-esteem
	Attainment	Attendance
	Progress	Inclusion
	Development	Self-care
	Results	Skill
	Benefits	Independence
	Effectiveness	Social
	Fail	Generalisation
	Follow-up	Increase
	Longitudinal	Decrease
	Success	Modification
	Achievement	

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Terms for educational provision (place/type of provision – not already stated above (IC3)	Instruction Pedagogy Multidisciplinary Teaching/classroom methods /approaches Educational practices or strategies Curriculum Classroom or learning environment Home school/ing Educated other than at school (ETOS) Educated outwith school Home educated Home tutoring Playgroup Comprehensive Mainstream/ing Ordinary	Inclusive education Inclusive education/al programme/s Integrated Reverse integration Dual enrolment Individual education plan (IEP) Inclusion ABA school/class Resource teacher Special needs assistant Segregated Special school/class/unit Specialist Teacher/staff/classroom assistant training Outreach Community

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Terms for age/stage of schooling **(IC3 and IC4)**	Early years	Secondary
	Early provision	Second level
	Early intervention	College
	Foundation	Third level
	Preschool	Education
	Nursery	Tertiary
	Infant	Further
	Reception	Higher
	Kindergarten	University
	Elementary	Continuing
	First level	Post primary
	Junior	Institute of technology
	Primary	Post-school
	Middle school	Lifelong
	High school	Adult
Terms for type of study **(IC5)**	Intervention	Tutoring/mentoring
	Evaluation	Tuition
	Training	Curriculum
	Learning	Program/me
	Skills	Survey
	Development	Course

Appendix A1 cont.

Exclusion terms**	Pharmacology	Genetics
	Psychopharmacology	Eating disorder
	Psychological assessment	Sleep disorder
	Clinical	Pesticide
	Medical	Peptide
	Screening	Neural
	Prevalence	Cortical
	Epidemiology	Fragile X
	Immunisation	XXY
	MMR	

Note that terms within each box are "OR" terms for search purposes, that is papers can include, for example, (ASD OR autis OR Atypical OR high functioning…etc). Searches for each set of terms within boxes will be carried out separately and then the searches combined so that articles are identified that include at least one search term from each of the boxes, that is searches between boxes are "AND" terms (in line with inclusion criteria stated above). Note also that inclusion criteria IC6 (English language) and IC7 (2002-08) are set at the beginning of the search and will apply to all searches.

**Plus those studies concerned primarily with family factors (indicators of family stress /coping), are primarily theoretical, philosophical or psychological in their orientation (testing psychological hypotheses without intervention approaches); or where ASD is NOT the primary diagnosis, for instance studies with deaf or blind children with autistic symptoms. These exclusions will take place during screening of titles of abstracts rather than through use of specific search terms.

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Appendix A2: Empirical strand pro forma

Rater	**Name**	
	Date document rated	
Bibliographic information	**Year of publication**	
	Country of study	
	Full ref for bibliography	
Participant information	**Focal group (parents, CYP, teachers)**	
	Diagnostic focus or information	
	Details of control or comparison group(s) (if any)	
	Source of data (teacher observations of children; parent reports; researcher-led intervention)	
	Age range	
	Number	
	Language	

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Study information	**Aims/research questions**	
	Setting/context (school, college, home, community)	
	Specific focus (social skills, behaviour, ABA, ICT, curriculum)	
	Type of study (design)	
	Dependent variable(s) including nature of data (survey findings, qualitative interviews, expert views, psychometric or standardised tests)	
	Independence of researchers to study	
Main findings /outcomes [MAIN MESSAGE]		
Any comments re health and education involvement?		

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Any ethical issues or concerns?				
Any other notes /comments				
Published abstract				
Weight of evidence (WOE) evaluation [Low, medium or high]	A Soundness in answering the *study* question	B Appropriateness of design and analysis for the *review*	C Relevance of study focus for the *review*	D Overall WoE judgment of quality in relation to the *review*

Appendix A3: Expert strand pro forma

Rater	Name	
	Date document rated	
Bibliographic information	Year of publication	
	Authors	
	Any notes about the authors (parents, independent researchers, well-known expert)	
	Organisation	
	Country	
	Publisher	
	Full ref for bibliography	
Specific information	Diagnostic group/focus (HFA, AS, Autism and SLD)	
	Age Range	
	Setting/context (school, college, home, community)	
	Brief description of nature of doc (survey findings, collection of evidence, expert views)	

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	Any specific focus (social skills, behaviour, ABA, ICT, curriculum)	
	Main findings	
	Recommendations (if any)	
	Any other notes/comments	

Appendix A4: EMPIRICAL STRAND – Full details and critiques of research articles/reports

The papers in this empirical section cover pre-school educational interventions through to post-compulsory and higher education, from family and home-based education to provision in formal educational settings. The papers are presented thematically. The section is structured to look at multi-component interventions first, followed by comparative studies and home-based interventions before focusing on social interaction, understanding and skills. We then outline studies that focus on specific learning approaches and tools before examining papers on the voices of children and young people, those describing training programmes for school personnel and those describing training for parents. It should be noted that the order in which papers appear in each section offers no indication of importance, quality or relevance; papers considered of high importance or relevance are denoted by a ** following the citation; not all sections contain evidence that was rated ** (high).

The subsections are listed here:

3.1.1 Multi-component interventions

3.1.2 Comparison of different types of interventions

3.1.3 Home-based interventions and impact on parents

3.1.4 Social interaction, understanding and skills

3.1.5 Specific learning tools and approaches

3.1.6 Voices of children, young people and adults

3.1.7 School staff training

3.1.8 Parent training/ involvement

Each theme is subdivided into early years, primary and secondary where possible. The different themes/subsections have different numbers of papers and many have thematically based subgroups. Note that these more detailed critiques are intended to *augment* rather than *repeat* the information in the main report. Readers should refer back to the main report for concise summaries of the main findings from each section.

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3.1.1 Multi-component interventions (n=7 studies)

Introduction/Overview

This section summarises and critiques papers that deal with multi-component intervention studies. These studies use a range of teaching methods and therefore often focus on multiple measures (Wolery and Garfinkle, 2002). There were seven papers in this section: five covered pre-school children and two included children of primary age. It has not been subdivided across age groups due to the small numbers of papers on this theme.

Perez-Gonzalez and Williams (2006) aimed to develop and test individualised learning programmes for children with autism in Spain, focusing on behavioural procedures for teaching spoken functional language across home, schools and "other places suitable for the daily routine of the family". Three children (aged five, seven and eight) described as having "different levels of autism" were included, although no information about cognitive profiles was supplied. In an intervention using an AB design, children's baseline behaviours were assessed using standardised instruments and then skills were taught until they reached "fluency". Parents were also instructed on how to stimulate the skill in everyday life. Children initially received four hours' intervention per day, increasing to eight hours, for two to three months in total.

The authors report that all children learned new skills, including spoken functional language, and the "level" of skills acquired mapped almost directly onto number of hours training; on average, one skill was learned for every hour of intervention. On the basis of these findings, it was suggested that children would be able to attain the level of a typically developing six-year-old (for example) and/or become "integrated" at school if the level of training (and learning levels) was maintained; specifically, the authors suggest that 50 hours a week would be reasonable. They stated: "We believe that the improvements the children achieved are much greater than those normally achieved by such children in specialised schools" (p48).

However, there was no direct evidence for these claims. The AB design and small number of participants substantially limit any demonstration that gains were attributable to the programme. In addition, there were no indications of follow-up (maintenance) or

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generalisation of skills and children were isolated from peers and classroom contexts for extensive periods of time. There was also a lack of detail on implementation and no account of fidelity (intervention consistency or quality) was provided. The intervention also varied across children and contexts (home and school) and so it is not possible to say whether, and how, this intervention was effective.

An Italian study carried out by **Panerai et al (2008)** compared the effectiveness of the TEACCH programme with the normal integration of children with disabilities into mainstream schools (with additional support supplied by teachers and speech and language therapists). Very broadly, the TEACCH programme incorporates visual aids that can be individualised for the child (picture-based timetables) alongside structured routines for teaching and learning that include rewards for correct completion of work. In this study, eight children received the TEACCH programme while resident in a research institute, while a further eight were assessed during their attendance at mainstream schools. Their mean age was nine years and all were diagnosed with autism according to DSM-IV criteria and CARS scores. All also had severe or profound intellectual disabilities.

The evaluation of outcomes for children were based on two standardised measures [the Vineland Adaptive Behaviour Scales (VABS) and the Psycho Educational Profile – Revised (PEP-R)] carried out twice for each participant, one year apart. According to the authors, the TEACCH and school-based groups were "treated" for the same number of hours per day. The former showed significant gains in more domains of the PEP-R (according to skills judged to be "passed", that is "acquired" rather than "emerging'). There were no differences found in either group on "emerging" skills. Similar results were obtained for the VABS with significant changes (improvements) in more domains for the TEACCH group than the school group. There were no changes in either group on the communication scales of the VABS, or for domestic and community living skills or interpersonal relationships. There was also no change in "maladaptive behaviours" for either group. The main conclusion of the authors was that "…the TEACCH programme was more effective than the treatment applied to the control group" (p326)

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Unfortunately, this interpretation of the findings is highly questionable for several reasons. First, the TEACCH programme was planned and implemented for individual children *according* to their profiles on the VABS and PEP-R; thus the dependent measures (that is standardised tests) used were biased towards the TEACCH approach from the start. Second, the school group started from a higher baseline of ability and so their PEP-R scores were already higher than the TEACCH group meaning there was less scope for demonstrating change in this group. Finally, the environmental/contextual differences between the schools and the research institute were likely to be at least as great as programme differences, and so it is not possible to attribute any changes to the TEACCH programme specifically. In other words, this study did not compare autism specialist environments only. In short, it was not appropriate to compare these groups directly and so conclusions on greater effectiveness of TEACCH compared to regular schooling cannot be made.

In the US, **Stahmer and Ingersoll (2004)** evaluated a multi-component pre-school education programme (Children's Toddler School or CTS) involving use of a range of teaching methods and techniques informed by applied behavioural analysis (pivotal response training, discrete trial training, incidental teaching, structured teaching). Twenty children with ASD with an average age at entry to the programme of 28 months participated in the study and remained for an average of 9.5 months. Standardised tests of developmental and behavioural functioning were administered at programme entry and exit in addition to a bespoke checklist measure of functional communication, social and play skills. The programme consisted of three main components: 15 hours per week in an inclusive pre-school classroom (one that accommodates typically developing children as well as those with autism); two hours a week of individual special skills training; two hours a week "home visit" from a classroom teacher to support parents in using naturalistic techniques at home.

The study found significant improvements on most domains of functioning, including use of functional communication and increases in social and play behaviours. This was confirmed through statistical analyses of the measures taken at programme entry and exit. The authors concluded that these results suggest the CTS model "…may be an effective

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treatment model for children with ASD who are under the age of three years…" (p78). However, multiple statistical comparisons (using t-tests) were carried out across the multiple measures without any correction for this (such as Bonferroni), thereby increasing the likelihood of obtaining significant differences by chance (Type I errors). Moreover, it was not possible to conclude that increases were due to the programme as this was an intervention-only design (no comparison groups) and there were, therefore, difficulties in separating out maturation from clinically significant intervention effects. Importantly also, the independence of this evaluation is questionable given that the first author worked in the same setting which delivered the educational programme. Generally, this paper highlights the difficulty in evaluating a multi-component programme. Such programmes are established to respond flexibly to needs and circumstances but it means their effectiveness and that of their constituent components is very difficult to judge.

A study by **Boulware, Schwartz, Sandall and McBride (2006)** in the US evaluated the effectiveness of a comprehensive early childhood programme incorporating different behavioural strategies (discrete trial teaching, response prompting, visual supports) alongside naturalistic teaching techniques in an inclusive setting. Eight children with ASD, aged 18 to 29 months, were enrolled in the university-based programme which aimed to promote social and communicative competence. Standardised tests were taken before and after the intervention including assessments of cognitive development, behaviour and communication. Children attended the Project DATA (Development Appropriate Treatment for Autism) for toddlers programme twice weekly for a 1½-hour session. The programme was also supplemented by four additional components, including integrated playgroup (three hours), individualised instruction (six hours), and support in the home or community by project staff (seven hours). There was large individual variation in the time spent in the programme; for example, one child spent nine months while another spent 21 months. Results showed that all eight children made gains in functional behaviour during enrolment and for six the gains were particularly impressive. The programme helped them to achieve meaningful outcomes in social communication, self-regulatory skills and cognitive development in a relatively short period of time. Although the sample was small, the study offers a positive contribution to the review in that it considered important functional behaviours such as toileting and training, imitation, verbal communication and

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interaction with peers. However, the small sample and lack of a comparison group make it difficult to draw robust conclusions on treatment effects. The children were also of different ages when they started the programme. Kasari (2002) recognises that age of treatment commencement may have an important influence on outcome and that this could have an impact on treatment effects. The age variation in this study can therefore be problematic. However, the research design is strengthened by outcome measures relating to the behaviours targeted for intervention and the study taking place in a naturalistic inclusive setting.

Also in the US, **DiPietro et al (2002)** used attendance at mainstream school and percentage of time spent in "inclusive" settings (general education classes) as outcome measures for the success of a pre-school centre-based behavioural treatment programme. This information was obtained from a parental survey completed by 27 respondents at one to nine years following their child's discharge from the centre. Children were aged five to seven when they left to go to a local school and had been "in" the programme for 10-52 months before this. The behavioural programme available through the centre included home and school-based interventions using ABA procedures and techniques. Parents were also surveyed on their satisfaction with current schooling for their child. Results showed that 25/27 children were in state schools (and two were in private special schools) and 19/25 children were educated in mainstream classrooms for 100 per cent of the time. Individual support for children in those settings varied between 68-100 per cent of the time (but there was wide variation within this). Parents were generally satisfied with current provision irrespective of percentage of time spent in mainstream classes with or without individual support. Children's experience of mainstream school was unrelated to their time since discharge from centre-based programme.

The authors state that the

>…results suggest that the long-term outcome of children who have autism or PDD and require intensive behavioural intervention can be supported in less rigorous educational settings and in particular, can receive instruction with good effects in the context of students who do not have disabilities. (p129)

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In other words, children from the centre made a successful transition to their local mainstream school and this was interpreted as a positive outcome of the programme. Unfortunately, however, it is not possible to attribute "outcomes" (successful or otherwise) to the centre-based programme because there were no control or comparison groups in the study. In addition, no background information about the children was available and so we do not know the profile of those being followed-up. The group was diverse in age and time spent in the programme, thereby making it impossible to know (for example) whether length of time spent in the programme made any difference. Finally, and crucially, individual schools and parental choices are vital factors in determining progress of children and parental satisfaction with educational provision. Thus, no meaningful conclusions about the long-term effectiveness of a pre-school behavioural programme can be made from this study.

Dyer, Martino and Parvenski (2006) conducted a qualitative case study of a US behavioural intervention programme for children aged two to five with a diagnosis of autism or pervasive developmental disorder. The intervention model consisted of different 1:1 treatment components, most of which (but not all) were based on ABA approaches. Different children received different components depending on individual need; individualised programmes were based on assessment and the child's preferences. Thirty-five children were involved for the first three years and all families were sent the evaluation tool: Quality of Life Questionnaire' (QL). The 19 families who responded became the study's target group. The children were aged 36 to 60 months at entry (16 males; three females) and interventions took place either at home (n=9), school (n=9) or a combination of both (n=1).

Findings were based on two methods: first, the QL questionnaire was sent to parents of all participant children following three years of treatment. Questions focused on child gains and quality of life for the family. Families were asked to respond to seven questions, six of which used a Likert five-point scale (How often does your child interact with peers/friends?) plus one open question: "What gains have you noticed in your child's treatment?" The second method was the assignation of "quality treatment points" to each participant, based on a set of seven criteria which focused on treatment type, intensity and duration;

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level of family participation and training; and level of staff training and supervision. Each criterion was given equal weighting (one point). Inter-observer reliabilities were obtained on eight participants, achieving an agreement rate of 80-100 per cent. All parents reported gains in their children following intervention. The authors report that the children who had the highest QL points were those who participated in programmes with the most treatment components and vice versa.

The authors themselves indicate that the data is limited due to lack of internal validity, and children were randomly assigned to high, medium and low quality groups with no baseline information on the make-up of each group. Contextual data was not available and no interim data was presented. It is therefore not clear how external, developmental and environmental factors may have led to gains regardless of the interventions. Although the programme was open to two- to five-year-olds, the children in this study varied between three and five years at entry. It is therefore not clear what interventions, and for how long, these older children received or how variations in environment affected outcome. Almost half the participants were aged four or over at entry (n=8), so would have started formal schooling soon after entry – a factor which would have been likely to influence outcomes but is not taken account of. The study design is also subject to potential bias from parents, who would have been favourably disposed to the intervention to remain involved for three years. There is no data available on those families who may have dropped out of the programme for any reason. The questionnaire findings cannot be directly linked to the intervention, other than for the final open question which uses loaded terminology (that is. gains). The design of the "quality treatment points" is such that three elements were given equal weighting: level of family involvement, quality of staff and the intervention itself. Only one of these was intervention-dependent.

Schwartz, Sandall, McBride and Boulware (2004**) in the US studied the effectiveness of the Project DATA (Development Appropriate Treatment for Autism) programme. This is a federally funded model project for developing a school-based programme for young children with autism. The project consists of five components: a high quality early childhood environment, extended instructional time, social and technical support for families, collaboration across services and transition support. Its aims are to provide

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services that are effective, inclusive, developmentally appropriate and acceptable to consumers. It synthesises current knowledge on child development and best practices in applied behavioural analysis to deliver a child-centred curriculum, using data-driven decision making, and giving children with autism the opportunities to interact successfully with typically developing peers every day. It relies on close collaboration between the families and teaching staff.

At the time of the study, 48 children had participated in the project for a mean of 16 months. The children were aged three to six years when they participated and all had independent diagnosis of autism or PDD-NOS (pervasive development disorder – not otherwise specified). All participants attended one of three pre-school classrooms, each with a morning or afternoon session at the centre. The extended-time component of the school programme meant they received about 20 hours a week of school-based services.

To evaluate the effectiveness of the project, authors collected information on the children's developmental progress in functional skills, families and consumers' satisfaction and ongoing self-assessment by the management team. Developmental progress was measured by using the AEPS (Assessment, Evaluation and Programming System: Bricker and Pretti-Frontczak, 1996) to assess pupils at the beginning and end of the school year as well as using a Project DATA curriculum based measure at the beginning and end of each school year. Parents were interviewed annually to gauge satisfaction and to identify priorities for intervention. The authors constructed an index to evaluate functional outcomes. The six functional outcomes represented were: use of speech to communicate, ability to follow complex directions, motor imitation, toilet training during daytime hours, symbolic play and co-operative play with peers.

Findings showed the children made functional gains across all these skills, with gains reported in terms of percentage of children mastering different functional outcomes. Social validity was measured through parental satisfaction, as expressed through interview and demand by families for the programme. Local school districts replicated it and the authors received multiple inquiries about training staff.

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Although never designed as a research project, the programme has been data driven and has collated information indicating progress for children and parents who are satisfied. Furthermore, the research approach is one in which data on children's learning has guided every component of the programme and this data has also enabled decisions to be made on staffing, programme configuration and policies. This resulted in practice and policy responding to the evidence rather than following a rigid curriculum. It has also enabled teachers to use data on children to further inform assessment and planning. Outcome measures were related to aims of intervention and covered key areas of difficulty in children with autism, focusing firmly on developing an approach that enables inclusion for the child with autism and takes into account the importance of working closely with families.

Despite the high weight of evidence attached to this study, we recognise some limitations, including the fact that personnel delivering the programme conducted the research; there was no control or comparison group; there was little background information on the children or family characteristics; and there were only measures of group progress with no data reported on individual outcomes or possible variations within those. These aspects make it difficult to determine the extent to which it is the type of intervention services, child and family characteristics or even therapist characteristics such as level of training, warmth, and empathy that might underlie outcomes (Kasari, 2002). This study is nevertheless of great importance to this review because it provides a model for synthesising research and teaching delivery as it shows how data and research on interventions can inform teaching and planning and vice versa. It would be valuable to extend this research, as the authors note, to comparing this group of children to those receiving different types of services.

3.1.2 Comparison of different types of interventions

Introduction/Overview

The research studies in this subsection compare different types of interventions in order to make informed decisions about their effectiveness. Two subsections come under this theme:

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1. The first looks at comparison of interventions for pre-school children, including intensive behavioural programmes, special nursery placement, the Portage programme and an eclectic programme (which adopts a mix of different interventions and matches these to individual differences).
2. The second part compares different pre-school interventions to develop children's play.

3.1.2a Comparison of different types of interventions: Preschool (n=5 studies)

Reed, Osborne and Corness (2007**) in the UK investigated the real-world effectiveness of early teaching interventions for children with autism spectrum disorder in a community-based sample over 10 months. The interventions consisted of:

1. ABA home based with one-to-one teaching.
2. Special nursery placement with teaching conducted in groups.

Portage with a mixture of 1:1 and teaching in groups. The study measured the effectiveness of the above three early teaching interventions undertaken in the community rather than in the clinic. The study included 48 participants aged 2½ to four years.

The study measured autism quotient, developmental level, cognition and behaviour. It used a battery of different tests, including GARS, PEP-R, BAS II, VABS and CRS-R, taken at the start of the study (baseline) and at follow-up after nine months. Analysis used multivariate analysis of covariance (MANCOVA). Findings highlighted little change in "severity of autistic symptoms" over the period and none of the interventions produced "recovery". Intellectual functioning was higher for ABA and nursery children than Portage. Nursery had a strong impact on all three measures whereas Portage was limited to a few. Improvements in educational functioning were biggest for the ABA group while the nursery had the biggest gains in adaptive behaviour functioning. In terms of reduction in oppositional behaviour, nursery and Portage showed more improvement than ABA.

The study has some limitations, recognised by the authors, in that treatment fidelity was not measured and there were no direct observations. Caution also needs to be exercised in interpreting the results because children in the three interventions received large

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variations in intensity of treatment, with the ABA group receiving a mean of 30.4 hours per week, the nursery children a mean of 12.7 hours a week and the Portage children 8½ hours a week. The ratio between adults and children and between 1:1 and group work also differed between interventions. The ABA children received mostly 1:1 intervention, while most nursery teaching took place in groups. The Portage children received three-quarters of their intervention as 1:1 sessions with the rest of their time spent in small groups.

This study's strength lies in a robust design coupled with a good sample size, three control groups and participants being evenly matched. It was a naturalistic study with participants receiving interventions available in their locality. It also measured a range of aspects of children's functioning. However, its real importance, as identified by the authors, relates to the identified need to study the relative importance of educational skills versus adaptive behavioural skills at pre-school for subsequent school functioning.

Also in the UK, **Magiati, Charman, and Howlin (2007**)** conducted a two-year follow-up study of i) community-based early intensive behavioural intervention and ii) specialist nursery provision for children with ASD. The study involved similar numbers of children to the Reed et al (2007) study, with 44 aged 23-53 months. It examined cognitive, language, play, adaptive behaviour and severity of autism, using a battery of tests, including the Bayley scale of infant development, the VABS, BPVS and the ADI-R (to confirm diagnosis), plus a questionnaire on family characteristics and the type and intensity of intervention. This was also a naturalistic intervention study in which families had already chosen interventions, but children were closely matched at intake. Assessments were conducted at home or school by the first author and a research assistant. They were not blind to the study's aims but were independent of treatment delivery. The third author scored video recorded assessments. Both groups showed improvements in age equivalent scores, but standard scores changed little. At follow up, there were no significant group differences. Home-based early intensive behavioural intervention (EIBI) and the autism specialist nursery produced comparable outcomes after two years. The only difference approaching significance related to the Vineland daily living skills, however, there were large individual differences. Intake IQ and language level were the best predictors of overall progress.

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The authors note that EIBI families were more highly educated than nursery families and had higher socio-economic status, although this was not statistically significant. The EIBI children had significantly higher time 1 IQ than the nursery group. The extent of progress of EIBI children was less than typically reported in university-based or clinic-based studies but accords with other community-based studies. All children continued to require specialist educational support. The authors comment: "our data supports the growing consensus that no one intervention for children with ASD is universally superior to all others" (NIASA, 2003).

Howard, Sparkman, Cohen, Green, and Stanislaw (2005**) in the US compared an intensive behaviour treatment (IBT) and eclectic treatments for young children with autism. The study involved 64 children split into three groups: IBT (n=29), a comparison group (AP, N=16) receiving intensive eclectic treatment and a second comparison group (GP, N=16) in non-intensive public early intervention programs. Effects of treatment intervention were examined using standardised tests of cognitive, language and adaptive skills, given to children at intake and 14 months into treatment. The study used a battery of tests dependent on age and developmental level of children, including the Bayley scale of infant development and the VABS. At follow-up, the IBT group had higher mean standard score in all skills domains except motor skills. There were no statistically significant differences between the mean scores of the two comparison groups. Authors reported that learning rates at follow up were substantially higher for children in the IBT group than for either of the other two groups. For example, children in the behaviour analytic group gained an average of 17 points on standardised measures of cognitive functioning; while the non-intensive public intervention group produced negative mean change scores in multiple skills domains.

In short, authors highlighted that the effect of "eclectic" treatments on both comparison groups was to flatten or decrease, rather than increase, the slopes of the developmental trajectories of most children. Based on these findings, the authors projected that children receiving the interventions in the comparison groups would lose more ground to their typically developing peers the longer they remain in such intervention programmes.

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However, children in the IBT group were diagnosed at younger age and began treatment at an earlier age than children in the autism programme, who in turn were diagnosed at younger age than those in the generic programme. Given that age of treatment commencement may be an important factor in children's outcomes when they receive interventions, this needs to be noted, although the analysis corrected for the parents" level of education and for the children's age at diagnosis. The authors note that parents of children in the IBT group were more educated, on average, than parents of children in the other two groups but the study is not able to answer whether this is likely to affect outcomes.

There were two comparison groups receiving intensive and non-intensive treatment and authors claim the study can throw light on the relation between intensity and treatment. The study found the mean scores in all skills domains were lower for the AP comparison group than the IBT group, despite the children receiving the same intensity of intervention. There were also other further differences (other than intensity and commencement of treatment in terms of age) that could affect outcomes including that the IBT group received intervention in multiple settings (across school, home and the community), while the two other groups received treatment in either public school classrooms (the AP group) or in local community education classrooms (the GP group). The authors note limitations to the study in that assignment to treatment group was parent determined rather than random; examiners were not blind to group assignment; and finally, results were analysed in relation to norm referenced assessments conducted in formal testing situations rather than direct observational measurements of behaviour. The authors note and deal with these limitations in the paper. This well-designed study raises important findings that need to be replicated in further studies.

Farrell, Trigonaki and Webster (2005) in the UK conducted an exploratory evaluation of two early intervention programmes for young children with autism. The study involved two interventions: ABA/Lovaas and LUFAP (Lancashire Under Fives Autism Project). The ABA intervention involved nine children and eight attended LUFAP. The main aims of the study were to obtain views from parents and professionals involved in the LUFAP and ABA programmes about pupil progress and the strengths and weaknesses of the particular

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programme in which they were involved. This was a qualitative study, which took place over a two-year period. Data was collected through a range of Interviews with parents, class teachers, support assistants, therapists and senior LEA officers. The interviews included parental comments on progress. Other measures included VABS (baseline and post-test) and Bayley scales of infant development.

Results showed that mean age equivalent level score remained a long way behind chronological age and the children would therefore need continuing support. In general, all stakeholders were positive about the impact of both programmes. Data from a reduced sample indicated that all the children made progress as measured on the VABS and the Bayley scales although progress of those on LUFAP was more encouraging than those on ABA/Lovaas. All those associated with ABA expressed positive views. However, there was little evidence that home-based programmes were integrated systematically into school activities. All teachers expressed positive views about LUFAP. The research team also assessed progress made for each child for each month they were on the programme. LUFAP children did particularly well in communication and socialisation. Progress from the ABA group was steadier. The ABA group scored less well on the socialisation scale of the Vineland. However, limitations include that the two groups of children were not directly comparable. The children in the ABA group had lower scores on the VABS and Bayley at the study's outset and so their difficulties were more challenging.

A study by **Remington et al (2007**)** carried out a "field effectiveness" study in the UK, comparing the progress of pre-school children with autism (diagnosed according to the ADI-R) across two groups: one receiving home-based early intensive behavioural intervention and the other in receipt of standard statutory provision from the local authority ("treatment as usual"). Families (n=23) included in the intervention group had opted for an early intervention programme while those in the comparison group (n=21) were not actively seeking this for their child with autism. All children were aged three (on average) at the outset and those in the intervention group received home-based behavioural intervention by trained therapists for 18 to 34 hours a week. Standardised assessments of IQ, language, adaptive behaviours, behaviour problems, severity of autistic

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symptoms, social communication and parental well-being, were taken at baseline, 12 months and 24 months.

Results from these measures showed statistically significant gains for the intervention group at 12 and 24 months compared to the non-intervention group on three domains, (following statistical controls for differences in chronological age): IQ, mental age, Vineland daily living skills. There was also some evidence of greater improvement in the intervention group on responding to joint attention (although this was a marginal result) and on comprehension and expressive language tests. Mothers (but not fathers) from the intervention group also reported a significant improvement in positive social behaviours of their children. Interestingly, fathers in the intervention group reported more symptoms of depression at both 12 and 24 months compared to fathers in the comparison group. The authors concluded from these findings that "…intervention for childhood autism based on applied behavior analysis and delivered intensively at home during the pre-school period can bring about significant changes in children's functioning without a negative impact on other family members…" (p435).

However, the study's conclusions should be rather more modest than this. The authors also reported data relevant to individual progress over the 24-month period in order to assess whether any gains on standardised measures could be regarded as clinically significant (over and above that which may have occurred due to maturation alone). These analyses revealed that five children in the intervention group and three in the comparison group made clinically significant gains; not an overwhelming difference between the two groups. In addition, those children benefiting most from the early behavioural intervention were shown to have had higher IQ, mental age and communication and social skills scores at the start of the study, suggesting that gains were likely to have been influenced by this existing higher ability rather than/as well as the early intervention. There were also no significant group-wise changes on core autistic difficulties, that is social and communication skills (assessed via the VABS) and severity of autistic symptoms; and no reported decrease in problem behaviours following the behavioural intervention. Finally, it should be noted that the research team was led by, and comprised (among others) staff

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members from the research centre also involved in providing the early intervention programmes for 13 of the families in the intervention group.

Overall, this was a well-designed and detailed study that attempted to provide as robust an approach as possible within the very real constraints of carrying out an intervention study in naturalistic contexts (according to parental preference and in the context of family homes). This comparison of early intervention with standard statutory provision provides only modest evidence at best for the greater effectiveness of the former over the latter. Certainly, there is no strong supporting evidence that investing substantial resources in such intervention for all pre-school children with autism could be justified.

3.1.2b Comparison of different interventions for developing play: Preschool (n=5 studies)

Colozzi, Ward and Crotty (2008) compared simultaneous prompting procedure in 1:1 and small group instruction to teach play skills to pre-school students with pervasive developmental disorder and developmental disabilities. There were four children in the study, three children aged four years and four months and one aged three years and seven months. The setting was a public pre-school classroom and the research design was based upon a multiple probe design across responses. Dependent variables were i) acquisition and error rates of daily probe and training trials of target pretend play expressive vocabulary skills, ii) target pretend play motor skills and iii) instructive feedback expressive vocabulary skills. Findings indicated a variation among individual students. Small group instruction may be more conducive to skills acquisition even though group sessions were more challenging to conduct. Group instruction required more training sessions and more training trials and had more training errors than 1:1. Data indicates that the simultaneous prompting procedure resulted in acquisition, maintenance and some generalisation of the target skills. Given the small size of the sample, further studies would need to be conducted in order to generalise findings. It is also important to note that long-term maintenance effects could not be assessed.

Kok, Kong and Bernard-Opitz (2002) compared the effects of structured play (teacher directed with massed trials being used for teaching) and facilitated play (incidental

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teaching method) approaches with eight pre-schoolers with autism. There were four children in each intervention, between four and five years. Socially competent peers were taught to engage the communication and play of children with autism. The research design used multiple baseline design across subjects with a crossover design for both play conditions. A battery of tests was matched to the functioning level of participants and included Leiter international performance scale; Bayley scales of infant development; Autism behavior checklist and NFER's schedule of growing skills. The study undertook frequency counts for appropriate and inappropriate initiations and responses for both dependent measures. In addition to this, researchers administered a survey to assess typically developing peer assessments. This was supplemented by qualitative reports by eight caregivers. Preliminary results indicated an interaction between the mental age of the child and the teaching paradigm used. Implementation of structured and facilitated play models was accompanied by increases in appropriate play and communication. There was more evidence of appropriate communication under the structured play condition for six of the eight children; while three showed more communicative interactions under the facilitated play condition. The findings give some preliminary support for the assumption that verbal or higher-level children may initiate play more under facilitated play conditions and that communicative responses may be more frequent under structured play conditions. The authors noted that the findings were in line with discussion of a needed continuum of intervention approaches. The findings also reflect some advantage of providing structure as well as facilitation in playgroups.

Wong, Kasari, Freeman and Paparella (2007) studied the acquisition and generalisation of joint attention and symbolic play skills in 41 young children with autism aged 31 to 55 months in an early intervention programme for pre-school children. Participants were recruited from this programme and then randomised to one of two treatments: a targeted intervention for symbolic play skills (taught to improve functional and symbolic play skills) or one for joint attention skills (taught to share attention between objects and other people using gesture and eye contact). Interventions involved ABA methods. The study had two aims: to assess how quickly children with autism mastered a joint attention versus a play skill using two simultaneous and sequential behavioural teaching formats; and to investigate child characteristics that might relate to performance mastery. The intervention

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taught the child to display exemplars of three different play or joint attention actions for each goal level. The study used a battery of assessments, which included the Mullen scales of early learning; the Reynelle developmental language scales; the structured play assessment, the early social communication skills assessment and a mother-child interaction assessment. Overall, children had an easier time learning play skills than joint attention skills. Children with higher mental and language ages reached performance mastery criteria faster than children with lower scores.

Findings were qualified by teaching domain and child characteristics. The study found that several factors affected the rate at which young children with autism mastered and generalised the learning of play and joint attention skills, including children having higher mental, receptive and expressive language levels.

Attempting to overcome the oft-repeated methodological shortcomings in intervention research, **Kasari et al (2006**)** implemented a randomised controlled intervention study comparing activities focusing on joint attention and initiation with those involving symbolic play. Fifty-eight children with autism aged three to four (diagnosis confirmed via the ADOS and ADI-R) were assigned to one of three groups: joint attention, pretend play or control. All children already attended an early intervention programme (EIP) for six hours a day, which was based on ABA principles. Educational psychology graduate students implemented the specific intervention in that context during daily 30-minute sessions over five to six weeks. Sessions in the joint attention group focused on teaching joint attention behaviours while the play intervention focused on teaching symbolic play skills. The control group received their EIP as normal. Pre- and post-intervention measures included a standardised social communication scale plus videotaped structured play and caregiver-child interaction sessions.

Both intervention groups showed significant and specific improvements in skills related to the focus of the intervention; so, for example, the joint attention group initiated more "shows" (holds an object towards an adult to share their attention), while the playgroup showed more diversity and sophistication in their play. In addition, these skills generalised to interactions with a caregiver who was not involved in any of the intervention sessions.

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Both groups of children involved in the intervention also showed some crossover improvement in skills compared to the controls; so, both groups improved in co-ordinated joint looks and functional play skills.

This carefully controlled and implemented study offers promising data on the effectiveness of targeted interventions on the core social and communication deficits of children with autism. The intervention took place over a short period of time, with a reasonably modest level of targeted input (30 minutes per day) and demonstrated successful learning and generalisation of skills. However, all participating children were already enrolled in intensive behavioural intervention programmes and the specific joint attention and play interventions were embedded within that programme; thus, it is not clear how children not attending such programmes would respond. Long-term follow-ups of learning were not conducted and so we do not know whether skills were maintained in the absence of continued structured input. In addition, it is not clear how feasible it would be to replicate such approaches within the context of everyday school contexts in either mainstream or special classrooms. Nevertheless, the study does provide encouraging evidence that children with autism can successfully learn core skills when given support via more child-centred methods. Notably, the authors suggest that the control group may have shown lack of progress within these two domains of behaviour because their standard intensive behavioural programme was more adult-directed.

Bernard-Opitz et al (2004) compared adult-directed discrete trial teaching (behavioural approaches) with a more child-centred, naturalistic play intervention. In this Singaporean pilot study, eight young children with autism (diagnosis checked with the ADI-R), aged 28-44 months, were randomly assigned to one of two groups, balanced according to age, severity of autistic symptoms and evidence of symbolic play. Both groups received both interventions in a crossover design, with 30 hours per child being spent on each five-week intervention. Child-parent and child-experimenter interactions were videotaped and coded for compliance, attending and communication. Parents also completed a feedback form at the end of the intervention and a telephone interview about their child's progress at four months post-intervention. The training sessions were conducted at a "behavioural

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intervention centre". It is not clear how or where children spent the rest of their time (in nursery schools and/or at home).

Across both types of intervention, children showed improvements in play and communication and reductions in ADOS scores, suggesting reductions in the severity of autistic behaviours. Six of the eight children showed higher "compliance" under the behavioural compared to the play condition. Parents also rated children as showing greater improvements under the behavioural, compared to the play, condition. The two children who started the intervention with the lowest cognitive levels (and who also received the least parental involvement) showed no improvements.

Overall, then, both interventions facilitated improvements in most, but not all, these children and the behavioural approach was more effective in promoting compliance behaviours. However, the authors note some limitations with the study including the lack of distinction (in some cases) between the implementation style of the play and behavioural sessions and the use of the ADOS for measuring change in behaviours (a use not intended by the creators). In short, it is difficult to conclude from this small-scale, if well-designed study, whether one type of approach was more effective than the other. The authors conclude that "child, family, cultural context and treatment variables have to be considered when helping parents make informed decisions about treatment options" (p330).

3.1.3 Home-based interventions and impact on parents (n=3 studies)

Introduction/ Overview

There were three studies in this section, each with a very different focus. One examined parental perceptions of their involvement in home-based programmes; another progress and outcomes of children with ASD participating in parent-managed home-based behavioural interventions; and the third concentrated on the relationship between time intensity of early interventions and parental stress levels on child outcomes.

In Northern Ireland, **Dillenburger et al (2004)** focused on parental perceptions of their involvement in home-based ABA programmes. Twenty-two families participating in

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delivering ABA programmes for children with autism (aged three to 13 years) completed a questionnaire on the validity of the ABA approach, appropriateness of intervention strategies and importance of the outcomes for their children. Before completing the questionnaire, parents attended nine fortnightly training sessions introducing them to the principles of ABA, from which they were then encouraged to develop an individually tailored ABA programme for their child. They were then visited on a weekly basis for about two hours by an "ABA professional" to supervise and adjust the programme. Parents had been involved with the programme for varying lengths of time and, for the purposes of analysis, split into two groups: a "long term group" (n=12) involved from 18 to 72 months and a "short term group" (n=10) involved from two to 12 months.

Parents perceived that the ABA programme had made a difference in virtually all the children's lives in terms of independence, quality of life, and skills development maintenance and interaction. Most parents also felt that the ABA approach had been effective in a range of behaviour categories (self-help, social, motor skills) although a minority suggested the programme had not been effective for specific skills. Qualitative responses to open questions indicated that the outcomes for family life, parents and the child were positive.

It is important and valuable that parents felt pleased with the programme and their children's progress. However, the evaluation of the programme was not independent – being carried out by personnel involved in delivering the training and with whom (presumably) parents had built supportive relationships. Parents were also not in a position to compare ABA with other methods or approaches. Therefore it could be that being actively involved in a supportive training programme (whatever it might be) is rated positively but we cannot conclude from this that a positive evaluation is specific to ABA, or that ABA is rated more highly than other approaches. Similarly, no conclusions on the actual effectiveness of the programme can be drawn from this study because there were no independent observations of behaviour or progress carried out or reported. Finally, no information was reported on the ability range or cognitive profiles of the children; these are likely to be diverse and so it is unclear for whom, and under what circumstances, positive effects might be demonstrated.

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In a UK study, **Bibby et al (2002)** evaluated the progress and outcomes of children with ASD participating in parent-managed home-based behavioural interventions. A total of 66 children were included with a mean age of 45 months at the commencement of the home-based programme, although analyses were often conducted on varying subsets of this group due to incomplete data from all children. Children were assessed on a number of measures including language, cognitive development, IQ and the VABS, as well as a checklist on speech and behaviour. These measures were taken at Time 1 (the start of the assessment period) and then 12 months later (Time 2). It is important to note that Time 1 assessments differed across the group in terms of how long children had already been receiving their behavioural programmes: 18 per cent were in their first 12 months; 52 per cent in their second year of the programme and the remaining 30 per cent had been participating in a home-based programme for more than two years. A number of organisations delivered the home-based programmes and these varied in terms of hours per week the child received, number of therapists involved and the level of training therapists had received.

Overall, the results were highly variable across the children with some showing progress on some measures and others showing a regression in IQ or other types of functioning over the 12-month period. There was very limited evidence of any clinically significant progress on any of the measures (defined by the authors as an improvement greater than 15 points). None of the children achieved the Lovaas definition of "best outcome" ('normal" intellectual and educational functioning) and so the authors concluded that parent-managed programmes, as implemented across the families involved in this study, are less effective than clinic-based behavioural programmes. Overall, however, interpretation of the findings is significantly clouded by the high levels of variability of the "treatment" within and across the included families, as well as the usual limitations of an AB design and lack of information on treatment fidelity or quality. The effectiveness, or otherwise, of parent-managed home-based behavioural interventions cannot be properly assessed from this study.

Osborne et al (2008) conducted a UK-based study exploring the relationship between time intensity of early interventions and parental stress levels on child outcomes. A total of

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65 children, aged two to four years, were included, all independently diagnosed as having an ASD by specialist paediatricians (although no specific criteria were stated). Children receiving four different types of early interventions were included: reinforcement-based interventions offering 1:1 intensive teaching based on behavioural techniques for an average of 13.5 hrs per week; nursery placements in small groups of six to eight children for an average of 8.1 hours per week; speech and language therapy during 30-60 minute weekly or fortnightly sessions averaging 1.2 hours per week; and parent education provided by local authorities or voluntary organisations, such as the National Autistic Society (NAS, UK), focusing on the characteristics of ASD and how to manage behaviours and averaging 4.2 hours per week. It is important to note that nearly 80 per cent of the children received at least two forms of teaching intervention and a quarter of the group received three different types.

Baseline (taken at the start of the first intervention for each child) and follow-up measures (nine to 10 months later) were taken on a number of standardised assessments including the GARS, VABS, PEP-R and other tests of cognitive abilities, as well as a self-report questionnaire for parental stress levels. For analyses, the sample was split into two groups: a low time-intensity group (less than the mean of 15.6 hrs per week) and a high time-intensity group (more than 15.6 hrs per week). Results showed that across the intervention groups, those receiving more time input showed greater improvements on intellectual, educational and adaptive behaviour measures compared to those receiving lower time input. However, for the higher-intensity, but not the lower-intensity, group this effect was substantially reduced by high levels of parental stress. In other words, parental stress levels did not appear to influence outcomes for children receiving lower time input while those receiving higher intensity inputs did best when parental stress levels were lower. The findings highlight the importance of taking parental stress levels into account when designing, and before deciding on, the intensity of early intervention programmes.

This study was not designed to assess whether a particular type of intervention was more effective than another in terms of child outcomes (and the high percentage of children receiving more than one intervention precludes this) but, by definition (and according to the data reported), the home-based reinforcement interventions require a higher intensity

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of input than others. This suggests that parents involved in these kinds of interventions were more likely than others to be clustered within the "high-intensity" group. Thus, baseline levels of parental stress may be especially important for parents considering implementing these kinds of programmes in their home. At the very least, parents should be apprised of the finding that high stress levels might reduce the effectiveness of the intervention on improving child outcomes. It would be particularly valuable to build on this study with a larger sample of participants so that analyses on the impact of type of intervention on outcomes, mediated by parental stress, could be explored directly.

3.1.4 Social interaction, understanding and skills

Introduction/ Overview

This subsection covers a range of studies that consider interventions which aim to improve the social understanding and communication of children on the spectrum. The first group (group a) focuses on social interaction, understanding and skills. Most have incorporated structured techniques across multiple baseline designs and included small numbers of children (three to eight) in centre-based settings. The second group of studies (group b) looks at visual techniques or video modelling procedures in interventions to facilitate play and/or social initiations and interactions with pre-school and primary age children with autism. The third group of studies (group c) focuses on including typically developing peers to facilitate social interaction and communication skills for, and with, children with autism. This is followed by the fourth group (group d) which involved grouping or pairing children with autism with peers with SEN or autism to facilitate play and/or social communication skills.

3.1.4a Social interaction, understanding and skills: pre-school (n=5 studies)

In this section, we look at studies analysing interventions that focus on social interaction, understanding and skills. This category contains 11 studies. Five included children of pre-school age, two analysed interventions covering children of primary age and four focused on interventions with children of post primary age. The pre-school studies focused upon:

1. Identifying classroom setting events to determine how they affected the social behaviours of children with autism spectrum disorder;
2. The effects of prompting and social reinforcement.

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3. Incidental teaching of age-appropriate social phrases.
4. Using pivotal response training to facilitate learning of specific grammatical morphemes (*-ing, -ed*).
5. Using discrete trial and pivotal response training techniques to facilitate two joint attention skills. The studies involving primary age children focused upon social emotional skills training and a social behaviour learning strategy. The studies with post primary pupils focused upon structured social skills programme, social skills training with a typically developing peer, social communication skills and a social skills training programme using the conceptual framework of cognitive behavioural therapy (CBT). Most studies incorporated structured techniques across multiple baseline designs and included small numbers of children (three to eight) in centre-based settings.

Boyd, Conroy, Asmus, McKenney and Mancil (2008) conducted a descriptive analysis of classroom setting events to determine how they affected the social behaviours of children with ASD. The study aims to identify naturally occurring antecedent variables (setting events) in the classroom environments of children with ASD that promoted their engagement in peer-related social behaviours with typically developing peers. A number of classroom setting events were observed including those with varying group sizes, contexts in which the adult or child directed the activities and contexts with varying levels of teacher engagement. The study took place over a 12-week period with seven children aged three to five. Researchers examined the influence of setting events on social behaviour and undertook calculations of the rate of positive initiations and percentage of social interactions. For most participants, small group sizes, child-directed activities and limited teacher engagement most influenced the occurrence of target children's social behaviours.

Setting events differentially influenced the social behaviour displayed by participants. For most, rates of social interactions were highest during 1:1 or small group compared to large group. Social initiations occurred at higher rates during child-directed settings in comparison to teacher-directed settings. Social interactions were more likely to occur

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during child-directed activities in comparison to adult-directed activities. Less adult involvement resulted in higher rate of social initiations for most participants.

Although the study focused only on classroom observations it makes a useful contribution to the review because it identified contexts and settings and how they affected interaction. This kind of study is potentially very useful for practice because it can provide research-based information on settings conducive to interaction and can therefore enable the link between assessment and intervention. This type of research, therefore, helps to develop some notions of *precondition*s for intervention; the next step would be to incorporate those setting events into individualised social skills intervention. However, conclusions are weakened by the small number of participants in the study (making it difficult to generalise), the short length of time in which the measures took place (12 weeks) and the limited measurement of setting events, making it difficult to determine any other contextual factors that might affect children's interactions.

The other four studies were carried out by **Gena (2006)** in Greece, and **McGee and Daly (2007), Koegel et al 2003a** and **Jones, Carr and Feeley (2006),** all in the US. **Gena (2006)** conducted a small intervention study looking at the effects of prompting and social reinforcement on establishing social interactions with peers during the inclusion of four four-year-olds with autism in pre-school. There were 12 typically developing pre-schoolers who were matched by gender and age to the children with autism. The participants received behaviour analytic intervention in dyads or in small groups before and during their inclusion in pre-school. The study aimed to identify whether a behavioural analytic procedure could improve the social interactions of children with autism upon their inclusion in "regular" (mainstream) pre-school. It used a multiple baseline design and coded children's initiations and replies. Results showed that the children with autism demonstrated limited social and communicative interactions with their classmates overall; however, they showed dramatic improvement in target areas, including an increase in appropriate social responding. While this provides some support for the use of structured approaches in teaching skills to young children with autism the small sample size limits the ability to generalise the findings. Strengths of the study include that trained observers who also implemented the intervention conducted observations and inter-observer agreement

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was measured. However, the children received differing intensity and length of intervention, and generalisation data was only collected for two participants. Some also received other forms of intervention during the study and so there were a number of factors that could potentially influence outcomes. There are, therefore, limitations in terms of the extent to which robust conclusions can be drawn from this intervention.

Similar findings were obtained by **McGee and Daly (2007)** in their study of incidental teaching of age-appropriate social phrases to three children with autism aged four to five, enrolled in a university-based mainstream pre-school. The study used a multiple baseline across participating children. The primary variable of interest was the use of two social phrases ("all right" and "you know what?") The social phrases were selected through canvassing teachers" views through a questionnaire to identify everyday language used by typical pre-schoolers. There were three four- to five-year-old children in the study, all with an independent diagnosis of autism. Four typically developing children were present in the experimental sessions but they received no direct instruction in use of the social phrases. Two teachers conducted observations and experimental sessions were run within the traditional early years activities, which were observed at baseline, during teaching sessions and a variety of other contexts. Participants used none of the target social phrases during baseline, but all showed an immediate increase in use of the phrases when taught and this also transferred to different contexts. Again, while the study demonstrates that structured teaching approaches can be effective in learning specific skills, its usefulness is limited by the small number of participants coupled with weak justification for why these phrases were included and what their use may be in real life. As the authors note, future research is needed to determine whether the use of social phrases like these helps children to interact with typically developing peers in meaningful ways. In addition, they also note that it is not possible to establish a causal relationship between study procedures and language growth because the children were also participating in other classroom interventions.

Likewise, **Koegel et al (2003a)** involved two boys with autism in a small study involving use of pivotal response training to facilitate learning of specific grammatical morphemes (-*ing*, -*ed*), with the aim of detecting generalised effects on language of wider use of the learned

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morpheme and longer utterance lengths. The boys, aged six and four, were involved in twice-weekly half-hour sessions with an instructor who used the techniques in the context of reading books together. Using a multiple baseline design across the two participants, results showed that the children learned their target morpheme fairly rapidly (in eight sessions or four weeks) and this use generalised to an unfamiliar instructor in different settings, using different materials. There were also related gains in other language measures following the intervention.

The positives of this study were that the procedure was child-centred (being based on their choice of book) and involved naturalistic turn-taking while reading. It was, therefore, relatively easy to implement. However, findings from the generalisation probes could be doubtful because children's use of the target morphemes before the study could not be thoroughly investigated (they may have used different examples of the morpheme with different settings or stimuli). In addition, the contextual appropriateness of language use was not assessed and so it is not possible to tell whether children had rote-learned responses or whether they understood what they were asking/saying. These limitations alongside the small number of participants limit the contribution of this paper to the review.

Finally in this section, **Jones et al (2006)** used discrete trial and pivotal response training techniques to facilitate two joint attention skills (respond and initiate) in five children with autism aged two to three. The paper describes a series of three studies. In the first study, pre-school teachers taught joint attention to the children; the second study extended this to parents teaching at home and the third extended the previous research to looking at several additional dependent measures as well as judgments of social validity by parents. The purpose of the studies was to examine the effectiveness of a multi-component intervention to address both responding to others' joint attention bids and initiating joint attention. This was then extended to children's interactions with parents and finally to examine the pivotal nature of joint attention and the social validity of the intervention. The study used a multiple baseline design across the two joint attention skills. Instruction took place in the pre-school classroom and lunch areas covering baseline, intervention, expansion and maintenance periods. There are no details on the length of the study. The

authors reported that the strategy was effective in developing joint attention skills with clear improvements in initiations and responses demonstrated during the intervention. Importantly, these skills were also shown to generalise to a large sample of stimuli and were consistently demonstrated during maintenance probes, suggesting that the learning was not simply confined to the structured intervention period. The intervention's success suggests it is possible to address core deficits, such as joint attention, by systematically teaching specific skills using behavioural techniques. Crucially, the study targeted age-appropriate behaviour, based on knowledge about typical child development, making this an important approach for developing procedures that target core areas of impairment in autism.

3.1.4a Social interaction, understanding and skills: Primary (n=2 studies)

Two empirical studies focused on implementing specific social skills training directly with primary-aged children with autism. The first, carried out in Taiwan **(Yang, N-K et al, 2003)** included six children with autism, aged seven to nine, attending mainstream primary schools. Three had learning disabilities and three were described as "high-functioning', with an IQ >70, and were divided into two groups accordingly. They all attended mainstream classrooms for most of the time but also received some "pull out" sessions (four to six hours a week) in a special education resource. The training took place in these resource rooms and the intervention aimed to improve related behaviours in the mainstream classroom, that is to demonstrate generalisation of skills. Social-emotional skills training was conducted in these small groups for 80 minutes a week for 13 weeks. Two children in each group were designated as "control" participants and maintained a "general remedial education" during this time. Training targeted functional social and emotional classroom behaviours including: attention skills, imitation and following instruction, greeting skills, emotional recognition and emotional expression. Teaching techniques included direct instruction, modelling, role-play, visual cues, rehearsal and reinforcement procedures. Teachers were asked to record the frequency of five positive social behaviours demonstrated by the children with autism (agrees to join a game or activity; initiates play).

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The authors used regression analyses to explore results for individual children and concluded that all four participants in the experimental group significantly improved positive social behaviours over time, while the two control participants did not show the same trend. Statistically, there was a medium effect size for two participants and small effect size for the other two participants. The authors conclude: "These findings suggest that social and emotional skills can be taught to children with autism and that outcomes in more positive behaviours can be generalized to general education settings" (p413).

Unfortunately, however, this conclusion is overstated; the usual problem in extrapolating findings from small numbers of participants applies here. Also, there is a lack of specificity in describing the exact methods used in the intervention and no report of actual skills learned. It could be that improvements in social behaviours were spontaneous and unrelated to the intervention. Finally, the use of regression analysis in this study is questionable, especially given the small number of participants. Regression equations only provide a general trend and inspection of the graphs showing the actual patterns of data for the children were highly variable across time and, in some cases, no different to baseline data. Overall, this study provides limited evidence for the review.

The second of the two studies targeting the primary school age group incorporated a multiple baseline design and thus potentially offers a greater weight of evidence to the review. **Bock (2007),** in the US, implemented a social–behavioural learning strategy for promoting the social interaction skills of adolescents with AS. Four boys with AS, aged nine to 10, participated; all attended mainstream primary schools. The strategy offers a structured series of questions that students are encouraged to ask themselves when thinking about social situations (Stop – Observe – Deliberate – Act [SODA]) and these are developed into individualised story "scripts" for each child. It is similar in this respect to the social stories approach (see Learning Tools/Approaches Section 3.1.7c). Three stories were developed for each child to tackle different situations at different times of the day and they were encouraged to read the relevant story before entering the target situation (social studies, break and lunch). The duration of the intervention is not stated. Observers scored the target social activities (participating in activities with peers, play an organised

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sport game, visit peers during lunch) during the intervention and also at a five-month follow-up.

All four students increased their target behaviours across all three settings from baseline to intervention and the increase co-occurred with the intervention. Interaction behaviours were maintained during follow-up and students retained and liked the strategies. Teachers also liked the SODA scripts and felt they were easy to implement and fairly easy to produce. As the authors note, however, "…because it was a single-subject study, results must be limited to the study participants. Thus numerous replications producing similar results are needed to verify generality of findings to other children with AS" (p95).

Mindful of these limitations this is, nevertheless, a promising approach for children with AS, being based within the everyday routines and context of school. The scripts were judged to be easy to implement and did not require highly structured adult intervention. In fact, their use was under the student's control and these were easily individualised for specific situations. Generalisation of skills was not tested, however, and so the findings are limited to the intervention period.

3.1.4a Social interaction, understanding and skills: Post Primary (n=4 studies)

Four articles focused on post primary-aged pupils with AS or HFA. In the US, **Webb et al (2004)** investigated the effectiveness of a structured social skills programme for 10 boys aged 12-17. All attended mainstream (general) school settings for at least some of the time. The programme focused on five social skills for co-operative working: Share ideas; Compliment others; Offer help or encouragement, Recommend changes nicely; and Exercise self-control (SCORE). For each skill, participants were taught a systematic sequence of steps including discussion and modelling of the skill, verbal practice and role-play. The instruction (led by a researcher) took place during 60-minute evening sessions, twice a week for 6½weeks and participants were trained as a group. Six out of the 10 participants showed greater than 20 per cent improvement on the SCORE skills between pre- and post-test and, as a group, there were significant improvements on four out of the five skills. About half the participants expressed some satisfaction with the training. There

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were no significant differences on a standardised social skills measure between pre- and post-test.

This study was well designed and demonstrated that changes in performance occurred only after teaching had been completed on each skill. In addition, some (although not all) of the boys expressed high satisfaction with the programme, as did their parents. This suggests that this structured approach to social skills training has some merit. However, there were no follow-up measures and so it is not possible to tell whether the learning was maintained. There were also no changes in measures of behaviour outside the learned setting suggesting that generalisation of skills was limited. Finally, while participants did well in judging the correct skill to use in a given situation they scored lowest when they needed to demonstrate the skill themselves (during role play). This suggests that the instruction was helpful in developing understanding but not actual behaviours or skills.

The second study was based in the UK **(Broderick et al 2002)** and involved nine young people with AS, aged 12-15, all attending mainstream secondary schools. Social skills training with a typically developing adult partner (including conversational skills, eye contact, body posture and conflict resolution) took place in a community youth group over a six-week period. Participants were split into two groups and training began at different times for each group. They were asked to complete questionnaires about social skills and self-esteem at three separate intervals. The authors stated that the young people maintained excellent attendance and reported increased confidence and self-esteem following the intervention. Unfortunately, however, this study was published as a "brief report" and so there is insufficient information to be able to judge the "active ingredients" of this approach. Specifically, there is no description of the exact methodology and limited reporting of results. There is also no reporting of any independent evaluations of actual improvements in social skills following the intervention. Thus the conclusions that can be drawn from this study are limited.

In a similar study, also based in the UK, **Mackay et al (2007)** included a larger group of children across a wider age range in groupwork sessions at a community-based youth group. Thirty-eight children and young people (aged six to 16) with high-functioning ASD,

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all attending mainstream schools participated. Children were split into six groups (grouped according to age and geographical location) and attended groupwork sessions, carried out by two members of the research team. The 1½ hour weekly sessions took place over 12-16 weeks after school, and focused on social communication skills such as social and emotional perspective taking, conversation and friendship skills. Parents were also asked to identify three focal skills for their son/daughter that represented particular areas of difficulty and these skills were incorporated into the sessions. Community outings and practice of skills at home also took place to encourage generalisation of understanding. Parents and (where feasible) young people completed pre- and post-groupwork standardised social skills questionnaires and also rated progress on the "three skills". Findings showed that parents and participants gave higher mean ratings on all questionnaires following the intervention and parents rated their child's competence in the "three skills" as significantly higher also. Parent comments in interviews were mostly positive about the intervention and their experiences with it.

As a naturalistic study carried out in real-life settings this represents a welcome approach that also accommodates individualisation of taught skills as well as flexibility depending on the profile of the group. However, the design of the study (lack of comparison or control groups) as well as wide variability in the groups, target skills and taught strategies mean it is not possible to judge whether any improvements could be attributed to the intervention and, even if this was the case, which aspects of the approach promoted the improvements. The authors note that they were seeking to include a wait-list control group for this study but it was not possible due to difficulties in the recruitment process; this would have made it possible to link improvements with the intervention but its "active ingredients" would have remained difficult to specify.

The final paper in this section describes a study carried out in Israel. **Bauminger (2002)** implemented a social skills intervention using the conceptual framework of cognitive behavioural therapy to focus on social-interpersonal problem solving and social-emotional understanding. Fifteen high-functioning children with autism, aged eight to 17 years, took part in an intervention implemented in their natural school environment and also involved teachers, parents and a class peer in the training. The intervention took place for three

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hours a week over a seven-month period and was led by the child's class teacher. The social-emotional intervention focused on a curriculum exploring friendship; simple emotions; and social-interpersonal problem solving, where children were taught to improve social initiations with (starting a conversation with a peer). Teachers led the formal teaching of this curriculum, parents helped their child implement social goals at home and peers acted as training partners to help practise target social initiations.

Standardised measures of children's social skills, and observations of their social interactions during break periods, were taken before and after the intervention. Group-based statistical analyses showed that children were able to make more socially relevant suggestions for problem solving following the intervention and were also able to identify significantly more complex emotions. They were also more likely to initiate and respond positively to peers. Teachers rated children more highly, on average, on the standardised social skills questionnaire and these gains (with only one exception) were found to be unrelated to children's age or IQ.

As with the Mackay et al study described previously, this approach represents a welcome attempt to implement a social skills intervention based in children's natural environments and incorporates parents and peers as well as teachers. As such it has greater potential as a more widely applicable educational intervention. However, the design of the study limits conclusions drawn (there were no control measures or comparison group), although the lack of statistical links between improvements and age or IQ suggests that the results were not due simply to maturation. In addition, the multidimensional nature of the approach means that specific "active ingredients" cannot be identified although the guiding principle of this intervention is that it *should* be multidimensional in order to promote deeper understanding and (potentially) greater generalisation of knowledge.

3.1.4b Social interaction, understanding and skills: Visual supports and video modelling (n=7 studies)

Seven studies employed visual techniques or video modelling procedures in interventions to facilitate play and or social initiations and interactions to pre-school and primary-aged children with autism. However, none was rated as contributing a high weight of evidence

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to the review due to the small numbers of children involved (two to four) in combination with some methodological shortcomings. In addition, findings from most suggested that while children could learn relevant social information from the visual or video stimuli, there was limited evidence of this learning being used spontaneously or generalising to untrained situations or stimuli. This section has not been subdivided across age groups due to the small numbers of papers on this theme.

Johnston, Nelson, Evans and Palazolo (2003) studied the use of visual supports in teaching young children with ASD to initiate interactions, with three children aged four to five. The study aimed to examine the effectiveness of an intervention strategy teaching pre-school children with ASD to use visual supports to request entrance into play activities. The study adopted a multiple probe design across participants, using observations, assessments and survey. Data for all three participants revealed decreases in the percentage of intervals coded as off-task behaviour. There were increases in the percentage of intervals coded as "talking to teacher". Results suggest that the intervention strategy was successful in teaching pre-school children with ASD to request entrance into playgroups. However, use of verbal language with peers did not increase. Observation of the classroom environment revealed that most interactions were between teacher and student, with very few interactions between students. This could be related to the context in that the classroom environment was for children with ASD and the pattern of communicating with the teacher might be linked to the context. Given the low number of children in the study and the lack of a control group, findings need to be treated with caution.

Gena, Couloura and Kymissis (2005) studied an intervention designed to modify the affective behaviour of pre-schoolers with autism using in-vivo or video modelling and reinforcement contingencies, with three children aged three to five. Experimental sessions were conducted two to four times a week in the child's home. Each session lasted about 15-20 minutes. There were 14 trials with one- and three-month follow-up sessions. The aim was to assess treatment intervention across three dimensions: new people, untrained scenarios and time. The study used a multiple baseline design. Data was collected on all measures of the independent variable including presentation of the scenarios,

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reinforcement contingencies and error correction procedures. The children received treatment in three categories of affective behaviour: sympathy, appreciation and disapproval. The study found that contextually appropriate affective responding can be taught to pre-school children with autism at home and in the context of play activities using in-vivo modelling or video modelling. The authors treated affective behaviour as operant behaviour and did not discuss the extent to which video modelling combined with reinforcement and prompting may be appropriate for teaching those aspects of affective behaviour, which are very context specific. The study was limited by the small sample, and children were not matched in terms of age or IQ/functioning. Although the study found responses generalised to new, untrained scenarios, to other people and were maintained during follow up, generalisation was not assessed across environments or contexts.

Hine and Wolery (2006) used point-to-view modelling to teach play to pre-schoolers with autism with two children aged 30 and 43 months, in an inclusive, full day university-based pre-school programme. The design used multiple probe design across two behaviours (gardening and cooking) and across two participants to evaluate effectiveness. There were three phases: baseline, treatment and post-treatment. The study used observation through digital video recorder. Results indicated that video modelling was effective in teaching specific actions with toys and sensory materials to two girls with autism. In three of the four behaviour sets, the children acquired new play behaviours in the absence of experimenter re-enforcement. Children generalised skills to untrained materials for both tasks and generalised skills into the classroom for the gardening task but not the cooking. The authors suggested this showed that one could change not only verbal behaviour but also motor movement on toys, although acquisition of cooking skill did not happen for one child without verbal prompting. Furthermore, the authors indicated that generalisation could be promoted through point-of-view video modelling involving multiple exemplars of materials. Again, this study was conducted with a small sample of only two children so findings cannot be generalised. Even within the limitations of the study, there was little evidence of generalisation and lack of clear justification for why the specific tasks were chosen.

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Macdonald, Clark, Garrigan and Vangala (2005) used video modelling to teach pretend play to children with autism. Two boys, aged four and seven, took part in the study which used a multiple probe design in an intensive behavioural pre-school programme that offered "individualised programming" five days a week and six hours a day. Sessions took place in the child's specialised pre-school classroom. The study aimed to use video modelling to teach pretend play skills to the children. Participant responses were scored from videotapes subsequent to each session at baseline, during training, mastery and at follow-up probes. The authors did not indicate the intervention's timespan. Both children exhibited rapid acquisition of verbalisations and play actions and maintained this performance over time but unscripted play did not emerge. Limitations of this study relate to the small sample size and lack of information on the characteristics of the children. In addition, the children differed in age and both had diagnoses of pervasive developmental disorder but received very different educational provision from one another. They were integrated into mainstream classrooms for differing amounts of time, and so there were variations between the intensity of input and the broader educational interventions that were used with them.

Nelson, McDonnell, Johnston, Crompton, and Nelson (2007) undertook research on a visual intervention play strategy (Keys to Play) to increase the social interactions of young children with autism in four separate pre-school community based programmes. There were four children in the study aged 45 to 53 months. The study used a multiple baseline design across baseline, intervention and maintenance stages. These were implemented across children and settings using observations to determine the extent to which the child used the Keys to Play to successfully enter a play situation or used another strategy such as words, sign language, or parallel manipulation of objects. Researchers also included a social validity questionnaire. Several observers were involved in the study and checks were made for inter-rater agreement. Dependent measures were the percentage of opportunities where a child used the Keys to Play to enter the playgroup or used another strategy such as words, sign language or parallel manipulation of objects. The study is interesting because it builds on a developmental approach which stresses the importance of play to children's development and then targets a specific play skill (initiation into play) using an embedded, peer mediated strategy to enable children to enter into play

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situations. This is potentially a relatively simple strategy to incorporate into practice because it encourages children to interact with other children by use of a laminated paper key that is shown to peers to initiate play. The authors draw the conclusions that the strategy was successful in increasing the play initiations of the participating young children with autism. All children exhibited increases in initiations of play over the course of the study. At the same time, their engagement time within playgroups concomitantly increased, as did the sophistication level of their play. However, further studies need to be conducted across settings and with control groups to know whether the findings can be generalised. There was variability between the individual children and further studies could aim to assess whether certain children are more likely to benefit from this kind of strategy than others.

Two studies incorporated visual prompts or techniques in structured approaches to teach social behaviours to primary-aged children with autism but, again, offer fairly limited evidence for the review due to familiar limitations of small sample size and methodological weaknesses. The first was carried out in the US by **Simpson et al (2004)** in which four children with autism, aged five to six, were taught three different social behaviours (sharing with others, complying with teacher directions and social greetings) via computer-based instruction using video models. The children were described as having mild or moderate autism with some language delay (although no criteria were stated) and all attended a specialist autism resource at their mainstream primary school. Students worked individually with a computer programme (a teacher sat alongside) in their special resource classroom for three sessions a day for up to 24 days, across a multiple baseline design. The computer programme consisted of images and texts comprising simple statements and explanations plus video examples of desired behaviours modelled by typically developing peers.

All students showed increases in unprompted social behaviours although some were already improving during baseline, suggesting that observational learning may have been occurring and/or students already had the behaviours in their repertoire. Three of the four children showed fairly large increases in social behaviours at the point of intervention suggesting a direct effect of the programme (but this was not the case for one child). The

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multiple-baseline design of this study allows a conclusion that the video instruction affected the target social behaviours of these students.

The ubiquity of computers in classrooms nowadays means this approach could be implemented in schools; however, children were required to spend fairly lengthy periods of time at the computer, away from peers, which may not be the best way to encourage social interactions. The lack of individualisation of stimuli/behaviours available through this computer-based approach is also a significant limitation. The fact that children already had some of the behaviours in their repertoire means the finding's strength is reduced; moreover there was limited information about diagnostic or cognitive profiles of the children, making it difficult to identify children who may benefit most from this approach. Future research would need to include consideration of follow-up and generalisation to more naturalistic contexts to demonstrate the utility of this approach in mainstream, as well as special and specialist, classrooms.

Nikopoulos and Keenan (2007) carried out the second study in the UK. In two studies, four children with autism (diagnosed according to DSM-IV criteria) aged six and seven and attending special schools, were included. In the first study, three children (two rated as "severe" according to the CARS and one as "mild-moderate') received the intervention in a multiple baseline design while only one child was included in the second study. The intervention involved watching videos of a 10-year-old child engaging in sequences of behaviours involving objects (ball, table, vacuum cleaner) and social initiations with an adult. Following the video clip, children were invited to play with identical objects. Their reciprocal play, social initiations, imitative responses and object engagement (isolated play or behaviours) were coded during these interactions during the intervention and also at one- and two-month follow-up periods. The children's generalisation of behaviour was also tested in a session carried out with a typically developing peer.

Children generally imitated the behaviours of the experimenter more quickly after seeing the video clips than before. An increase in reciprocal play was evident for all children following presentation of the clips, but this pattern decreased for one participant, and was variable for others. There was some evidence of generalisation of behaviours to a typically

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developing peer and maintenance of behaviours at follow-up. Overall, this study suggests that video modelling succeeded in building a sequence of three behaviours in the absence of prompting.

However, the small sample means applicability of the findings to different participants and contexts is limited. Indeed the authors themselves note that the video modelling approach may not be suitable in community settings. In addition, the extent to which behaviours were useful and relevant to the children is questionable and whether they were spontaneously used outside the trained environment is not known. It is also not possible to identify the "active ingredients" of this intervention which could have been the video footage, verbal instruction, structured setting or a combination of these.

3.1.4c Social interaction, understanding and skills: Peer facilitation: Typically developing peers

Introduction/Overview

This section summarises studies that focused on including peers to facilitate social interaction and communication skills for, and with, children with autism. There were eight papers in this category. Two involved pre-school children and six involved primary age children. The former involved small numbers of participants and described structured instructional approaches. For the papers involving primary age children, six studies involved typically developing peers in interventions to facilitate social interactions with and by classmates with autism. The first four studies summarised below adopted structured instructional approaches and involved small numbers of participants (two children in four studies and five in another). The remaining two adopted more naturalistic and contingent methods and involved three and 10 participants with autism.

3.1.4c Social interaction, understanding and skills: Peer Facilitation: Typically developing peers: Preschool (n=2 studies)

Two papers included pre-school children in small-scale interventions involving small numbers of participants. **Kalyva and Avramadis (2005)** aimed to improve communication between children with autism and their peers through a "circle of friends" approach in the UK. "The 'circle of friends' is an educational approach that facilitates the inclusion of

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children with disabilities into the school community by engaging their peer group in supporting the individual proactively" (p253). Five children aged three to four were involved. They had diagnoses of autism and average IQs and were all based in a mainstream pre-school setting. Three boys were randomly allocated to the intervention group and two (also on the autism spectrum) formed the control group. Twenty-five typically developing children acted as peer facilitators and were of similar age to the study children. The circle of friends was applied for half an hour a week at a nursery and lasted for three months. Each group had the active involvement of a teacher and five peers. Intervention effects were measured by using an observation schedule that recorded the number of responses and initiation attempts during baseline, post-intervention and at two months follow-up. Findings suggested higher response and initiation rates at follow-up for the intervention group compared to the control group despite there being no differences for the two groups at baseline. The study drew the conclusion that circle of friends is a powerful intervention. These results are encouraging for practitioners although they need to be treated with caution for this review. The evidence for this statement is limited; not least because of the use of group-based statistical analyses on very few children, and results not reaching statistical significance. However, the children were carefully matched and all received regular ABA treatment along with this intervention for similar amounts of time to one another. They had also attended nursery for similar lengths of time. The use of a control group adds strength to the findings. The paper rightly concludes that further larger-scale longitudinal research is needed to examine the long-term benefits of the approach for children with autism.

Garfinkle and Schwartz (2002) in the US used a multiple baseline design across four participants to evaluate the effects of a peer imitation intervention package. Data was collected at baseline, during training and at follow-up, in small groups and during free play. All data were collected live through observations over five months. Children were aged four to five. Two had independent diagnoses of autism, one scored within the autistic range on the CARS (childhood autism rating scale) and one had a diagnosis of developmental delay. All had significant social, cognitive and communication delay. The children were enrolled in an integrated university affiliated pre-school setting. The intervention took place in the classroom as part of classroom activities and the assistant

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teacher was responsible for implementing it. The intervention consisted of a four-step programme giving every child the chance to be a leader (whether typically developing or developmentally delayed) and cueing the other children to imitate the leader. The study used a combination of direct observation and responses to a social validity questionnaire completed by adults involved in the study. Results from the latter indicated that participants could implement the intervention in their classrooms, that they attributed changes in the target child to the intervention, and that non-target children also became more aware of one another, thereby showing the intervention had the potential for classroom use. The authors reported that although there was variability in the participants' behaviour, all were able to imitate their peers' behaviour. Increases were also seen in social behaviour in terms of proximity to peers and in number of interactions. Despite this, findings need to be treated with caution as overall levels of peer imitations and social interactions remained low, variable and consistent with baseline behaviour. Only in the case of one child did the peer imitation behaviour maintain into the follow-up period. In addition, generalisation probes showed small increases in peer imitations but overall numbers were low, variable and not observed every day. These findings were not reflected accurately in the study abstract.

3.1.4c Social interaction, understanding and skills: Peer Facilitation: Typically developing peers: Primary (n=6 studies)

Thiemann and Goldstein (2004) included five children with autism or PDD (aged six to nine) and ten typically developing peers (aged seven to nine) in this US study. All children with ASD were based in mainstream school classrooms and diagnosed according to DSM-IV criteria or the CARS and had functional verbal communication using simple sentences. Each child with autism was grouped with two typically developing peers, making five groups in total. The multiple baseline design compared the use of two different interventions, introduced consecutively, across the groups: peer training and systematic instruction with written text cues (WTT), on general social interactions and specific social-communication skills. The peer training intervention involved teaching typically developing children in five standard skills:

1. Look, wait and listen.
2. Answer questions.

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3. Keep talking.
4. Say something nice.
5. Start talking.

This training took 150 minutes in total. The WTT intervention involved an adult working with the child with autism to generate and rehearse social scripts for three different social skills. This instruction, using written and pictorial cues, was provided for 25 minutes on one skill at a time three to four times a week (the total number of weeks is unclear).

Results showed that the peer training led to increases in the overall rates of social interactions for two children with autism and "stabilised" interactions for another two; one showed no improvement. For all five children there was highly variable responding across time and peer training did not influence their use of specific social initiation strategies, which only occurred with adult prompting. In other words, peer training alone was not sufficient to improve children's use of specific initiation strategies. The WWT intervention using visually cued adult instruction increased the communication competence of verbal students with autism who already had some reading ability. Peers were more responsive to initiations by the children with autism following the training. Changes in social skills, as rated by teachers, were recorded for two of the five children.

This well-designed study showed that responding was highly variable across even a small group of children when using these approaches and, moreover, that peer training alone was not effective in increasing social initiations of children with autism. This suggests that isolated approaches do not work and there is a need to tailor interventions according to a child's individual strengths (which the authors acknowledge). In addition, highly intensive and intrusive procedures were used making this a difficult approach to transfer more widely to the classroom. Finally, all children taking part were routinely offered prizes of toys or sweets during the training sessions, making this an ethically dubious approach.

Harper et al (2008) were also interested in supporting social interactions between children with ASD and their peers during play or break time. This US study included two boys with autism (no criteria stated) aged eight and nine; one with, and one without, learning

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disabilities. Four typically developing peers from their mainstream primary school classes were involved as peer tutors; two for each child with ASD. Peers were given instruction in pivotal response training (PRT) strategies for gaining attention, varying activities, narrating play, reinforcing attempts, turn-taking; this took place during seven sessions (one a day) for about 20 minutes each. PRT is an approach based on ABA principles that encourages children to participate and respond through a structured sequence of steps. Following a multiple-baseline implementation across the two participants, play skills and interactions during unstructured playtime were observed over seven days. Generalisation of skills was also tested over four to five sessions following the intervention with no prompts from typically developing peers.

Both participants increased their target behaviours and turn-taking behaviours following the intervention and these skills generalised to unprompted playtime sessions. One child with ASD showed greater gains for social initiations than the other. The small number of participants necessarily limits the generalisability of these findings, however, the effects were positive overall and seemed to be maintained and generalised (although this was only tested over a short period of time). The intervention occurred in a naturalistic setting (normal break times) and the training with typically developing peers was carried out in less than two weeks. This makes the approach of potential merit in transferring to other schools and contexts. A further strength is that it could reduce the need for potentially stigmatising adult intervention. However it does place pressure on peers to "get it right". In addition, peers' ability to withdraw from the study is questionable (given that it takes place in their break time) and they could be exposed to challenging behaviours. The authors also note that qualitative research in this area is needed in the future to understand fully the context and meaning of changes in social interactions.

The other two studies incorporating structured approaches offer more limited evidence for the review due to the inherent difficulties of interpreting AB designs. First, **Yang, T-R et al (2003)** examined the effects of participation in integrated play groups in Taiwan on the symbolic and social play of children with autism. Described as a pilot study, the authors included two children with autism (according to DSM-IV criteria) aged six and seven along with typically developing peers. Integrated play groups were structured playgroups where

children with autism and typically developing peers could mix. Essentially, this model used "guided participation" from an adult to enhance opportunities for children with autism (novices) and typically developing peers (experts) to play together. The groups met twice a week for 40-60 minute sessions over about six months (35 sessions in total) and comprised two children with autism (of which one was included in the study) and three typically developing peers. One group met in the child's school and the other in the child's home. The study aimed to decrease functional, isolated play behaviours and increase symbolic and joint play.

Both children showed increases in symbolic play and "attending behaviours" and reductions in isolated and functional play. Parents placed a high value on the programme and felt their child enjoyed taking part. While this approach potentially represents a more practical and realistic intervention than some programmes, due to the playgroups being embedded in the child's routine and familiar settings, it is not possible to conclude that improvements were due to the intervention. In addition, the methodology for guided participation is not described in detail making it very difficult to judge whether this could transfer to other contexts.

There is also a lack of detail and specificity in **Grey et al (2007);** a study in Ireland which examined the effectiveness of "co-operative learning" (CL) for two boys aged eight with high functioning ASD (no criteria or diagnostic information stated). CL is a particular method of small group working that emphasises specific elements such as being clear about learning outcomes as well as each group members' responsibilities in contributing to these. The boys were each placed in small groups with three typically developing peers; one group completed their CL sessions in a mainstream classroom and the other in the special needs classroom of the same mainstream school. Each group received four 30-minute baseline sessions with "traditional teaching" followed by five to seven CL sessions. All were videotaped and coded for presence or absence of social engagement (conversation with another child or seeking/receiving/giving help) and task engagement (verbal or nonverbal, passive or active, task participation).

The authors reported increases in social engagement for both children, although for one child, this steadily decreased across CL sessions to almost baseline level. No gains were found in task engagement, suggesting CL did not facilitate better school task performance. It is important to note that the teachers felt the CL approach required a great deal of additional work and the children were too young to be using this approach. The teacher in the mainstream class found it difficult to manage in the wider class context while the teacher in the special education class felt it could be beneficial but not used daily. Even the authors note that the approach "… may simply be too cumbersome to be practical" (p326).

Moreover, the intervention differed between the two groups making it impossible to isolate any "active ingredients" within and across variables, including nature of the setting, amount /type of teacher feedback, and the importance of the particular children chosen as group members (see Kuhn et al, 2008, below). The dependent variables were crude (behaviours either present or absent), vague and diverse and the quality of interactions between children not measured. Moreover, teacher reactions could be regarded as lukewarm at best. The difficulties in drawing firm conclusions from this study mean that it should not be regarded as positive evidence for the use of CL.

The final two papers in this section explored the use of less structured approaches for instructing peers in strategies to promote social interactions with children with ASD, and both offer some positive evidence for the review. First, **Owen-DeSchryver et al (2008)** in the US, worked with two boys aged seven with autism and one aged 10 with AS (no criteria stated) alongside three or four of their typically developing peers. In a multiple-baseline design, the peers received training during three 30- to 45-minute sessions, which consisted of finding out more about autism, discussing strategies for befriending students with autism and helping to involve them in activities, and thinking about the strengths and preferences of the target child with ASD in their class. The aim was for the peers to involve the children with ASD more in play activities during break and to initiate interactions with them in the hope of increasing the social interactions and initiations of students with ASD.

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Following the intervention, trained and untrained peers increased their initiations and responses to the children with ASD. One child with ASD showed no difference in initiations towards peers following the intervention; the other two showed increases. Peers were also more responsive to initiations made by children with ASD following the intervention. Despite the usual limitation of small numbers of participants, this well-designed study offers some promising results. Specifically, it suggests that a small number of peers can be trained in promoting social interactions with classmates with ASD and this effect can extend to untrained peers; that is, there is a promising "snowball effect" of social interactions that is potentially reciprocally reinforcing.

This approach is particularly encouraging because only very modest instructional time with peers was needed to produce these effects and the study was implemented in naturalistic classroom, and break time, contexts. This makes it of potentially greater utility than more intrusive approaches in special and mainstream schools. It is important to note that no follow-up was data collected so it is not possible to tell whether these effects endured over time. In addition, there was no information on the qualitative aspects of behaviours, which makes it difficult to tell whether the increases in interactions were socially meaningful for those taking part.

In the UK, **Whitaker (2004)** implemented a similar intervention, involving 10 children with autism and 10 typically developing peer tutors, all aged six to seven. The study took place in a mainstream primary school with an autism specialist resource base. All children had been diagnosed with autism according to ICD-10 criteria. They were described as having moderate to severe autism with learning disabilities. The aim was to increase initiations and joint attention of children with autism in interactive play sessions with their peers. Peer tutors were given a single session of training, involving explanation, modelling and role-play. This session was based around four simple principles (rather than being prescriptive about specific behaviours) and encouraged peers to: get close; follow his/her lead; talk slow, talk simple; and make it fun. In other words, the emphasis was on following the spontaneous behaviours and preferences of the child with autism rather than working towards an "end product" skill.

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The study followed an AB design, with baseline assessments followed by 20-24 play sessions across two school terms. Play sessions between the pairs of children were videotaped at early and late intervals during the intervention and coded for joint attention behaviours, communication and shared play. Between the early and late sessions there was a 24 per cent increase in shared play on average (from 42 to 66 per cent) although this difference was not statistically significant. The children with autism were three times more likely to make requests of their peers in the later compared to earlier session, although this was from a very low starting point with requesting reaching only 10 per cent in the final session. There was no change in the joint attention behaviours of the children with autism across the intervention. Nine of the 10 typically developing peer tutors were enthusiastic about the experience, as were their parents. However, one typically developing child was scratched by their autistic peer during the study causing significant apprehension.

Despite the usual limitations of an AB design, this is a useful study for the straightforward, practical and child-centred training, and the inclusion of comments from peer tutors and their parents. It is important to seek information about the acceptability of any programme like this from all of the participants; in other words, the usefulness and success of an intervention necessarily extends beyond the question of whether it "works" or not. Children and parents were enthusiastic about peer tutoring so this offers a socially valid and acceptable approach (notwithstanding the difficulties of encountering challenging behaviours). Whitaker also included important qualitative observations of children's behaviour (notably lacking in other studies) suggesting noticeable increases in anticipation and enjoyment of the play sessions by the children with autism. Apart from the AB design, a limitation of this approach was that the play sessions did not take place in normal break times; children were removed from classes to participate, thereby limiting its potential for replicability in other contexts.

3.1.4d Social interaction, understanding and skills: Peer Facilitation: peers with SEN or ASD: Primary (n=2 studies)

Two US studies involved grouping or pairing children with autism with peers with SEN or autism to facilitate play and/or social communication skills. **Loncola and Craig-Unkefer (2005)** placed six children with autism (no criteria stated) into pairs (matching a child with

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higher language ability with a child with lower language ability). All were aged six to eight and attended the same special school for children with autism. In a multiple baseline design, a teacher worked with the pairs of children in planning, playing and reviewing play sessions using specific themes and toys (grocery store, doctor, farmer). These 10-minute sessions took place three times a week for about 19 sessions (about six weeks) and children's peer directed social communicative behaviour was video recorded and analysed.

All children increased their use of descriptive statements (mostly one-word) during play during the intervention and five out of six showed an increase in total number of words used and also in mean length of utterance. However, the total number of requests to the play partner did not increase suggesting that initiations remained difficult for these children. In each pair, the child who started with greater language ability maintained greater language ability although both children in the pair improved in their use of language (albeit sometimes in different ways).

There were no maintenance or generalisation probes carried out and so it is not possible to know whether learning endured beyond the intervention phase. In addition, the reliance on quantitative (frequency) data cannot indicate whether increases in language use were socially or contextually meaningful or appropriate. Nevertheless, despite the small number of participants this well-designed study offers some promise, suggesting that with a small amount of direct input children with autism, when paired with other children with autism, can improve their social communication. This intervention did not require an intrusive or carefully controlled environment or stimulus – the procedure was more about "ideas" on how to play with a peer – and, as such, provides a more promising basis for replication.

The second study, by **Kuhn et al (2008),** was also based in special education classrooms and grouped children with autism with peers with SEN. The focal participants were two boys with autism (no criteria stated) aged seven to eight who were placed into small groups with two or three of their classmates (without autism but with learning disabilities and developmental delay). Both groups of peers worked with both children with autism. The peers with SEN received training in pivotal response techniques similar to those used

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by Harper et al (2008, see above) using a variety of toys including cars, Lego, blocks and dinosaurs. Training took place during eight 20-minute sessions conducted over a period of "several weeks". The length of the actual intervention, following the training, is unclear although it did follow a multiple baseline across groups design. The researchers recorded the number of opportunities the children with autism were given to interact with their peers, and their rate of responses to peer prompts and to unprompted initiations.

Both children with autism showed increases in responses to prompts following the peer training and one showed an increase in initiations. The two groups of peers performed differently with one group providing more opportunities (prompts) and therefore producing a higher number of responses from the children with autism. The authors suggest that the configuration of the peer groups (in terms of social and cognitive abilities) in relation to the profiles of the children with autism is important in determining how successful the groupings are likely to be in facilitating social interactions.

The multiple baseline design of this study allows the conclusion that the intervention was linked in time to increases in social responding by the children with autism. This suggests that children with SEN can be trained to facilitate play (or at least interactions of some kind) with children with autism. However, it is not clear to what extent the behaviours were really "play like" or reciprocal; again, some qualitative analyses of the interactions would have been helpful. In addition, there were no generalisation or follow-up probes and the study is limited by the familiar problem of small numbers of participants.

3.1.5 Specific learning tools/approaches

This section reviews papers describing research that investigates the impact of specific learning tools and approaches. The first group of studies (group a) looks at structured and systematic instruction to teach a range of skills, including reciprocal imitation skills and play. The second group (group b) describes studies that focus on strategies to develop specific cognitive skills. The third group (group c) of studies conducts research on the impact of social stories. We then review a group of studies looking at picture-based learning approaches (group d) and computer-based approaches (group e).

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3.1.5.a Structured or systematic instruction

Introduction/Overview

There were four papers using structured or systematic learning tools and approaches for pre-school children. These papers covered studies that looked at reciprocal imitation skills using a naturalistic behavioural approach; a tabletop intervention entitled Tabletop Identiplay; a study assessing the effectiveness of correspondence training and activity schedules on on-task and play correspondence behaviours of a group of children and a final study which looked at the effects of enhanced milieu teaching (EMT) on the social communication skills of pre-school children. All these studies were conducted with three to five children and most used multiple baseline design.

3.1.5a Structured or systematic instruction: Preschool (n=4 studies)

Ingersoll and Schreibman (2006) in the US evaluated an intervention teaching reciprocal imitation skills to young children with autism using a naturalistic behavioural approach, with a focus on object imitation. The study used a multiple baseline design with five children, aged 29 to 45 months, who all had a diagnosis of autism. Treatment focused upon five phases that lasted for two weeks each. The study analysed the effects on language, pretend play and joint attention. Several behavioural assessments were conducted pre- and post-treatment including standardised instruments (the motor imitation scale, the joint assessment and the structured laboratory observation). In addition, the children's primary caregivers completed the MacArthur communication development index to determine language age and the childhood autism rating scale to determine severity of autism.

The study assessed whether immediate object imitation can be successfully taught using reciprocal imitation training (RIT) and a naturalistic behavioural intervention. It also looked at whether increases in imitation led to collateral changes in the children's language, pretend play and joint attention behaviours. The study found that all children exhibited significant increases in their rate of spontaneous object imitation and maintained those across treatment phases. There were also significant increases in imitative language. The authors concluded that RIT was effective for teaching generalised object imitation skills to young children with autism. The children also had increases in language, pretend play and

joint attention through the intervention, suggesting that RIT leads to collateral changes in other social-communicative behaviours. The authors concluded that these results provide support for the effectiveness of a naturalistic behavioural intervention for teaching imitation and offer a new and potentially important treatment option for young children who exhibit deficits in social-communicative behaviours.

This was a well-designed study and strengths include its use of multiple measures directly aligned with the intervention aims. The first author conducted the therapy and the intervention, but other assistants were involved in observations and scored for fidelity of treatment implementation. There were also measures of inter-observer reliability. However, although children were matched in relation to their spontaneous object imitation during play with others, there was quite wide variation in age of the children and in their mental ages. The authors note variability in the children's responses to treatment and that the study can not draw conclusive evidence for the notion that changes in social communicative behaviours are produced by changes in imitation. Despite the naturalistic behavioural approach, the study was conducted in a laboratory so behaviours were not assessed in the children's natural environment or during play with similarly aged peers. Finally, the small numbers limit the ability to generalise the findings.

Thomas and Smith (2004) conducted an intervention study of a play-based intervention (called Tabletop Identiplay) in the UK. This was described as a pilot exploratory study involving three children aged three to four with a diagnosis of autism. The study considered whether a play-based intervention increased specific play behaviours; these were evident across different play contexts; and improved play behaviours led to an increase in social interaction. The intervention facilitated key elements found to be difficult for children with autism, including shared focus, imitation, parallel play, play dialogue, narrative structure and flexibility. Children's behaviour was coded through observation and analysed using 15-second interval sampling. Observations were coded by two researchers and were checked for inter-rater reliability. In addition, key workers were asked to fill in a questionnaire.

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Results showed that children spent a greater amount of time engaged in social interaction after intervention, as indicated by frequency of eye contact and increase in verbal communication. In addition, all children played more purposefully with the tabletop toys in the free-play session following the intervention and included part of the taught play sequence. They also spent more time playing alongside other children in parallel play and/or playing with other children post intervention. The authors argued that increased skills with tabletop toys and the spontaneous use of the script reflect the importance of the specific teaching element of Tabletop Identiplay. They speculate that Tabletop Identiplay, with its balance between skills teaching and mirroring, provided a sufficient structured learning experience to not only start the play off, but to also give the children the confidence to start something new. Play scripts with tabletop mirroring appear to teach young children with autism a sequence that they can apply in their free play, making them more approachable to peers and therefore improving social interaction. As the authors state in the paper, this was an exploratory pilot study which nevertheless shows encouraging potential in terms of the approach. To be able to draw more robust conclusions about this particular intervention, future research studies could look at increasing the sample size, using a control group, matching participants by skill and age level and increasing the intervention period. In addition, it will be important to investigate whether individual characteristics affect how useful the approach is for specific children.

Morrison et al (2002) in the US conducted an intervention study to determine effectiveness of correspondence training and activity schedules on on-task and play correspondence behaviours, using a multiple baseline design. The study involved four children, all with a diagnosis of autism aged 58 to 70 months in an inclusive pre-school classroom. The intervention combined use of correspondence training and photographic activity schedules, explored the generalisation of behaviour change and assessed the social validity of the strategy among relevant consumers. Two dependent variables were measured: the percentage of intervals the child exhibited on-task behaviour and the total number of occurrences of correspondence between children's play selections and their actual play behaviour. All four participants' on-task and play correspondence behaviour increased while experimenter prompts decreased. Parents indicated that the study's goal held significant value in preparing their child for future inclusive programmes. The authors

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reported observed behaviour changes in children post-intervention and teachers indicated it was an effective strategy. The authors noted that the strategy's success meant it could serve as a non-intrusive means of enabling inclusion because it enabled participants to increase their play skills and become active members when playing with peers. They concluded that combining correspondence training and photographic activity schedules to increase the on-task and play behaviour of the children was effective. These are strident claims for such a small study and further studies would need to be conducted to confirm them. Study design limitations mean that further research is needed to explore whether the skills generated in this setting can be generalised to other contexts.

Hancock and Kaiser (2002) in the US looked at effects of enhanced milieu teaching (EMT) on the social communication skills of pre-school children with autism. The study involved four pre-school children, aged two to five with a mean age of 44 months. The research design was a modified single subject design and training sessions took place in a small playroom in a university-based clinic setting. EMT is naturalistic and incorporates aspects of behavioural and social interactional approaches. Children were engaged in the intervention for 24 15-minute sessions for a total of six hours. The study assessed children's acquisition, maintenance and generalised use of language targets and social communication skills. It used four classes of variables and these included trainer use of the intervention strategies, child social communication during observations, developmental measures of child language and parent satisfaction. Inter-observer agreement was measured. After EMT intervention, all children showed increases in their total use of language targets. The authors reported generalisation to the home for three of the children. Parent ratings of satisfaction were also very positive. The authors therefore concluded that the intervention has positive potential for promoting change and generalisation in social communication across settings and measures. They also noted a point of particular interest which is that the actual time it takes to effect change in children's language may not be as long as traditionally thought and that the particular use of a responsive rather than didactic engagement strategy may be important. This was a well-designed study – however the design does not allow conclusions to be drawn on possible variability in its use depending on the entry skills of the children. Furthermore, the

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effects were variable across individual children and numbers were too small to isolate factors that might influence that variability.

3.1.5a Structured or systematic instruction: Primary (n=5 studies)

There were five studies in this section, focusing on the use of structured or systematic learning tools and approaches with children of primary age. They described the following approaches: a multi-component training procedure to teach children "helping behaviours"; a class-wide peer tutoring approach teaching children ball-catching skills; a study which considered whether incidental and observational learning could be taught using a structured approach; the effect of using a structured reading programme on the acquisition and understanding of sight words and, finally, a study looking at the effectiveness of 30-minute versus 120-minute distribution of "embedded instruction".

Reeve et al (2007) used a multi-component training procedure to teach children with autism "helping behaviours" in the context of a private special school for children with autism. Four children (three boys) aged five and six, diagnosed by independent agencies (no criteria stated) and with "some verbal skills" (no further information provided), took part in this US study. Target skills included cleaning, picking up objects, putting items away, sorting materials (eight in total). These were taught in a multiple baseline design involving multiple exemplars of helping behaviours in different settings with different experimenters; sessions included highly structured trials involving presenting stimuli, requesting a response, modelling a response and providing positive reinforcement. The exact length of the intervention was unclear.

Along with probes to assess learning, children were tested at 60 days following the end of the intervention. Undergraduate psychology students (blind to the study's conditions and rationale) were also asked to provide social validity ratings of the children's behavioural responses. All participants learned to engage in helping behaviours and could discriminate between appropriate contexts in which to demonstrate them. All children maintained appropriate responding after 60 days and also generalised behaviours to novel situations. Social validity ratings of behaviours also suggested the children were demonstrating appropriate helping behaviour.

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The authors noted the procedure's complexity which would need to be simplified to have practical utility. In addition, the experimenters' interactions with the children included verbal as well as video modelling of appropriate behaviours and so it is not possible to know whether it was the structured approach, video modelling or something else that led to behaviour changes. In fact, correct responding followed 60-85 per cent of trials that used the video-modelling stimuli suggesting that this is a powerful ingredient. Overall, this study suggests that structured instruction approaches (especially those including video-modelling) can promote learning of specific skills. However, the small number of participants, complex design and lack of on the ability profiles of participating children, limit the study's usefulness for the present review.

Also in the US, **Ward and Ayvazo (2006)** assessed use of class-wide peer tutoring in teaching ball-catching skills to children with autism in mainstream PE classes. Two boys aged eight (one diagnosed with autism and one with PDD; no criteria stated) were paired with a typically developing partner to improve their catching skills so they could participate in the same activities as their typically developing peers. Class-wide peer tutoring involves breaking the class into small groups or pairs. Each group is then instructed to perform particular tasks and make notes or provide feedback on success. The scores are added together within teams or groups and then shared with the full class. In this case, the typically developing peers were given coaching in structured techniques to encourage their partner with autism to participate in ball-catching activities.

PE lessons were held twice a week for 30 minutes over 26 sessions focusing on catching and striking. The study followed an A-B-A-C single subject withdrawal design which consisted of whole group demonstration of the tasks by the teacher, followed by sessions in which the children with autism were encouraged to respond to the lead of their typically developing peer, followed by sessions where the typically developing peers prompted their partner with autism and then focused on their own performance to "model behaviours". The number of catches made per session was used as an indicator or level of engagement and the number of "correct" catches as a measure of the degree to which children with autism performed the same tasks as their typically developing peers. Results showed some increases in "correct catching" for one child but this was highly variable

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across time. The second child with autism showed a decreasing trend during the intervention period of "correct catches". Both students showed more "task engagement" (more catching) in the intervention conditions compared to the whole-class baseline.

The narrow focus on catching behaviour in this study coupled with the variable results from the children limits its relevance for the review, despite a more carefully implemented study design. It is also not clear how number of catches could be interpreted as evidence of engagement in the task; after all, children could be highly engaged in the task but not very good at catching (we know that motor clumsiness and difficulties with co-ordination are often found in children with ASD). One limitation, as the authors note, is the failure to modify the approach according to the individual skills of the children: "One-size-fits-all approach might not have been the best choice when students have markedly different baseline performances" (p241).

Another US study, **Ledford et al (2008)** considered whether children with autism would demonstrate incidental and observational learning of words when structured instruction took place in pairs. Six children with autism (confirmed by CARS scores) aged five to eight, all with significant cognitive and language delay, took part in the study. They attended the same specialist resource classroom and sessions took place in pairs with systematic instruction from a teacher; the instruction used a behavioural technique involving showing a target word or phrase on an index card, waiting for a response and then modelling or reinforcing correct responses (constant time delay – CTD). A session lasted for no more than 15 minutes and consisted of 24 trials – although the number of sessions per day and number of days over which the instruction was carried out is unclear.

Using a multiple probe across behaviours design, the results showed that each student successfully learned their target words and phrases and also learned their partners' words (observational learning) plus incidental information about the words and phrases. The authors noted that this provided encouraging evidence for the ability of children with autism, with associated learning disabilities, to benefit from small group instruction. Indeed, the findings suggest that this type of approach was successful for these students, at least during the period of instruction (no follow-up probes were carried out to check for

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longer-term learning). There was also some evidence that learning of words generalised to reading signs in their natural locations around the school.

The findings offer support for the idea that small-group instruction for students with autism and learning disabilities can be effective, thereby potentially offering a more cost-effective teaching strategy. However, it is not known whether similar findings would be obtained in larger groups of students or whether this particular type of instructional technique is necessary for incidental and observational learning to take place.

In Ireland, **Balfe (2008)** examined the effect of introducing a structured reading programme called Edmark on the acquisition and understanding of sight words. Three children with ASD (no criteria stated) and moderate learning difficulties, aged 10, seven and six were included. They all attended special classes within mainstream schools and were selected on teacher recommendation because of their failure to acquire reading skills. Teachers were instructed in programme use by the researcher who then returned after 12 weeks to a) assess the students' ability to maintain the sight words presented one by one, b) to read the words in sentences, c) to match sentences to pictures and d) to follow a written direction. All three students made progress over the intervention period; two students had acquired 20 sight words and could recognise most of these out of context and the other student had acquired 10 words and could read them all out of context. In a subsequent follow-up the students had retained their ability to read the words out of context and the third student could read all 20 words.

This study adds to the evidence that structured teaching approaches can facilitate learning for children with ASD. However the AB design of this study coupled with small numbers of participants limits the generalisability of the findings. As the author notes, the improvement in reading could be attributed to a resource which clearly described a step-by-step approach for the teachers. In addition, implementing the programme meant teachers were possibly encouraged to implement regular, targeted teaching sessions around reading, which may have differed from previous practice (although this is not clear from the write-up). Unfortunately, it is not possible to know whether it was the regularity or

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structure (or both) that led to improvements or whether the Edmark programme is better than other structured teaching approaches in this respect.

Polychronis et al (2004) compared the effectiveness of 30-minute versus 120-minute distribution of "embedded instruction"; essentially, structured instruction consisting of questioning, modelling a response and offering social reinforcement for correct responding. Two children with autism (rated as "mild to moderate" on the GARS), aged seven and 11, and two others with non-ASD disabilities were included; note that here we only consider the findings from the two children with autism. Both were included in mainstream education classes in US schools. The targeted skills related to the children's IEPs and included telling the time and naming the capital cities of 20 US states. The study adopted an alternating treatment design so alternating daily sessions of 30 and 120 minutes for each child followed a baseline evaluation of skills. In other words, this was a basic AB design intervention study.

Teachers implemented the sessions with each participant within the context of normal lessons in their general education classroom. The total number of days over which the intervention was carried out is not clear. The researchers examined the percentage of correct responses during test probes (specific sessions to test knowledge, carried out by one author) and during naturalistic probes (carried out in the general education classroom by one author). Results showed that both trial distribution strategies (30 and 120 minutes) were effective in promoting acquisition of target skills or knowledge; but the shorter (more intensive) 30-minute sessions were as, or more, effective than the 120-minute sessions. Generalisation to untrained stimuli also occurred and teachers were positive about the approach.

The usual limitations of study design and small participant numbers apply but this is nevertheless a useful article because it considers teaching approaches that can be used within the context of mainstream classrooms. As such, it suggests that short periods of structured learning can be embedded within normal classroom activities and may lead to successful learning. The study focused only on discrete learning of facts or specific tasks,

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however, and so it is not possible to tell how useful this approach would be for more abstract or complex topics or skills.

3.1.5a Structured or systematic instruction: post primary and post-compulsory education (n=3 studies)

Introduction/Overview

This section summarises three studies that used structured or systematic learning tools and approaches covering post primary and post compulsory education. One looked at the effects of "priming" classroom assignments on academic and responding behaviours of two pupils with autism; another looked at the effect of an "intensive habilitation program" [sic] (IHP) in improving functional communication and reducing maladapative behaviours within a group of 11 young adults with ASD and severe learning difficulties. The final study evaluated the impact of a residential programme based on the TEACCH model, focusing on programme quality as well its impact on participants.

Koegel et al (2003b) investigated the effects of "priming" classroom assignments either at home or during special education services at school, on academic responding and problem behaviours of two children with autism with moderate learning difficulties (aged five and 15). Priming is a method where a low-demand version of a higher-demand task is presented to the child ahead of time and is given plenty of positive reinforcement during completion. The theory is that the student achieves success and gains confidence and skills and so finds it easier to tackle the related, but more difficult, task in the classroom. This has a concomitant effect on disruptive behaviours which are expected to reduce because the child is more engaged in the academic task. Both children attended mainstream schools and spent some of their time in special education classes. Measures of academic responding and disruptive behaviours were taken in the mainstream classes. Teachers and parents were blind to the study's experimental conditions and children's tasks were varied between priming (related to classroom content) and nonpriming (unrelated to classroom content) tasks; thus, the study's design allowed links to be made between the intervention and outcomes. Both students showed an increase in appropriate behaviour and academic responding under the primed compared to the nonprimed conditions; effect sizes for both participants were large.

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In a well-designed study these findings are suggestive; children can be helped to engage more meaningfully in classroom tasks if they receive structured support with completing simpler, but related tasks beforehand (either in the evening at home or while at school). The reduction in disruptive behaviours using this method is also encouraging. However, findings are necessarily limited because of the small number of participants involved and the differences in their ages and study contexts. There was limited description of what the priming sessions actually consisted of and over what length of time the intervention was carried out, thereby making the study difficult to replicate. These sessions were also not monitored (if carried out at home by the parents) and so it is not possible to judge the fidelity or quality of the intervention in this respect. Nevertheless, this approach shows promise because the priming sessions appeared to be relatively straightforward to implement and participants could be observed in their natural classroom context without adult prompting or intervention.

In Sicily, **Polirstok, Dana, Buono, Mongelli, and Trubira, (2003)** carried out an 18-month study to ascertain the effect of their "intensive habilitation program" [sic] (IHP) in improving functional communication and reducing maladaptive behaviours within a group of 11 young adults with ASD and severe learning difficulties. The focal group were all females, which makes this an unusual and non-representative sample, although the authors do not comment on this aspect. The IHP is a programme created by the residential training centre in which the study took place and in which all participants were resident, and is a combination of "gentle teaching", "humanistic applied behaviourism" and "positive approach". The study followed an AB design, with testing of functioning in areas of functioning including "preoccupational", "psychomotor" and "functional communication". The 18-month period was divided into three six-month training periods and mean percentages and ranges of task co-operation reported (though it is not clear whether the data was gathered at start/end of each period, or during every training session). Data was collected through staff observation with external raters taking measures of task compliance, and a psychologist administered the VABS pre- and post-study.

The authors reported statistically significant increases post-test for all adaptive behaviours except community living and coping skills and decreases in maladaptive behaviours. They

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also report significant gains in task compliance, with functional communication increasing most. The authors argued that the results demonstrated the effectiveness of gentle teaching, humanistic ABA and positive approaches. However, there were some limitations, which should be noted. First, the 11 individuals with ASD were a sub-set of a larger group (the target group for this study) but specific data on the ASD sub-set are not provided. Second, the AB design is weak and the dependent variables unclear. Finally, "stubbornness" is cited as a maladaptive behaviour and functional communication included training in "making eye contact with caregiver when individual's name was called". These operational examples of communication and behaviour calls into question the ecological and social validity of the target skills.

Van Bourgondien, Reichle, and Schopler's study (2003) evaluated the impact of a residential programme based on the TEACCH model, and focused on the quality of the programme as well its impact on participants. The target group was adolescents and adults with autism and severe learning disabilities, divided into a treatment group of six and a control group of 26. The study control participants were located in: group homes (n=10); institutions (n=6); family homes (n=10). Their age range was 16 to 48 years.

The study followed an AB design with assessments taking place four times over an 18-month period: baselines at six and one month pre-treatment; follow-ups at six and 12 months from start of treatment. Data was collected via caregiver observations and from parent reports, using semi-structured interviews and questionnaires. Assessment tools included an environmental rating scale and family satisfaction questionnaire, both designed for the purpose of the study, as well as the adolescent and adult psycho-educational profile (AAPEP).

Findings related more to environmental factors than to skill acquisition. Participants were found to have more structured, individualised programming and positive behaviour management compared to controls, and staff had a greater understanding of autism. Family members of those in the treatment group were significantly more satisfied with provision than others (the difference was focused on the level of community involvement that participants experienced, and the quality of staff, rather than the living environment

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itself). The authors identified no difference in skill acquisition between treatment and control groups, and suggested that this indicated the need to reconsider how progress was defined and measured within this group. They also identified a decrease in behavioural difficulties. The inclusion of parental reports offered some means of triangulating data, and although these reports may have been subjective, (since all groups – treatment and control – were recruited via applications for the residential centre) the authors make this explicit in their analysis.

3.1.5b Strategies to develop specific cognitive skills (n=2 studies)

Introduction/ Overview

There were two learning tools/approaches that focused on the development of specific cognitive skills. The first study investigated use of concept mapping as a learning tool and the second studied the use of a video-based programme targeting "mindreading".

Roberts and Joiner (2007) investigated the use of concept mapping as a learning tool for supporting the retention and recall of subject specific knowledge for national curriculum science lessons for students attending a special school in the UK. Concept mapping involves the development of a visual map showing "facts" (in boxes) and links between facts (using lines and arrows). Ten young people with ASD, aged 11 to 14 (mean IQ = 92), were split into two groups of five using a natural and pre-existing division according to tutor group membership. Both groups received tutoring on two topics (sex education and human development) using both "conventional" [not described] or concept mapping teaching methods (the order of these counterbalanced between groups). Each topic was taught during two one-hour science lessons in a block of six weeks. Student knowledge of the topic(s) was assessed through pre- and post-test questionnaires; their pre- and post-test concept maps were also scored for scientific accuracy.

Concept mapping promoted a three-fold increase in retention and recall of information compared to "conventional methods" although differences did not reach statistical significance due to wide variations in scores within groups (likely compounded by small sample size). Qualitative analyses of the concept maps suggested an improvement in understanding the links between concepts also. These results are encouraging because

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the study employed a naturalistic and yet robust experimental design and the training for students on how to use concept maps was short (two one-hour sessions) and easy to implement. For this reason, the approach could potentially be transferred to mainstream contexts although this has yet to be tested. The study's main limitation was sample size.

A Canadian study by **Bell and Kirby (2002)** investigated the use of a novel video-based programme targeting "mindreading" skills (theory of mind abilities focusing on emotions and beliefs assessed using "false belief" tasks). Three boys aged six and seven were included, each diagnosed with autism according to an interdisciplinary team. Information on their receptive and expressive language abilities was not available, although two were described as essentially nonverbal and one had some limited verbal communication. Instructional sessions were based on the use of three videos showing graded social interaction vignettes, accompanied by narratives of the action and colour-coded icons to represent the actors' desires and beliefs.

The study's design (essentially AB) included pre-intervention and pre-testing on standard false belief tasks followed by teaching in emotion and belief using the videotapes. Near and distant transfer of learning was assessed using different false belief tasks and a previously unseen video skit, respectively. Follow-up testing took place one week after the last teaching day. Teaching took place over 12 sessions on a prearranged schedule for the same three consecutive days a week for each participant with each session lasting 30-40 minutes.

All three children were able to pass false belief tasks at a higher level following the teaching than at the outset. One passed false belief tasks without meeting criterion in the teaching sessions and so it was not clear whether and how understanding was linked to the teaching. Two students were able to generalise from teaching in the emotion category to higher-level belief tasks; two did not complete distant transfer and one found it difficult. Notably, one student with limited verbal skills found all or most of the tasks difficult and engagement levels were low.

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Overall, this study offers very limited evidence for the effectiveness of this approach for children with autism with minimal language skills. Children received repeated teaching sessions despite obvious difficulties with the tasks and low levels of engagement. The tasks required verbal responses and explanation and so perhaps it should not be surprising that this was difficult for at least one of the children. This, coupled with the small number of participants and the study's AB design, severely limits possible conclusions.

3.1.5c Social stories (n=3 studies)

Introduction/Overview

Three studies investigated the use of social stories. One looked at the effect of prosocial behaviour of pre-school children; another looked at an intervention using social stories to decrease the disruptive behaviours of three children of primary age. A third implemented an approach using "comic strip conversations" to teach children with autism how to better manage and maintain interpersonal relationships and problem solve in social situations.

Crozier and Tincani (2006) in the US, studied the effects of social stories on the prosocial behaviour of three pre-school children with ASD, aged three to five. This was an intervention study using different types of reversal design. The study used observations, event recording and teacher interviews. Teachers were also given a social validity questionnaire. Observations were conducted using event recording to measure behaviour change according to the targets of the individual child. The findings replicated previous research in showing positive results for social story use, specifically indicating that it increased appropriate behaviour and decreased inappropriate behaviour for two participants. For the third, it was necessary to introduce verbal prompts. The first child showed a rapid increase in time sitting appropriately when the social story was in place and the authors noted that this suggested a functional relationship between the target behaviour and the intervention. The second child showed an overall increase in unprompted verbal interactions per session from initial baseline to final intervention. The third child showed a decrease in the average number of inappropriate behaviours and an increase of in the average number of appropriate behaviours. The small sample makes it difficult to generalise these findings across settings or to explain individual variation among children. Since this is only the second study to focus on social story use with pre-

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school children with autism, additional replications are needed to confirm the efficacy of this approach with this population. The study's strengths include that individual targets for each child arose from their educational needs (although this also makes it difficult to compare results across the three children). The authors made the important point that the field would benefit from studies looking at procedures for fading a social story from the instructional setting.

A US study **(Scattone et al, 2002)** sought to decrease disruptive behaviours of three boys with autism (two aged seven and one 15) using social stories. Such stories are designed to help children manage their own behaviour by describing particular (usually familiar and frequently experienced) scenarios, what might happen and how the child should respond. They are developed with individual children's needs in mind and structured around their specific context (including people, situations and places). In this case, students either read aloud, or had the story read to them, daily before the beginning of class or at specific times during the day (before break). Video observations of behaviours were recorded three times a week and coded according to the presence of disruptive behaviours. All three participants showed decreases in their disruptive behaviours during the intervention phase. For example chair tipping reduced from 50 to 5 per cent; inappropriate staring from 67 to 18 per cent and shouting from 16 to 5 per cent.

These results are encouraging because the intervention was much less intrusive, and time and labour intensive, than many. It was also implemented in naturalistic, everyday school environments. Social stories are also flexible in the sense that they are purposely designed around a child's individual needs and circumstances. Moreover, the study included a multiple baseline across participants design and so the effect of the intervention could be clearly seen. The familiar limitation of small participant numbers applies here, however, and there was no follow-up so it is difficult to know whether these effects were maintained. Some teachers also used verbal prompts along with the story (not a part of the intervention) and so it is difficult to determine which specific elements of the social story approach are critical or irrelevant to their effectiveness.

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Pierson and Glaeser (2007) implemented a similar approach using comic strip conversations to teach children with autism how to better manage and maintain their interpersonal relationships and problem solve in social situations. Three boys with high-functioning autism ("diagnosed by district criterion as on the autism spectrum") aged six to eight were identified as "exhibiting loneliness" and included in the study. The boys attended a specialist ASD resource room attached to a mainstream school and spent most of their time in this specialist setting during the day. Positive social behaviours such as eye contact, voice volume, greetings, apologising and joining in games were the focus of the comic strip conversations.

Children worked on a comic strip conversation with their teacher in daily sessions, which took place at the back of the classroom while the rest of the class continued as normal. Students were encouraged to draw scenarios, reflect on their own feelings and (with the teacher) think about alternative strategies for social problem-solving. Alternative, appropriate behaviours were agreed upon and then reinforced throughout the day by the teacher. This procedure was repeated daily for six weeks.

Teachers provided feedback on any changes in target behaviours and decreases in loneliness. Qualitative data analysis suggested changes in target behaviours for all three participants. They were all noted to show increased willingness to participate in activities, make fewer "lonely" vocalisations and be more talkative with peers. The authors concluded that the study "…found significant improvements in social skills and desired classroom outcomes using Comic Strip Conversations for students with ASD at primary level" (p465).

Conclusions drawn from this study, however, are necessarily more limited than the authors suggest. Its design (no baseline measures or control or comparison groups) precludes any linking of the intervention with observed outcomes. It is also not possible to know which aspects of the comic strip conversation promoted any changes. It could have been individual attention from the teachers, positive reinforcement/reminders during the day or the chance to think through alternative solutions that made a difference. Data were not independently observed or systematically gathered and there is no presentation of the

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data in the paper or any information on how they were coded. It was notable that comic strip use continued following the intervention and so there was some suggestion that the children liked it. This would need to be tested in a more robustly designed study with more participants in the future.

3.1.5d Picture-based learning approaches: Precursor skills for understanding pictures or symbols (n=2 studies)

Two studies examined precursor skills for understanding pictures or symbols, both covering pre-school children.

In the US, **Chavez-Brown, Scott and Ross (2005)** measured the "differential effects of simplified and typical verbal antecedents on acquisition of picture discriminations for four pre-school children with autism" (p153). The study used an alternating treatment design and study participants received instruction in the home. The researchers videotaped all sessions and used event recording to record responses during baseline and treatment. The study reported on inter-observer agreement levels. One participant made more correct responses during simplified than typical verbal antecedent conditions, another made more correct responses during typical rather than simple verbal antecedents and there was no clear difference for the two participants. Two participants responded better to typical antecedents and one responded better to simplified antecedents. The authors concluded that this supported use of structured three-term contingency instruction for children with autism. However, the combination of small sample size, limited number of training sessions and possible experimenter bias (trainers were not blind to the purpose of the study) limits conclusions drawn. The authors also noted that the use of a preset mastery criterion is a limitation of the study. These limitations, combined with the children's differential responses, led the authors to conclude that this was a preliminary study for future research. It is not possible to draw any evidence-based conclusions from it.

Also in the US, **Drager, Postal, Carrolus, Castellano, Gagliano, and Glynn (2006)** looked at the effect of aided language modelling (ALM) on symbol comprehension and production in two pre-schoolers with autism, aged three to five. A single subject multiple baseline design was used and inter-observer agreement reported. Findings showed that ALM

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increased symbol comprehension and production in the two children. The authors highlighted that a number of variables could have influenced children's performance and noted that the findings present preliminary evidence that a modelling intervention may be effective. They also recognised that there were no safeguards to prevent experimenter bias and caution was needed in generalising these results.

3.1.5d Picture based learning approaches: Picture Exchange Communication System: PECS (n=5 studies)

Five studies involved investigations on the picture exchange communication system (PECS), with one exclusively covering pre-school children and three covering mainly primary age children but involving children of a mix of different ages. The pre-school paper compared the effectiveness of PECS and responsive education and prelinguistic milieu teaching (RPMT) for facilitating intentional communication. The second paper examined the use of PECS with a mixed age range of three children aged three to five. The third paper was a pilot study in the UK to evaluate PECS' potential for supporting language and communication skills of children with ASD. This is followed by a study with high weight of evidence involving a group randomised controlled trial (RCT) on the use of PECS to see if this would lead to increases in spontaneous communication. A final paper implemented a PECS programme with three boys with autism aged three to 12.

Yoder and Stone (2006**) compared the effectiveness of PECS for facilitating intentional communication with responsive education and prelinguistic milieu teaching [RPMT]. Thirty-six pre-school children with autism (mean age three years; diagnoses confirmed with the ADOS) participated in this US randomised comparison study. Nineteen were assigned to the PECS condition and 17 to the RPMT. The latter is an intervention programme targeted at prelinguistic young children with developmental delays. It was designed to facilitate intentional communication through prompting and modelling specific behaviours and language. The target behaviours for this study were initiating joint attention, requesting and turn taking – all considered to be important pragmatic functions used for intentional communication in prelinguistic children. Parents were asked to bring their children to a university-based clinic for three 20-minute sessions a week for six months (72 sessions)

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where all sessions were conducted by trained facilitators and videotaped for subsequent coding.

Carefully controlled statistical analyses of children's behaviour across the intervention showed that joint initiating behaviours increased in both programmes but the RPMT approach promoted greater gains than PECS in this respect. The superior performance was found specifically in relation to children who, before the intervention, already displayed a greater number of joint initiating behaviours. By contrast, the PECS programme was more effective in promoting joint initiation behaviours in children with minimal or no such behaviours before the intervention. The RPMT also promoted more turn-taking behaviours than PECS.

The differential performance of the two communication programmes depending on children's abilities at pre-treatment is an important finding. In short, this study provides good evidence on the suitability of different programmes for different children. Specifically, PECS seemed to be more effective for children with lower levels of intentional communication at the start of the study, while RPMT was more effective for children with pre-existing higher levels of intentional communication. As the authors note, the implementation of both interventions was also of a relatively low intensity making them potentially easier to implement in other contexts. An important implication of these results is that children's existing abilities should be assessed before deciding which treatment (if any) is likely to be most effective. The difficulty in deciding between programmes, however, is the limited amount of comparative data and fine-grained information about children's abilities that exists in the current literature.

Ganz and Simpson (2004) used PECS with three children with ASD, one with autism and two with developmental delay and all with moderate or severe autistic characteristics according to the CARS. The children were aged three, five and seven and PECS sessions were carried out in their school setting in this US study. They received two to five PECS training sessions per week (with 15 trials per session). Total number of weeks of training is not stated. Videotapes of training sessions were coded for proficiency of meeting PECS criteria for learning; number of intelligible words spoken; and non-word vocalisations.

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Results showed that children could master the PECS system and used more intelligible spoken words, especially towards the end (Phase 4) of training.

Unfortunately, the study's design substantially limits any conclusions drawn. This was an intervention only design, without baseline data, and so it was not possible to conclude that speech increased as a result of the intervention. There was also no follow-up testing so it is not possible to know if any gains in skills or spoken language endured. Moreover, while the authors assert that generalisation of skills took place, this was not assessed formally and relied on anecdotal reports. Finally, it should be noted that the research was funded by a grant to the first author (Ganz) and Bondy and Frost – the two people who have developed the entire PECS system. This evaluation of PECS is therefore non-independent.

Magiati and Howlin (2003) carried out a pilot study in the UK to evaluate the potential of PECS for supporting language and communication skills of children with ASD. PECS is an established educational approach that uses behavioural principles (such as prompting and reinforcement) to teach communication skills using symbols and pictures. Thirty-four children from seven special schools were included in the study alongside all staff members from the participating classes (a total of 47 including teachers, assistants, care staff and one speech and language therapist). Children were aged five to 12 and assessed as having minimal or no spoken language and a diagnosis of autism or ASD. Staff members participated in a PECS training workshop and were then monitored by PECS consultants (although no details were given about the frequency or duration of this). Pre-intervention (baseline) measures of the children's communication ability were taken and followed by three sets of ratings over the following six months of using the PECS teaching programme. Teachers were asked to supply data of their ratings of children's vocabulary using PECS at the specified times.

Results showed an increase in children's use of PECS, and in their PECS vocabulary, over time. Typically, there was an initial rapid increase in the early stages followed by a levelling off and non-significant change thereafter. This was especially the case for children with

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higher language ability at the outset. Encouragingly, children also improved other communicative behaviours not included in the PECS programme.

For example, there was a small but significant increase in children's use of gestures and single spoken words and an overall reduction in problem behaviours. Notably, improvements were greater and more consistent for children who had not used PECS before. Parents and teachers also gave positive reports with teachers stating that the programme had not been particularly difficult to implement in the classroom.

Unfortunately, the overall impact of the findings are limited since no comparison group was included and children could not serve as their own controls (as in a multiple baseline design) because baseline data before the commencement of the PECS programme were not available for all children. The study also relied on teacher reports of progress with no independent observation of children's use of PECS.

Nevertheless, these findings are positive and encouraging not least because rapid increases in PECS usage occurred following the PECS training and, as the authors note, this is unlikely to have happened spontaneously in all seven of the schools included. In addition, the programme was straightforward to implement and could be used within children's everyday classroom settings, making it a potentially more ecologically valid approach to intervention. The authors conclude that a large-scale systematic study of PECS is warranted using a randomised control design in order to fully assess effectiveness. We turn to this study next.

Following from this pilot study, **Howlin et al (2007**)** carried out a group randomised controlled trial (RCT) in the "largest fully randomised psychoeducational trial for ASD reported to date" (p479). Eighty-four children aged four to 11 from 18 classes across 15 special schools in the UK took part. All children were required to meet criteria for autism on the ADOS; have little or no functional language; no sensory impairment and to not be using PECS beyond "Phase 1". Teachers within each class were trained in PECS use to see whether this would lead to increases in spontaneous communication, PECS use and

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speech for children in the treatment groups. In this RCT study, school classroom was the randomisation unit, making three groups in total.

One receiving PECS training immediately after baseline; the second receiving PECS training two terms after initial baseline; and the third receiving no PECS training. The training consisted of a two-day (13-hour) workshop followed by "active treatment" where PECS consultants made six half-day consultation visits to each class, once a month, over the next five months. The consultants monitored, supervised and provided feedback to teachers on their use of PECS and also agreed action points and future goals.

Children were videotaped and completed standardised assessments at three separate time points during the study: at baseline and then at first and second treatment periods. The measures taken were videotapes of the children's daily "snack" periods for up to 15 minutes; standardised vocabulary measures, and the communication and reciprocal social interaction domain scores from the ADOS. Children's spontaneous behaviour captured on video was coded for three types: frequency of child communicative initiations; frequency of use of PECS symbols and frequency of speech.

Results showed that immediately following training children showed an increase in initiations and PECS use but neither set of behaviours was maintained to time 3 (follow-up). There was no significant main effect of treatment on rate of speech. There was also no significant effect immediately following treatment on ADOS scores but a decrease in severity scores at the 10-month follow-up. The authors noted that this finding was difficult to interpret due to the delay in seeing the change. There were also no significant changes in the treatment groups on any of the other standardised measures.

Overall, this study contributes a high weight of evidence to this review; it was a large, well-conducted and controlled study with background variability in age, ADOS profile and language scores controlled for in the statistical analyses. Findings indicate modest success at best for the use of PECS; children with ASD and language impairments learned to use PECS effectively but there was no generalisation of this skill to spoken language and no maintenance of learned skills once the intervention ceased.

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The importance of considering pre-intervention abilities is reinforced by a small-scale US study which examined the use of PECS by three children with autism using a multiple baseline intervention. **Charlop-Christy et al (2002)** implemented a PECS programme with three boys with autism ("diagnosed by independent agencies", no criteria stated) aged 12, three and five. All had receptive vocabulary levels substantially lower than their chronological ages and little or no spontaneous speech. The location of the PECS sessions differed throughout the study (child's school or home, room at the university) and the total length of the intervention is unclear. Children's speech, social communicative behaviours and problem behaviours were coded during free-play and "academic" sessions before, during and after the PECS training.

The three children learned to use PECS effectively and showed substantial increases in spontaneous speech (without vocal prompts) following PECS training. Social communicative behaviours also increased from baseline levels and problem behaviours decreased. The multiple baseline design showed that changes in observable behaviours were temporally linked to the intervention.

The small numbers of participants coupled with variations in where (and therefore how – although this is not reported) the intervention was carried out make it difficult to draw wider conclusions. Nevertheless, the authors classified these three children as "talkers" (as opposed to "nontalkers") because they could imitate behaviours and this may have facilitated their verbal communication. In other words, they already had within their repertoire the potential to imitate and produce speech and this may not be the case for other children. The authors noted that it would be important for future research to identify the profiles of children who may become "talkers" (and therefore likely to benefit from PECS) and those who do not. The Yoder and Stone study described above goes some way to unpicking at least some aspects of what this profile might be.

3.1.5d Picture-based learning approaches: Other picture-based approaches (n=1 study)

There was one study in this category, focused on whether nonverbal students with autism could acquire picture-reading skills and therefore develop visual literacy.

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In the US, **Cihak (2007)** explored whether nonverbal students with autism could acquire picture-reading skills and therefore develop visual literacy. The study is premised on this understanding being a prerequisite for using PECS. Two boys and one girl, aged seven and nine years, were included in the study. All three had been diagnosed with autism by independent agencies and were described (according to the CARS or GARS) as having severe (two children) or average (one child) autistic symptoms. In a multiple probe across behaviours design, children were taught to learn the meanings of pictures through individualised, systematic instruction with a teacher. The teacher pointed to a card, read the information and modelled the correct response. Children were encouraged to learn 10 pictures of familiar people, 10 of objects, 10 of actions and 20 of object-action sequences. Picture comprehension was defined as motor demonstration of the correct response (pointing to the person in the picture or selecting the appropriate object, performing the action shown). Students were shown all pictures per session although it is not clear how many sessions took place per day and therefore the total length of the intervention.

Results showed all three students were unable to comprehend any pictures during baseline but comprehension skills increased to a mean of 68 per cent and this was maintained with 100 per cent accuracy at the six- and nine-week follow-up. This provides good evidence of the usefulness of a systematic approach to helping nonverbal children with autism to learn picture reading, although generalisation to novel stimuli (pictures), people and places would need to be explored in future research. A further limitation is the lack of clarity on length or intensity of the intervention. This means it is difficult to know whether the approach could feasibly be replicated elsewhere. The usual limitation of low participant numbers applies here. As the author notes: "More students must be investigated before broad conclusions can be made" (p327).

3.1.5e Computer-based approaches (n=4 studies)

Introduction /Overview

There were four studies investigating computer-based approaches and these ranged from pre-school to post compulsory education. One pre-school study compared computer-based and book-based instruction to develop the reading skills of eight pre-school children; another examined use of a computer-based language "tutor" called "Baldi" for

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facilitating vocabulary learning for primary age children with autism. The third study investigated whether an individualised computer-based augmentative and alternative communication system (AAC) could be used to enhance the ability of three girls with Rett syndrome to identify symbols. Finally, Golan and Baron-Cohen (2006**) assess the effectiveness of computer-based software for teaching about emotion recognition (via the *Mind Reading* interactive CD-ROM) through two experiments with adults.

Williams, Wright, Callaghan and Coughlan (2008) evaluated the development of reading skills in eight children aged three to five. The study investigated two conditions, which included computer-based instruction and book-based instruction. This was described as a pilot study in which children were carefully matched by age, severity of autism and number of spoken words. The study used a matched sample, crossover design and the children worked one-to-one or with their teacher in a quiet environment for up to 15 minutes, five days a week for 10 weeks. Two observers conducted observations and inter-rater reliability was measured.

Findings included that all children spent more time in the computer condition than the book condition and that they spent more time on reading material when they accessed it through the computer. In addition, they spoke over twice the amount of words during the computer condition compared to the book condition. Although numbers were too small for statistical analysis, spontaneous gestures to communicate need were used 41 times in the computer condition but only once in the book condition.

This was a well-designed study with clear rationale using well-designed assessment measures for matching and measuring change and the study had, as authors note, a clearly defined outcome. However, methodological problems include the fact that children were exposed to a range of educational interventions and these needed to be modified significantly to motivate children to comply. The study did not take part over a long enough period of time to show substantial improvement, and the small numbers of children involved limit the generalisability of findings. Nevertheless, results show promising potential for using computer-based instruction to improve readings skills.

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Bosseler and Massaro (2003) investigated use of a computer-based language "tutor" called Baldi for facilitating vocabulary learning for children with autism in the US. Baldi is a three-dimensional computer-animated talking head, which provides realistic visible and naturalistic speech alongside the presentation of pictures and text. While using the programme, children listened to (and watched) Baldi's instructions ("click the little star") and responded accordingly. They were given (computer-based) feedback in the form of happy or sad faces. This article reports two studies with children with autism aged seven to 12 years, all with learning disabilities and language delay. In study 1, eight children learned a unique curriculum of words depending on their abilities. There was an initial assessment of vocabulary followed by training and testing and then reassessment after 30 days. Training sessions were carried out "a few times a week" over the course of six months. All students learned new words compared to their pre-test performance and retained much of this learning (85 per cent accuracy) after 30 days. Seven students enjoyed taking part, but one did not (and was withdrawn before the start of study 2).

The major limitation was the use of an AB design meaning that it was not possible to attribute the learning gains to the computer-based language tutor. This was overcome in study 2: a multiple-baseline design including six of the children from study 1. Participants trained and tested on one set (from three) of vocabulary items while also testing performance on the untrained sets. Generalisation of learned vocabulary was also tested to (a) new pictures of learned vocabulary and (b) use of vocabulary in a natural, classroom setting. The results were positive: children learned and retained new words using the programme and this learning generalised to new computer images and to a structured classroom setting not involving the computer task. The design of the study meant the learning gains could be attributed to the computer-based intervention.

Overall, this study offers a promising approach for learning vocabulary in the classroom. Children were motivated to use the programme and, of course, most schools or classrooms are well equipped with computers making this a potentially easily accessible and replicable approach. The children worked one-to-one with the computer and so this task could also be embedded into different classroom contexts. The authors note that exploring whether vocabulary gains extend to spontaneous speech is a crucial piece of

future research and this will be necessary for evaluating the full potential of this approach. Caution is needed in the length of time students spend on the computer without teacher or peer interaction, although sessions were limited to 10-30 minutes.

Hetzroni et al (2002) worked with three girls with Rett Syndrome (one of the described pervasive developmental disorders [PDD] in DSM-IV, which also includes autism, Asperger syndrome and PDD-not otherwise specified) in Israel to investigate if an individualised computer-based augmentative and alternative communication system (AAC) could be used to enhance their ability to identify symbols. The girls, aged eight to 10 attended special schools, were nonverbal and had some functional use of their hands. They were typically able to make choices by pointing to stimuli or objects with their head or nose. Specific symbols targeted were individualised according to girls' IEPs (and through parental and teacher information) but included information such as name, book, verb (eat, drink) and communication term (more, No). Each individualised set of symbols for chosen referents was created for the computer and matched to pictures or written Hebrew. The pictures or words had to be matched to the correct symbol (from a choice on the computer screen) which the girls signalled through their body orientation and/or direction of gaze.

The study's design included a multiple probe across sets, enabling each participant to act as her own control across baseline and intervention. The computer directed and controlled the sessions with no input from the teacher. Learning assessments (probes) of the sets were carried out after every six sessions and a follow-up conducted by class teacher six months after intervention. Two of the three girls showed steady, positive learning trends of the symbols and maintained this over time, including at the six-month follow-up. One girl showed a more unstable learning process. During the intervention period, however, the task was simplified and her learning improved. The findings suggest that girls with Rett syndrome are capable of matching spoken words to symbols when provided with computer-based instruction.

Overall, these findings are positive for computer-based instruction to help children with severe learning disabilities to learn symbols. The multiple baseline design allows the

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learning effects to be linked to the intervention and the study was also carried out in the children's normal classroom environment thereby having strong ecological validity. However, conclusions are necessarily limited beyond this small sample and generalisation of learning to other stimuli needs to be explored in future research.

There are very few educational intervention studies for adults with ASD. **Golan and Baron-Cohen (2006**)** report a rare example. Aimed at assessing the effectiveness of computer-based software for teaching about emotion recognition (via the *Mind Reading* interactive CD-ROM) the authors conducted two experiments with adults (aged 17 to 52) with AS/HFA. In Experiment 1, a software intervention group (n=19) was encouraged to use the *Mind Reading* programme at home for two hours a week over 10 weeks (20 hours in total). Before and after software use participants were given assessments to test close generalisation (to stimuli drawn from the *Mind Reading* software) and distant generalisation of learning (to novel tasks about emotion recognition not involving *Mind Reading*). Their performance on these assessments was compared with an AS/HFA control group and a typically developing control group, both of which received no intervention. Findings showed the adult intervention group made significant improvements on the close generalisation tasks following software use but showed no evidence of generalisation to the novel tasks.

The second experiment used the same assessment measures to compare the effectiveness of the software when combined with weekly group sessions supported by a tutor, with an AS/HFA social skills group and a typically developing control group who received no intervention. The findings were very similar to the first experiment; the software group showed significant gains in correct emotion identification on the close generalisation but not the distant generalisation tasks. They were better in this respect than the AS/HFA social skills group. Importantly, verbal ability significantly interacted with many of the reported gains, suggesting the software use and assessments were better suited to those with higher IQs.

Overall, this was a well-designed study with well-matched comparison groups and results suggest that adults with AS/HFA can learn emotion recognition skills from computer

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software when used at home or along with tutorial sessions. However, there was no evidence that this learning extended to novel stimuli and no indication of whether being able to correctly label facial emotions from a computer screen had any practical utility in understanding and responding in real-life social situations. Moreover, the drop-out rate was high (21-28 per cent) which could suggest a lack of motivation for participants in using the software. As a widely available educational tool, Mind Reading may be a useful "first step" (as the authors acknowledge) in a training programme for people with AS/HFA. It is only one of many components that would need to be included, however, for a wider understanding of social situations.

3.1.6 "Voice" of children, young people and adults with ASD (n=7 studies)

Introduction/Overview

The experience of schooling and life more broadly from the perspectives of children, young people and adults with ASD is a neglected area of research. According to our inclusion/exclusion criteria for the review this topic should technically be excluded because outcomes for children and young people are not reported. We consider children and young people's views to be essential, however, to informing high quality educational and other service provision and so include below some examples where these have been sought. Note that, due to the slightly wider search for reports relating to adults, some of these are not peer-reviewed journal articles There were six papers and one research report that examined the experiences of children, young people and adults.

Humphrey and Lewis (2008) asked 20 students with AS or HFA, aged 11 to 17, about their everyday experiences of mainstream school in the UK. The researchers conducted individual, semi-structured interviews with participants and pupils were also asked to keep a diary of their experiences at school for a month. All 20 students were interviewed and nine completed diaries (six written, three audio). Qualitative analysis of the data retained an emphasis on the meanings participants held about their personal and social worlds.

Students reported frequent experiences of social isolation and bullying and so support from friends was very important (where these existed). High levels of anxiety were also experienced because of the school environment (noisy, bustling, chaotic). Some felt able

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to cope with this, but others felt overwhelmed and emphasised the importance of having quiet "refuges" such as a library to escape to if needed. There were feelings of not being included due to teachers failing to differentiate adequately their teaching for pupils with different needs. Some students felt the visibility of individual support (having an assistant sit alongside) accentuated difference and this was considered unhelpful. An "AS Identity" was difficult and problematic for many but more positively incorporated for some. AS had mostly negative connotations of "difference" for these young people although tension was also felt around "fitting in" and therefore compromising individual identity.

This study provides evidence that the views of young people with ASD can offer powerful insights into the inclusiveness (or not) of mainstream educational provision. Of course, it is not possible to generalise more widely from this sample of 20 young people attending four different schools but the value of asking individuals about their experiences cannot be overestimated. As the authors note, it is also necessary to consider these views alongside other stakeholders (teachers, parents) and in the context of what actually happens in the classrooms.

Madriaga et al (2007) reported on a study that sought to gain insight into the perceptions of students with AS about their lives within higher education. The research was contextualised within the social model of disability, its stated aim being to acquire a better understanding of societal barriers and raise the profile of students with AS within higher education. The research entailed a longitudinal study following the lives of eight undergraduate students with Asperger syndrome throughout their first academic year within a higher education setting. Eight students (plus four mothers and two mentors) from different universities across the UK were interviewed three times during their first year at university. A single researcher undertook interviews and every member of the team analysed transcripts of all interviews. Analysis was based on a grounded theory approach.

The qualitative approach to this research was successful in gaining some important new insights into the experience of students entering higher education. Worthy of consideration is the authors' report that five of the eight students interviewed described feelings of euphoria upon entering higher education, a revelation that does not appear in

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other literature, which tends to focus on practitioner perspectives. The issue of diagnostic disclosure was also discussed in relation to a perceived hierarchy of impairment. That is to say, some students seemed to prefer either to avoid a specific label, or be more comfortable to be assumed to be dyslexic, which possibly carries less stigma. Moreover, those with multiple disabilities tended to regard AS as less significant than their other impairments. Most avoided disclosing Asperger syndrome to teaching staff and peers. The authors recommend that future research should focus on the social model of disability in relation to AS and consider the impact of transition into higher education for this specific group of students, with particular reference to the opportunities it affords for re-invention and re-engagement of individuals.

The authors conclude with a comprehensive set of recommendations derived from the research categorised for the purposes of government and higher education institutes (HEIs); lecturers in HE; HEI disabled student support teams; disability researchers and the disabled peoples' movement.

Thompson (2004) reported on a qualitative grounded theory study of seven couples where one partner had AS. The research aimed to identify counselling strategies that may be appropriate through a client-centred approach. The couples had all previously received couple counselling as a result of relationship difficulties associated with Asperger syndrome. The author conducted one-hour semi-structured interviews with seven individuals, a mix of men with Asperger syndrome or women who were wives/former wives of men with it. Interviewees were from across the UK. Interviews focused on exploring which aspects of the counselling interventions had been perceived as helpful. Interviews were independently transcribed and coded into seven main themes:

1. Counsellor should have knowledge and understanding of AS.
2. Initial counselling should be separate for both partners, and separate counselling should remain an option later.
3. During co-counselling, available resources should be used to develop a shared understanding of AS, emotions and personalities.
4. Counsellor should be ready to act as "interpreter" to enable communication between partners.

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5. Visual aids should be used to aid co-operative understanding.
6. Lists, strategies and so on can be used to aid memory and develop co-operation.
7. Partner support groups should be established.

The author also highlights that his research indicated individuals with AS were greatly influenced by "historical factors" such as childhood events. As a small-scale, qualitative study, this research is vulnerable to researcher bias as the author openly discusses. Nevertheless, it is unique and important in an area where there is a dearth of research examining interventions that support individuals with ASD to maintain relationships.

Townson et al (2007) undertook research on access and barriers to self-advocacy as perceived by individuals with ASD. The research took a flexible approach, based on four in-depth interviews with individuals, two focus group sessions and four periods of observations (of meetings about people with ASD/AS – participants not specified). The researchers were members of People First Research Team (people with learning Disabilities [LD]) plus one academic researcher, and the report is written in accessible English. Methodological information is incomplete. For instance, no information is given on numbers or profiles of participants. The article focuses instead on the process of emancipatory research. However, the approach is effective in enabling the authors to gain insight into the comparative experience of individuals with ASD and those with LD, and in this respect the work is significant.

The authors categorise their findings within three themes related to participants' perceptions of advocacy, namely: a lack of access to, and awareness of, both advocacy and rights; experiencing difficulty fitting into what is available; and expressing an interest in developing knowledge.

An important finding here is the authors' assertion that participants were less knowledgeable about their rights and the services available than would be expected of a group with LD. This implies there is important education taking place within wider disabled communities which foster greater opportunities and outcomes, but from which people with ASD are largely excluded. Because this research was undertaken from an LD

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perspective, it highlighted "an insider's view" of the disadvantages that people with ASD may have in comparison to the LD population in accessing the broader educational opportunities that foster independence and autonomy.

Pukki (2003) adopted a case study approach to explore issues of sexuality for adults with autism, with particular reference to the experiences of four adults with autism. The case studies consisted of three females and one male, presumably reflecting the contacts available to the author rather than a representative sample. Participants were described as autistic, although from the descriptions all appeared to have relatively good social communication. This should be considered a discussion article, rather than a research piece, since very little information is given about the participants and no information is available to ascertain how data was selected or gathered or whether participants had given explicit agreement for their cases to be used.

Nevertheless, as a writer and researcher with autism, Pukki presented the "insider's perspective" and the article tackled subject matter that, though important, is often evaded within the literature. As a starting-point, Pukki noted the importance of recognising the potentially harmful effects of "nothing happening" to mental health and self-esteem. She highlighted the paucity of literature focusing on the positive aspects of sexuality.

In relation to this, she highlighted the literature recommending that sexual education plans should begin only after a specified baseline of personal awareness and/or skills has been achieved, effectively excluding some individuals from ever receiving such education. The author cautioned against education plans focused on a notion of "normal relationships" asserting that for people with ASD, "normal" may not be attainable or desirable. In particular, she noted that the tendency for people with ASD to relate sensually to unusual environmental features is often ignored so that expressions of sexuality may be dismissed as ritual.

She also pointed out the potential of the internet for sexual abuse/misconduct, yet information on it tends not to cover this sensitive area. Information technology is increasingly considered a medium particularly well suited to the needs of people with

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autism, despite the lack of clarity and transparency about the worldwide web (for instance, the ease with which naïve users can inadvertently and unknowingly access illegal material). Pukki therefore raises an important point here about the education of young people and adults.

In summary, the author highlights that in contrast to other areas of education, sexual education is often vague in delivery and content. She recommends the use of simple education plans not dependent on cognitive or practical skills levels and adapted to suit individual preferences. She proposes that therapies be made available to two particular groupings: those with damaging past experiences, and those whose sensory sensitivities may be a barrier to sexual pleasure. Finally, and importantly, she recommends that work be done to gather, share and analyse information on strategies used by people with ASD regarding sex education and experiences to develop a balanced literature on the subject.

Muller et al (2008) sought first-hand perspectives on what social supports and strategies were found to be effective by a group of adults with ASD/AS. Eighteen individuals, aged 18 to 62, were interviewed. To meet the inclusion criteria, all participants were aged 18 or over, had self-reported difficulties with cognition, a diagnosis of AS/ASD and no learning disabilities. The findings were drawn from transcribed semi-structured interview data which were coded into major and minor themes based on the research questions. Data were collected over 18 interviews (one to two hours each) conducted by four team members. The coding structure was developed using a grounded theory approach to develop 15 major themes (mentioned by at least 50 per cent) and 11 minor themes (mentioned by at least 25 per cent) across two categories: social experiences and recommendations. This study was relatively unusual in that the researchers tried to incorporate a participatory approach by presenting their initial findings to participants to check for accuracy of interpretation. The participants were older adults, generally with late diagnosis, and most were already involved in specialist groups or networks. This was therefore not necessarily a representative sample.

Major themes identified from data on social experiences were isolation; difficulty with social initiation; communication challenges; longing for social connectedness; desire to

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contribute to community; effort to develop social awareness. Major themes arising from the data on social supports were external supports (interest groups); communication supports; self-initiated supports (physical activity or alone time); attitudinal supports (tolerance and encouragement from those close to them). Of note here were the strong findings on individuals' desire and willingness to increase their social awareness and the intense loneliness reported. Participants said this worsened as they got older. The authors argue that a developmental approach is needed, and this finding indicates the need for a greater understanding of how ASD presentation and need may alter throughout a lifespan.

The authors recommend that educators and service providers consider thoughtful groupings to provide specialist and mixed opportunities. Given the difficulties that individuals with ASD can have with initiation (or re-initiation following a period of withdrawal) of activities as evidenced by these findings, the research flags the need for educators to regard this as a key area. The range of supports valued by participants indicate that a well-tailored intervention to teach initiation/re-initiation strategies would be important in enabling individuals to access suitable "natural" supports and gain greater social connectedness.

Jones et al (2007) conducted a review (commissioned by the Office of the Northern Ireland Commissioner for Children and Young People (NICCY)) of the needs and services for 10- to 18-year-olds with Asperger syndrome. It aimed to identify the needs of this target group; to highlight which services were currently provided for them and their families and to explore how these might be enhanced further. This information was collated by a review of the most up-to-date literature and research relating to AS and ASD; a review of policy, legislation and guidance in Northern Ireland, collection and analysis of statistical data on AS and ASD, and use of questionnaires and interviews.

For our purposes, we draw out the findings from this research that relate to the voice given to the children and young people with AS in Northern Ireland. While acknowledging the sample was small, (35 children: 29 male and six female) the findings from this element of the review provide an insight into how students view themselves and others. Thirty-five

10-to 18-year-olds with AS completed questionnaires and 10 of those were interviewed face-to-face to elaborate on their questionnaires. The group was asked to rate the services and support (from schools, healthcare professionals, voluntary groups and teachers) given to students with AS in Northern Ireland. Over 57 per cent rated these overall as "not very good" with a further 15 per cent indicating "don't know".

All students were asked to rate satisfaction with life at school/college, friendships and future plans. Overall, positive ratings outweighed the negative, although 68 per cent said they would have liked their school/college to be different. Bullying in school/college was a recurrent theme. Another issue that arose was the need for staff and peers to understand AS. Teachers were rated by almost 66 per cent of respondents as "not very good" at giving support. In light of these findings, perhaps there is a need to explore teachers' perceived knowledge and understanding of AS and what supports they offer to these students. Results were triangulated with findings from interviews with parents and professionals. Although the research relies on a small sample of participants, with no way of knowing how representative it is, the findings give some pointers to the experiences of young people with AS in Northern Ireland. This study could therefore be treated as a pilot for further research focusing on the experiences of children and young people.

3.1.7 School staff training (n=4 studies)

Introduction/ Overview

This section summarises and critiques papers that looked at staff training. Four studies focused on training school personnel in specific techniques for supporting children and young people with ASD. Three used structured, behaviourally-based approaches and one focused on use of social stories. This section has not been subdivided across age groups due to the small numbers of papers on this theme.

Two studies focusing on primary and post primary aged children involved training teachers in use of structured approaches to reduce "problematic" or "maladaptive" behaviours in the classroom. In the US, **Dib and Sturmey (2007)** worked with three teaching assistants of children with autism (aged nine to 12) based at a private specialist school. Teaching assistants were coached to implement discrete-trial teaching aiming to reduce three

students' behavioural stereotypy. In Ireland, **Grey et al (2005)** included 11 teachers (and 11 students, aged two to 15) in an evaluation of the effectiveness of ABA teacher training to reduce frequency and intensity of problem behaviours (hitting, shouting, verbal aggression). Both studies reported positive outcomes for the intervention. Dib and Sturmey found all three teaching assistants showed increases to 100 per cent accuracy in delivering the discrete-trial teaching and reductions in student stereotypy were recorded for the three students. These reductions could be linked to the training because the study used a multiple-baseline design. Grey et al reported a substantial reduction in target behaviours across the 11 children and teachers rated the training programme as good on average. Seven (out of 11) parents completed a questionnaire and all noticed a beneficial change in their child's behaviour. Six of these believed ABA should be the main method of classroom teaching.

Unfortunately, both studies offer limited evidence due to limitations in design and level of detail included. Dib and Sturmey's study assumes that students' stereotypy was causally related to specific staff members, but this does not take into account any environmental or contextual factors, thereby reducing its potential usefulness in understanding which approaches may work in particular contexts. Moreover, while the multiple baseline design helps link intervention with a reduction in behaviour, there is no information on length of time of the training or intervention. Thus it is not possible to tell how feasible it would be to implement this approach in different contexts. We can conclude that more structured interactions with students appear to reduce stereotypy but we cannot know whether this is more effective than other methods. Crucially, however, there is no analysis or discussion of whether a reduction in stereotypy is linked to positive outcomes for the child in terms of learning or engagement.

There is also a lack of key information in Grey et al, especially on how baseline and intervention data were collected. Additionally, the number of intervention sessions varied widely across children (from three to 23 at baseline and three to 27 during the intervention) but there was no analysis of how this affected on behaviour. The study employed an AB design and so it is not possible to conclude the intervention was responsible for the reductions in target behaviours. Moreover, no account was taken of

non-trained or targeted behaviours during this period so, for example, there could have been an increase in other "undesirable" behaviours during this time. There was no follow-up so we cannot know whether any gains were maintained after the intervention period and observations of children were non-independent (carried out by the teachers involved in the training) and not objectively checked (no inter-rater reliability checks were reported). Finally, the ability ranges or cognitive profiles of the children were not reported. These are likely to be diverse and so it is not possible for say for whom this kind of intervention may be applicable.

The two remaining studies in this section adopted different approaches but potentially offer more robust evidence for the review. **Browder et al (2007)** focused on training teachers to support the literacy skills of children with severe intellectual disabilities or autism (in the IQ range 42-50). Three teachers and six students (two from each class, aged 12 to 14) were included in this US study, all of whom were based in "special education classrooms" in mainstream schools. Teachers were coached to use a task analysis for supporting the students to engage with and understand age-appropriate books (the same books their typically developing counterparts were reading in regular lessons). Eight books were adapted using large text and symbols and highlighting key ideas and words. The task analysis involved following a teaching "template', using systematic prompting, and self-monitoring adherence to the task. All three teachers showed mastery of the task analysis following training and included all 25 steps (or all but one) in their instructional approaches. All students made gains in independent or unprompted responses from baseline to intervention, including book awareness, listening comprehension and early literacy skills. The teachers also liked the training package, considering it fair, useful and of likely help to other teachers.

Limitations include a lack of specificity on the exact length or amount of training required and the number of teaching sessions carried out with the students. The number of participants was small and student gains in literacy were not the primary variables of interest, thereby limiting generalisability of the findings. Nevertheless, this approach aimed to develop materials that could help children with severe learning disabilities access the same reading books as typically developing peers. It therefore, provides a useful

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approach to developing inclusive practices. This was also a well-designed multiple baseline study and as such it was clear that training teachers in systematic task analysis helped to improve the students' literacy skills.

Quilty (2007) explored whether "paraprofessionals" could be effectively taught to write and implement social stories for children with autism with a positive impact on targeted behaviours. Three paraprofessionals (all with experience of working with children with autism in home or school settings) were paired with a child with autism, two aged 10 and one six, diagnosed with autism according to DSM-IV criteria. They attended mainstream schools but spent varying proportions of time in mainstream classes. Each staff member received three hours of training on developing and implementing social stories and the story focused on reducing inappropriate behaviours. Using a multiple baseline design data were collected in a resource room for two participants and in a mainstream classroom for one child. Analyses focused on the extent to which social stories plans were implemented and followed by staff members as well as frequency of student target behaviours at specific times of the day. Paraprofessionals successfully wrote and implemented individualised social stories for their target student. The children showed a decrease (on average) in their targeted inappropriate behaviours following intervention and maintained this reduction during a follow-up period.

This well-designed study offers encouraging findings on this approach. Minimal training for paraprofessionals was needed and the intervention took place in a less intrusive, more naturalistic way in the context of the children's everyday school routines. The small number of participants limits the ability to generalise conclusions but there is potentially good practical utility for this approach in the classroom.

3.1.8 Parent training/involvement (n=12 studies)

Introduction/ Overview

This section covers papers on parent training and involvement. Ten related to early years and two involved children of primary age. For the early years sub-section, the first paper focused on educational and social development through play. We then review three that use behavioural approaches for developing functional communication before reviewing a

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paper that evaluated an early social interaction project. Three further papers examined approaches that enabled parents to respond more sensitively to their child's interaction. A further two papers dealt with functional communication. Only two focused on the primary age range, one being a retrospective study on training fathers in social reciprocity; the other examining specific techniques for managing behaviour and improving social understanding.

Early Years

McConkey et al (2007) evaluated a specific resource, Keyhole Rainbow Resource Kit, designed to "help families minimise the effects of autism and to ensure the educational and social development of children with autism through play". In Phase 1 the kit, containing toys and information booklets, was assembled and introduced to 16 families in Northern Ireland whose children had a confirmed diagnosis of ASD by a key worker. During the first visit, information was gathered on the child and family (via interviews, self completion questionnaires and standardised measures including the VABS and GARS), and on the mothers' health and well-being. Families were also guided in their choice of activities to use from the kit and were visited at least five times during this phase. Information was gathered during this time by recording parental reports at each visit, the mother's diary and a structured interview at the end to ascertain the mothers' view of the kit.

A three-month follow-up interview then gauged reaction to the project and gathered information using the same assessment tools as at the first visit. Information from 13 to 16 families was gathered. In this phase mothers reported the children had less trouble relating to play activities, the kit had helped the children in various ways and they felt less stressed overall. They also suggested how the kit could be improved. There was no significant change in the children's development, however, as measured by the standardised scales.

In the second phase, a further 17 families used the kit under the direction of key workers for an average of six home visits with information gathered the same as before. Average gap between the two interviews was five months. In this phase a significant improvement

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in socialisation was reported as 88 per cent of parents reported "relating to others" as a problem before the project and only 31 per cent reported this as a problem afterwards. There was also a corresponding statistically significant increase in the socialisation domain scores of the VABS between pre- and post-test. Professionals and parents felt the kit was a useful resource in providing support for families with a pre-school child with ASD. Indeed, parents felt they would have liked the kit when their child was younger. Professional staff felt parents needed their support to use the kit and many parents concurred with this. Some parents, however, felt they could have used the kit independently.

Overall, while parents and professionals valued the kit this study offers limited evidence on the effectiveness of the intervention on outcomes for children. The sample was small and followed an AB design with self-reports from parents forming the main set of data (no independent observations of the children's progress were made). In addition, it is difficult to identify which components may have been important for the kit to be effective, including whether it was specific activities contained in it or the visits from the key worker that made the difference.

In the US, **Koegel, Symon and Koegel (2002)** implemented a five-day intensive centre-based education programme for parents of five young children with ASD (aged three to five) using pivotal response training (PRT) targeting functional communication. The study's main aim was to assess whether an intensive programme of this kind would facilitate improvements in skills for parents and children and therefore provide an effective mode of delivering parent training (especially for those who live away from centres where support could otherwise be provided). Parents were asked to provide videotapes of home-based parent-child interactions before and after the intervention for coding by the researchers. A non-concurrent multiple baseline design was used with follow-ups at different points post-intervention for each child (ranging from three to 11 months). The authors reported that parents mastered use of PRT techniques during the programme and that increases in the children's functional communication were also observed. They also asked independent raters to gauge parental "happiness, interest and stress" from videotapes of parent-child interactions taken during the intervention.

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Unfortunately, there are many limitations to this study which substantially limit the usefulness of these findings, not least the non-independence of this evaluation (carried out by personnel who delivered the training programme), the inference of parental feelings (rather than direct report) and the non-independent observation of children's videotaped interactions (supplied by parents). It is also not possible to know whether the noted increases in functional communication were contextually or qualitatively appropriate. Nevertheless, the study offers further evidence that parents are willing to be involved in training programmes and can implement trained procedures adequately with relatively modest input from trainers.

Another US study involved parents in a PRT training programme **(Baker-Ericzen, Stahmer and Burns, 2007)** but is similarly limited in the evidence it provides for this review. The authors, from the same centre involved in delivering the training, assessed the progress of 158 children in a community-based sample during a 12-week PRT parent-training programme. Parents met a PRT therapist for one-hour a week over the 12 weeks of instruction and feedback on use of PRT techniques. Before and after the intervention, parents completed the Vineland adaptive behavior scales for their child and the study looked for changes in these scores over the 12 weeks. Most children in the study (90 per cent) were aged three to five years with the remainder aged six or older. The group consisted of a 4:1 ratio of boys to girls with a span across different ethnic groups, most (35 per cent) being of Hispanic ethnic origin. The results showed statistically significant improvements in VABS scores between pre- and post-intervention with the exceptions of communication domain for girls and daily living skills for children aged six or over.

Although the study comprised a large community-based sample and standardised measures to explore outcomes, the findings are nevertheless limited by the study design, non-independence of the evaluation and lack of reported information. For example, the procedural fidelity of the implemented techniques was not measured and there was no comparison group involved. In addition, parents were the primary providers of the programme and also the source of data on children's improvements. There were no independent observations of the children's progress and also no reports on whether families were involved in other educational programmes or treatment studies during this

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time. The authors acknowledge these limitations and as a result describe the study as "preliminary".

Of potentially greater significance for the review are studies focusing on parent-child interactions and early communication skills, although some offer more robust evidence than others.

Ingersoll and Gergans (2007) in the US, carried out a parent-implemented imitation intervention with three mother-child dyads. The children were aged two to three and diagnosed with autism according to DSM-IV-TR criteria. The study focused on use of reciprocal imitation training (RIT) that encourages parents to respond contingently to children's gestures and to model uses of objects. The intervention aimed to determine if use of such strategies would increase spontaneous object and gesture imitation (early nonverbal communication skills) in young children with autism. Parents were randomly allocated to a two-, four-, or six-week baseline and then received 10 weeks of RIT training involving two 30-40 minute sessions per week at an intervention centre. All mothers were able to learn the skills taught during the training but variably applied these during treatment and follow-up (one month after intervention ended). Similarly, all three children showed some increased spontaneous object and/or gesture imitation but again this was variable over time and only one child showed evidence of maintaining this at follow-up, suggesting longer term retention of skills was low. Parents liked the intervention and found it easy to implement and recommended its use for others. However, generally this study offers limited evidence for the review. The number of participants was small and responding highly variable. Also, as the authors note, imitations may have increased simply because children had more play opportunities with their mothers rather than because of the specific components of this intervention.

Another US study, by **Wetherby and Woods (2006),** explored a more wide-ranging, naturalistic approach to parent-implemented intervention involving 17 children and their parents. In a quasi-experimental design, this group of two-year-old children and their parents participated in an early social interaction project for 12 months and their responding in a standardised, videotaped behavioural assessment compared with an age-

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equivalent group at post-test (aged three years) who had not taken part in the parent intervention programme. The programme involved trained therapists visiting the family at home (twice a week) to advise on how skills like turn taking, modelling, imitation and reinforcement could be embedded in high frequency activities and everyday family routines and contexts. As such, the programme was designed to individualise social communication goals for each child.

This experimental design allowed researchers to make some conclusions on which social communication skills may improve with maturation over time compared to those that may benefit specifically from intervention of this kind. Results suggested the intervention group improved significantly on most social communication skills measured and differed significantly from the non-intervention group on a subset of these (relating to gaze, shared affect and joint attention). Skills where no significant differences between the groups were found included symbolic play and nature of communication (gestures and words), which the authors suggest could improve due to maturation alone.

The major limitation of this study was that measures of behaviour at age two for the non-intervention group (ie. to match the intervention group at the start of the study) were unavailable and so we cannot know whether the groups were adequately matched. Nevertheless, the study does add further weight to the evidence regarding the potential effectiveness of focusing early intervention on these communicative skills and targeting the core deficits of autism, which are developmentally linked to later language and cognitive functioning. Moreover, as the authors note, visits to family homes to train parents in these skills may represent a value-for-money approach to intervention that, through being based within everyday contexts and routines, is also more manageable and motivating for participants.

Mahoney and Perales (2003**) in the US, **Aldred et al (2004**)** and **Drew et al (2002)** in the UK conducted focused interventions on supporting parents (mostly mothers) to respond in more sensitive ways to their child's interactions. First, **Drew et al (2002)** conducted a pilot randomised control trial of a parent training intervention for pre-school children with autism. Twelve families were assigned to the training group and 12 to the

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"local services" group (who only received input from other services or agencies in the usual way – speech and language therapy). The children involved were aged 22 months on average at the first assessment and all met ICD-10 criteria for autism. Parental training focused on linguistic precursors such as joint attention skills and joint action routines. Parents were also given behavioural management advice and techniques to promote "compliance" with requests. Parents acted as the everyday "therapists" for the intervention and received a three-hour visit from a speech and language therapist (SLT) every six weeks to monitor and provide feedback on the parents' implementation.

Standardised questionnaire measures were taken pre- and post-intervention, on average 12 months apart. Measures covered language comprehension and production, nonverbal IQ, symptom severity and parental stress. Comparisons between the intervention and non-intervention groups revealed only very modest gains for the former. There was some indication that children used slightly more words at the post-intervention point but there were no changes on any of the other measures. It should be noted though that the intervention group had significantly higher nonverbal IQ scores than the non-intervention group, which may have influenced this finding.

Authors also note that children's language ability in both groups remained very limited and there was considerable variation in their progress within each group. The study relied on parental reports and treatment fidelity was not measured so findings should be viewed with caution. Finally, some parents in the non-intervention group began intensive behavioural training programmes with their children during this study making it difficult to compare the real effect of the intervention. Overall, the study highlights the difficulties in trying to conduct a well-controlled study in the inherently "messy" contexts of everyday family life. Notably, many parents found it difficult to implement some activities as planned, suggesting the need for more nuanced implementation approaches (such as that outlined below by Moes and Frea, 2002).

The other two studies offer clearer findings. First, **Mahoney and Perales (2003**)** conducted a relationship-focused intervention to enhance the social emotional functioning of 20 young children with ASD. Parents participated in weekly intervention

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sessions for eight to 14 months. The sessions focused on enhancing their interactive strategies through using a responsive teaching curriculum. The study adopted a pre- and post-assessment design using data from standardised cognitive and language tests taken before and after the intervention. Newly developed norm referenced parent respondent instruments were administered. The temperament and atypical behaviour score (TABS) assesses parents' perception of children's temperament, attention, attachment, social behaviour, play, vocal and oral behaviour, senses and movement and stimulation and self-injury. The infant toddler social emotional assessment (ITSEA) is a scale that assesses parental perceptions of internalising, externalising, regulatory problems and social competencies. In addition to these standardised instruments, videotaped observations of mother-child interactions were used to assess mothers' interactive style using the maternal behaviour rating scale and children's social interactive behaviour, using the child behaviour rating scale (CBRS). Results showed the intervention sessions succeeded in encouraging mothers to engage in more responsive interactions with their children. Specifically, increases in the mothers' responsiveness were associated with significant improvements in children's social interactions as well as standardised measures of their social emotional functioning. There were also significant changes in the mothers' "style of interactions" over time as well as a significant improvement in children's CRBS score. The significant "qualitative" changes observed in mother-child interactions are very encouraging. Strengths of the study include its use of multiple measures and that these measures correspond closely with the aims of the intervention. However, weaknesses include lack of a control group and variability in the children's ages and length of their participation in the programme. In addition, the study utilised a pre- and post-test design and thus did not measure change during intervention.

Aldred et al (2004**) obtained similar findings in a pilot randomised controlled treatment study of an intervention aimed to increase the quality of parental adaptation and communication with their child. The study focused on shared attention and parental sensitivity and responsiveness to children's behaviours and communication. Twenty-eight children with autism, aged two to five, met full diagnostic criteria for autism on the autism diagnostic interview (ADI) and were randomly assigned to either a treatment or a control group, both of which were carefully matched in age and severity of autistic behaviours.

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Parents and children in the active treatment group attended monthly treatment sessions for six months during which their play sessions were videotaped and feedback provided on interaction and communication responses. Following feedback, parents were asked to spend 30 minutes a day interacting with their child to practise these strategies. Parents then attended for less frequent "maintenance" sessions over the next six months, making the intervention a year long in total. The control group continued to receive "routine care" (such as speech and language therapy) throughout the intervention period, as did the active treatment group. In other words, the intervention was in addition to normal levels of specialist input received by the families. Pre- and post-assessment measures consisted of a number of standardised questionnaire instruments (such as the VABS and the ADOS) as well as videotaped sessions of parent-child free play, which were analysed for communication, shared attention and contingent responding.

Results showed a significant decrease in severity of autistic symptoms, as rated by researchers, in the treatment compared to the control group. Parental ratings of children's expressive language also increased in the treatment group, as did the number of synchronous communication interactions shown during free play. Frequency and quality of observed child communication acts increased in the treatment group and decreased in controls.

Although there are limitations in the above two studies (including lack of information on treatment fidelity, no long term follow-up and no comparison with other interventions), these well-designed studies offer much promise in highlighting communication interventions that require reasonably modest training and support for parents. Taken together, the findings from these two studies offer powerful support for interventions that teach parents how to become more responsive to the early communicative behaviours of their children. These behaviours are pivotal in establishing higher level functioning (attachment, empathy, self regulation and co-operation) and thus tackling them early on could lead to improved social and communication skills in later development. Follow-up studies need to be conducted for this intervention and the involvement of school-based personnel and contexts will be important in the future.

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Finally, two studies were concerned with how parent-delivered interventions could be successfully individualised to offer a better fit with family routines. First, **Moes and Frea (2002)** were specifically interested in whether adopting more individualised approaches would undermine the intervention's effectiveness. This US study directly addressed the need for training involving parents and siblings to take into account contextual information regarding families' routines, beliefs, support and patterns of social interaction. Three families with children aged three with autism, undertook functional communication training (FCT) with their children under the guidance and support of the report authors. Parents were taught techniques to teach their children appropriate requesting behaviours and/or communication to curb disruptive behaviours. In a multiple baseline study across the three families, the authors explored the effectiveness of implementing FCT in a standardised way compared to a more contextualised approach in which parental and sibling responses and family routines were taken into account.

Results showed that functional communication increased and problem behaviours decreased during the "regular" FCT sessions but the effect was more marked with the implementation of the contextualised FCT approach. Moreover, parents felt the individualised FCT routine was more sustainable in their family context than the standard approach. Although the study was limited to only three families and had only a few generalisation probes, nevertheless this does represent a useful study that details how behavioural training programmes can be enhanced by improving the "goodness of fit" between the structured demands of the training and everyday family life. The key message is that the consideration of family context did not undermine the effectiveness of the intervention in increasing functional communication and reducing problem behaviours.

The second study was carried out by **Kashinath et al (2006),** also in the US. They involved five mother-child dyads (children aged two to six) in a multiple baseline study that focused on teaching two different strategies to parents which could be embedded within daily routines in and around the home. Specific strategies (from a choice of six, including time delay, natural reinforcement, arranging the environment and imitating contingently) for each dyad were decided following an assessment of their interaction style and chosen if they were absent or infrequent from normal interactions. The first author of the paper also

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conducted interventions with parents and visited them in their homes for 60-90 minute sessions twice a week during the study (total number of weeks not stated). Mother-child interactions were videotaped and coded for frequencies of target behaviours. These were for the use of the strategies by the parents and communicative outcomes for children (spoken language for four children and gestures for one child). Parents could implement the strategies within their daily routines although some proved a better fit than others. For example, strategies were implemented with a lower frequency in care-giving routines compared with play routines and there was variability in use of strategies within and across dyads. The children showed increases in communicative behaviours associated with the intervention, but again, these were variable within and across the pairs. Interestingly, the first strategy (irrespective of what it was) appeared to produce a change in responding from the child, while the introduction of the second strategy did not. Parents were positive about the intervention and found it relatively easy to implement.

Although the study's findings are limited due to variability in responding and the small numbers of participants, it does offer a useful contribution for describing how different techniques can be selected for a "best fit" with parents' existing communicative and interactive styles. Also, by embedding these within everyday routines it was clear that the parents appreciated the relevance and usefulness of the techniques. It was also clear that some techniques worked better than others in different contexts, reinforcing the notion that one approach will not work for all children in all contexts. However, it is unclear exactly how all six strategies relate conceptually to communication (the child outcome measures) and therefore this study is weaker in its theoretical underpinnings relating to the core communicative deficits of autism.

Primary

Seung et al (2006) carried out a retrospective analysis of an intervention study in the US to train fathers to facilitate social reciprocity with their children. Eight families, with children aged four to seven, gave permission for videotapes used for a different study to be analysed. All children met DSM-IV criteria for autism and this was confirmed with the CARS and ADI-R. Fathers were trained in use of two techniques: expectant waiting (allowing sufficient time for the child to respond to verbal initiations) and imitation with animation

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(responding in an animated/exaggerated way to child's behaviour). The research team analysed transcripts of verbal interactions from videotapes for the ratio of father-child utterances and numbers of utterances produced by the father and the child. These were taken from multiple baseline sessions of baseline, intervention and maintenance probes. Results suggested fathers could implement the trained strategies and children showed a corresponding increase in the production of one-word utterances.

Although this is a useful additional example of researchers including reciprocal communication skills as the focus of interventions the study has serious limitations which substantially reduce its usefulness for this review. Crucially, it was a retrospective analysis of data collected as part of a different study and so was exploratory rather than predictive. Also no information on training procedures and duration was included. In addition, the cognitive and language abilities of children were not reported and six of the eight children also received speech therapy during the intervention. There was also no systematic exploration of whether the words produced by children had functional or communicative relevance during the interactions. Finally, analyses using ANOVA were inappropriate for the data (a small number of participants plus means and standard deviations not reported).

Of much greater significance and relevance was a study by **Sofronoff et al (2004**),** which provided information about AS and training in specific techniques for managing behaviour and improving social understanding (such as social stories and comic strip conversations – see also Section 3.1.5c) for parents of primary school age children with AS (aged six to 12). In this Australian study, parents were randomly assigned to a one-day training workshop condition (n=18); six individual weekly one-hour sessions with a therapist (n=18) or a waitlist control group (n=15; who received the intervention following completion of the study). The study's focal measures were parental report questionnaires on their child's behaviour and social skills completed at: pre-treatment, one month post-treatment, and at a three-month follow-up.

Parents in both treatment groups (workshop and individual sessions) reported significant improvements in their child's behaviour and social skills during and following the

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intervention. The waitlist control group reported no changes over time. The parents who received training via the individual sessions reported greater gains for their children compared to the workshop group, which the authors suggest could be due to the opportunities to "fine-tune" approaches on the basis of individual sessions with a therapist. Parents drew more heavily on some approaches covered during training than others – those who used social stories and comic strip conversations rated them highly. Many parents found the psycho-educational aspects of the intervention especially useful (teaching about AS and the difficulties commonly experienced) and, in fact, rated this as the most useful part.

The study shows that parents are willing to take part in training and that training in managing aspects of AS can be an effective intervention. Although individual training workshops produced slightly larger gains for children, results also show training as a one-day workshop can also promote success. Parents could choose to implement aspects of the programme that they preferred and so it could be individualised to individual family needs. Its main limitation is its reliance on parental report on children's behaviours. There was no independent observation or ratings (by teachers) that would have strengthened the findings. In addition, the follow-up period was short and so it is not possible to tell whether positive change was maintained over a longer period. Future research could seek to compare the effectiveness of different "strands" of training to unpick whether (as parents reported) psycho-educational instruction was the most useful aspect. Nevertheless, this was a well-designed study and as such offers a high weight of evidence for the review.

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Appendix A5: Articles identified as potentially meeting inclusion criteria but not included for review (either single case design, review paper or unavailable)

Agosta, E, Graetz, JE, Mastropieri, MA and Scruggs, TE (2004). Teacher researcher partnerships to improve social behavior through Social Stories. *Intervention in School and Clinic* 39(5), 276-287.

Akmanoglu, N and Batu, S (2004). Teaching Pointing to Numerals to Individuals with Autism Using Simultaneous Prompting. *Education and Training in Developmental Disabilities* 39(4), 326-336.

Alberto, PA, Fredrick, L, Hughes, M, McIntosh, L and Cihak, D (2007). Components of Visual Literacy: Teaching Logos. *Focus on Autism and Other Developmental Disabilities* 22(4), 234-243.

Ayres, KM and Langone, J (2005). Intervention and Instruction with Video for Students with Autism: A Review of the Literature. *Education and Training in Developmental Disabilities* 40(2), 183-196.

Banda, DR and Kubina, RM Jr (2006). The Effects of a High-Probability Request Sequencing Technique in Enhancing Transition Behaviors. *Education and Treatment of Children* 29(3): 507-515.

Bellini, S and Akullian, J (2007). A meta-analysis of video modeling and video self-modeling interventions for children and adolescents with autism spectrum disorders. *Exceptional Children* 73(3), 264-287.

Benson, P, Karlof, KL and Siperstein, GN (2008). Maternal involvement in the education of young children with autism spectrum disorders. *Autism* 12(1): 47-63.

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Birkan, B, McClannahan, LE and Krantz, PJ (2007). Effects of Superimposition and Background Fading on the Sight-Word Reading of a Boy with Autism. *Research in Autism Spectrum Disorders* 1(2), 117-125.

Blair, K-S C, Umbreit, J, Dunlap, G and Jung, G (2007). Promoting inclusion and peer participation through assessment-based intervention. *Topics in Early Childhood Special Education* 27(3), 134-147.

Boutot, EA Guenther, T and Crozier, S (2005). Let's play: Teaching play skills to young children with autism. *Education and Training in Developmental Disabilities* 40(3): 285-292.

Brown, KE and Mirenda, P (2006). Contingency mapping: Use of a novel visual support strategy as an adjunct to functional equivalence training. *Journal of Positive Behavior Interventions* 8(3), 155-164.

Buschbacher, PW and Fox, L (2003). Understanding and intervening with the challenging behavior of young children with autism spectrum disorder. *Language, Speech, and Hearing Services in Schools* 34(3), 217-227.

Cameron, MJ Shapiro, RL and Ainsleigh, SA (2005). Bicycle Riding: Pedaling Made Possible Through Positive Behavioral Interventions. *Journal of Positive Behavior Interventions* 7(3), 153-158.

Chiang, H-M and Lin, Y-H (2007). Reading comprehension instruction for students with autism spectrum disorders: A review of the literature. *Focus on Autism and Other Developmental Disabilities* 22(4), 259-267.

Choi, SHJ and Nieminen, TA (2008). Naturalistic Intervention for Asperger Syndrome: A Case Study. *British Journal of Special Education* 35(2), 85-91.

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*Cohen, H Smith, T and Amerine-Dickens, M (2006). Early Intensive Behavioral Treatment: Replication of the UCLA Model in a Community Setting. *Journal of Developmental and Behavioral Pediatrics* 27(Suppl2),145-155.

Connor, M (2003). Monitoring and Reviewing Early Behavioural Intervention in Autism (Lovaas). *Educational Psychology in Practice* 19(1), 13-33.

Cowan, RJ and Allen, K D (2007). Using naturalistic procedures to enhance learning in individuals with autism: A focus on generalized teaching within the school setting. *Psychology in the Schools* 44(7), 701-715.

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These articles were only available via interlibrary loan and did not arrive by the deadline for inclusion in the review. They both contain potentially important data and should be included in any future reviews, especially those focusing on early intervention for children with autism.

*** This article was brought to our attention following the completion of the review. As we acknowledge in the report (p40) it is likely that some articles will not have been identified or included through our search strategies, but could have met the inclusion criteria. This is an additional article that should be included in any future reviews of early intervention.*

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