**"Research on Interventions for Children and Young People on the
Autistic Spectrum: A Critical Perspective"**

Neil Humphrey and Gill Parkinson

Centre for Educational Support and Inclusion
University of Manchester
Oxford Road
Manchester
M13 9PL

(tel) 0161 275 3404
(fax) 0161 275 3548
neil.humphrey@manchester.ac.uk

**"Research on Interventions for Children and Young People on the
Autistic Spectrum: A Critical Perspective"**

Abstract

Developing, implementing and evaluating programmes of intervention for children and young people on the autistic spectrum are challenging endeavours. In this article, we adopt a critical approach to research in this area, and attempt to offer an alternative perspective for understanding and interpreting empirical evaluations. We outline and discuss theoretical, methodological and practical issues and limitations associated with the current research body, and provide illustrative examples of gaps in the current literature.

Keywords

Autistic spectrum disorders

Intervention research

Methodology

Research on Interventions for Children and Young People on the Autistic Spectrum: A Critical Perspective

Introduction

The current corpus of research addressing issues concerning children and young people on the autistic spectrum is vast. Within this body of work, it is possible to identify four distinct literatures (National Research Council, 2001): (i) research attempting to describe and explain the neurological, behavioural and developmental characteristics of individuals on the autistic spectrum, (ii) research addressing issues that relate to diagnosis (in particular early diagnosis), (iii) research examining the effects of comprehensive 'treatment' programmes designed for individuals on the autistic spectrum, and (iv) research evaluating the impact of specific approaches that focus on certain aspects of an individual's behaviour, such as social skills. The broad aim of this article is to provide a critical perspective on research areas (iii) and (iv). More specifically, we hope to outline the theoretical and methodological limitations of such research, highlight gaps in the current literature, and provide a tentative framework for future work in this area.

It should be noted at the outset that the scope of this article is not fully comprehensive, nor is it intended to be. Recent examples of thorough reviews of the literature in this area are abundant (e.g. Heflin & Simpson, 1998; Jordan, Jones & Murray, 1998; NRC, 2001), and it would be a meaningless exercise to recite material that has already been given adequate coverage elsewhere. Rather, we take a more focused approach, in which space is given to explore some of the key theoretical and methodological issues in detail. As such, we analyse examples of research that are *typical* of the field (we therefore acknowledge that there are always going to be notable exceptions to the points made). Furthermore, whereas other reviews give precedence to 'what works?' over concerns about the quality and nature of research, we believe it is necessary to take the opposite approach. On balance, it is only truly possible to interpret the success of a given approach or intervention if one is cognizant of the efficacy of the methods by which 'success' is measured.

Defining 'Autistic Spectrum Disorders' and 'Interventions'

It is important for the sake of clarity to define exactly what is meant by the term 'autistic spectrum disorders' (herein referred to as 'ASD'). Since Kanner's (1943) and Asperger's (1944) original descriptions of 'autistic disturbances of affective contact' and 'autistic psychopathy' respectively, our understanding of 'autism' has progressed to the point where it is seen as a spectrum of difficulties rather than a singular condition. At the lower-functioning end of the spectrum are those who would previously have been described as having 'classic' (or, 'Kanner's') autism, many of whom fail to develop functional speech (Howlin, 1998a) and often have additional learning disabilities (Grofer-Klinger & Dawson, 1996). At the other end of the spectrum are those described as having Asperger syndrome and high-functioning autism, who usually develop adequate linguistic and intellectual faculties

(Wing, 1991). All individuals on the autistic spectrum share a common difficulty in making sense of the world. More specifically, they experience problems in communication and social development, and often display ritualistic and stereotyped behaviour and resistance to change (Howlin, 1998a).

Most individuals with ASD are likely to have special educational needs that require additional and special educational intervention to be made, although not all will require a statement of Special Educational Needs (Jordan *et al*, 1998) (indeed, there are a significant number of individuals with ASD, such as Temple Grandin and Wendy Lawson, who have achieved a great deal and for whom autism is *not* synonymous with special educational needs). The nature of educational placement and intervention is dependent on a number of factors, including the child's age, their strengths and weaknesses, the nature and extent of the difficulties associated with their ASD, the presence or absence of additional learning disabilities (Jones, 2002), the nature and level of provision available in the local area (DfES/DoH, 2002), the views of the parents, the views of the child, and the views of other key stakeholders (such as educational psychologists) (DfES, 2001). Based on such factors, a child or young person with ASD may be placed in a mainstream school, a school for children with moderate or severe learning difficulties, another type of special school or unit (e.g. a language unit), a specialist unit or school for ASD (run either by the local authority or an independent organisation), or receive home-based programmes (e.g. Applied Behavioural Analysis) (Jordan *et al*, 1998; DfES/DoH, 2002). The nature of the intervention which is pursued within these settings can take many forms (see Box 1) and have different goals. At the root of all of these goals, though, are "societal desires and expectations about the benefits of education for all children, and assumptions about what is important and what is possible to teach children with autistic-spectrum disorders" (NRC, 2001, p.40).

> Aromatherapy, art therapy, behaviour modification (for teaching skills or managing behaviour), computer assisted learning, Daily Life Therapy, drama therapy, Early Bird, early intensive behavioural intervention (e.g. Applied Behaviour Analysis), facilitated communication, floor time (the Greenspan approach), Geoffrey Walden approach, Hanen programme, holding therapy, Makaton signing and symbols, massage, the Miller method, music therapy, musical interaction therapy, Option method, picture exchange communication system (PECS), sensory integration, Sherborne movement, social stories, speech and language therapy, treatment and education of autistic and communication handicapped children (TEACCH).

Box 1. The range of intervention approaches for children with autistic spectrum disorders.

In scoping the literature in this area we relied on three main sources of information: (i) our own professional knowledge and that of our colleagues, (ii) online searches of relevant databases (e.g. Psycinfo, ERIC), and (iii) library

catalogue searches. Although our focus was primarily on empirical research articles, we also studied elements of the professional literature, along with relevant policy documents (e.g. good practice guidelines), in order to contextualise our findings. The literature base from which this article is written therefore includes existing large-scale reviews (e.g. Jordan *et al*, 1998), reports of empirical research (e.g. Salt, Shemilt, Sellars, Boyd, Coulson & McCool, 2002), professional literature relating to practical issues in intervention (e.g. Seach, 1998), and government policy documentation (e.g. DfES/DoH, 2002).

The field of education is now placing greater emphasis than ever before on identifying practices that have scientific evidence for their effectiveness (Shavelson & Towne, 2002), and it is therefore unsurprising that a great number of investigations have been carried out in this area. Given this, what is surprising is the number of approaches outlined in Box 1 for which there exists little or no research evidence. Examples include aromatherapy, art therapy, Option method, and holding therapy (Task Force on Autism, 2001). For others, a research base exists, and the aim of the following two sections of this article is to provide a critical perspective on this work. As noted by several authors (e.g. Dempsey & Foreman, 2001; NRC, 2001), 'intervention programmes' for children and young people with ASD can be broadly differentiated between those that are 'comprehensive' packages and those that focus specifically on certain aspects of development, such as the ability to establish joint attention. There is also an important distinction to be made between the 'psycho-educational' interventions considered in this article, and other approaches – such as dietary and psychopharmacological interventions. However, even these simple dichotomies may be misleading; it is well established that in practice approaches are often used in tandem, meaning that practitioners implementing comprehensive programmes may also make use of one or more specific approaches (the implications of such practices for research evaluations will be discussed later).

Research on Comprehensive Programmes

Comprehensive approaches are those which attempt to address a range of developmental capacities, emphasize early intervention, provide intensive intervention (usually at least 20 hours per week), actively involve families, and utilise staff who are trained and specialised in ASD (NRC, 2001). The most commonly used comprehensive approaches in the UK are early intensive behavioural intervention (e.g. Applied Behavioural Analysis) (Lovaas Institute for Early Intervention, 2003) and Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH) (Division TEACCH, 2003) (Jordan & Jones, 1999), and these will provide the focus for this section. Other comprehensive approaches, such as Daily Life Therapy (Boston Higashi School, 2003), are not considered in any depth here because they are not as widely available in the UK. The reader is pointed towards NRC (2001) or Wolery and Garfinkle (2002) for full listings of such programmes.

Early Intensive Behavioural Intervention (EIBI)

The many variants of early intensive behavioural intervention in autism originate from the work of Lovaas (1987), who pioneered the UCLA Young Autism Project. It is a behavioural approach that focuses on specific behaviours rather than the diagnostic entity of autism. It is underpinned by the theory that human behaviour is learned and is governed by its antecedents and consequences. The programme assumes that children can learn new skills by modification of stimuli and presentation of immediate reinforcement (the approach is therefore based on operant conditioning principles). The goal of EIBI is to shape a large number of adaptive behaviours by reinforcing increasingly closer approximations of target behaviours. These behaviours are taught in drills on a 1:1 basis (and at times, 2:1) for between 20-30 hours per week. As an early intervention strategy, EIBI is usually conducted with children between the ages of 2 and 4 (although there are examples in the research base of children aged 5 and above participating).

The first published research evaluation of EIBI was produced by Lovaas (1987). In the years that have followed, a large number of further studies have attempted to examine the efficacy of this approach, using a variety of research designs (e.g. Birnbrauer & Leach, 1993; McEachin, Smith & Lovaas, 1993; Smith, Groen & Wynn, 2000; Trigonaki & Farrell, 2002). All such studies have been experimental in nature, and are typically characterised by phase-change AB designs (wherein a baseline period measure is taken, followed by a measure taken immediately after an intervention period) and quasi-experimental between-participants designs (wherein the 'progress' of those undergoing EIBI is measured against one or more 'control' groups who receive a different or no form of intervention). Outcome measures in such studies include some or all of the following: cognitive/intellectual status, developmental and adaptive behaviours, post-intervention placement, and changes in diagnostic classification/reduction of autistic symptoms (Wolery & Garfinkle, 2002).

Although few studies have been able to replicate the level of success claimed in Lovaas' (1987) original work, most have reported favourable outcomes for children undergoing EIBI. Indeed, in a review of EIBI studies, Green (1996) reported that such interventions, "…can produce large, comprehensive, lasting and meaningful improvements in many important domains for a large proportion of children with autism" (p.38). Further, another extensive review by Hall (1997) led to the conclusion that EIBI provides, "…a menu of strategies demonstrated to be effective with people with autism to reduce stereotypic behaviours and to increase language and social initiation skills" (p.150). A recent example of research findings that are typical of the field are seen in Sallows and Graupner (1999). They examined the progress of 24 children (aged 24-42 months at pre-test) involved in the Wisconsin Young Autism Project. After 1 year of treatment, the average IQ increased from 49 to 71, the average one-year Vineland composite score increased from 15 to 31 months, and average gains in language were 13 months in comprehension and 8 months in expressive skills. Comparison with a control group for the IQ

measure revealed that children receiving standard special education services dropped 8 points from pre- to post-test.

Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH)

The theoretical underpinning of the TEACCH approach is that an understanding and consequent response to an individual's ASD (in particular the relative strengths that he/she may exhibit) is the key to effective teaching (and, subsequently, favourable outcomes) (Division TEACCH, 2003; Siegel, 2000). Thus, it is considered that children with ASD will benefit from a highly structured teaching approach that provides routine and predictability in visually (rather than auditory) based environment. A key component of TEACCH is 'direct instruction' – this involves organising the classroom (space), the day (time, routine), and the activities (pace and duration) for the child with ASD. Siegel (2000) states that, "visual aides are heavily emphasized with students using picture schedules and other cues to signal the beginning and ending of activities, steps in a task, and the sequence of activities in a typical day. Areas of the classroom are clearly demarcated to call attention to their purpose and types of activities that can take place there" (p.23).

The first published research evaluation of the TEACCH programme was produced by Schopler, Mesibov, Devellis and Short (1981), and a variety of studies have followed over the last 20 years (Division TEACCH, 1996; Jordan *et al*, 1998). Research designs in this area are extremely mixed; many are simply follow-up studies of groups of individuals with no control group or baseline period (e.g. Venter, Lord & Schopler, 1992), whilst others have implemented the aforementioned phase change (e.g. Short, 1984; Panerai, Ferrante & Caputo, 1997) and quasi-experimental between-participants (e.g. Panerai, Ferrante & Zingale, 2002) designs. Outcome measures in TEACCH evaluations have included parental ratings of satisfaction, staff ratings of improvement, family stress measures, cognitive/intellectual status, and developmental and adaptive behaviours.

As with EIBI, research reports on TEACCH generally report favourable outcomes. Indeed, in summarising the TEACCH research body, Howlin (1997) states, "In the hands of skilled teachers there is little doubt that such a framework for teaching has many advantages" (p.65). Further, Panerai, Ferrante and Zingale (2002) suggest, "Many studies have shown the effectiveness of the programme in children with autism and severe intellectual disability… [and] in high-functioning autistic students with Asperger syndrome" (p.319). A recent example of research findings that are typical of the field are seen in Panerai *et al* (2002). Using a quasi-experimental approach, they measured the progress of 8 children with autism and intellectual disabilities participating in the TEACCH programme. A control group of 8 children (matched by gender, chronological and mental age, and nosographic diagnosis) undergoing a 'non-specific' approach were used for comparison. After 1 year of participating in TEACCH, the experimental group showed significant gains in imitation, perception, gross motor skills, hand-eye co-

Paper Presented at the AARE Annual
Conference, Adelaide 2006
Australian Association
for Research in Education

ordination, cognitive performance, and developmental age (as measured by the Psycho-Educational Profile), compared to significant gains in only hand-eye co-ordination in the control group. The experimental group also made more significant gains in several adaptive behaviours (as measured by the Vineland Adaptive Behaviour Scale) such as play and leisure, compared to little progress in the control group.

Research on Specific Approaches

Alongside the 'comprehensive' approaches to autism, there exists a huge research base for strategies that seek to facilitate specific behaviours, skills or areas of development. Examples include research on teaching children with ASD theory of mind skills (Hadwin, Baron-Cohen, Howlin & Hill, 1996), collateral skills interventions to facilitate social interactions (Koegel, Camarata, & Valdez-Menchaca,1998), social skills interventions (Krasny, Williams, Provencal and Ozonoff, 2003) and sensori-motor therapies that aim to improve sensory and motor development (Baranek, 2002). The bulk of these approaches fall into two domains: (a) social communication and social development, and (b) reducing challenging/problem behaviour.

As atypical social communication and development form the cornerstone for a diagnosis of ASD, a great deal of research has been done on specific interventions in this area. Three recent review articles (Krasny *et* al, 2003; Goldstein, 2002; McConnell, 2002) have examined the research published. Outcome measures vary from study to study (and approach to approach), and include number of social interaction initiations, observed quality of social interactions, and expressive and receptive functional vocabulary amongst others. A recent example of research in this area that is typical of the field is seen in Charlop-Christy, Carpenter, Le, LeBlanc and Kellet (2002). Using a multiple baseline design, the authors examined the effects of Picture Exchange Communication System (PECS) training on the emergence of speech in play and academic settings in three children with autism. PECS is a behaviourally based programme that teaches children to exchange a picture card for something that they like or want, thus providing a means of access for social communication (Bondy & Frost, 1994). Charlop-Chrisy *et al* (2002) found that training in PECS led to increases in spontaneous speech, imitation, mean length of utterances, requests and initiations, and establishment of joint attention in all 3 children. These effects were also observed at 10-month follow-up (although only 1 of the 3 children participated in this phase of the research).

Approaches to dealing with problem behaviours (e.g. stereotypy, self-injury, aggression) in ASD have also been well researched, although it should be stated from the outset that the majority of the strategies described are not uniquely successful for children with autism. Two recent reviews of the research in this area are Carr, Horner, Turnbull, Marquis, Magito-McLaughlin, McAtee, Smith, Anderson-Ryan, Ruef, and Doolbah (1999), and Horner, Carr, Strain, Todd and Reed (2002). Outcome measures for the majority of the studies examined focused inevitably on the reduction of problem behaviours (usually expressed as a percentage). Horner *et al* (2002) state that, "the one

consistent finding has been that interventions developed from functional assessment information appear more likely to result in significant behaviour reduction" (p.434). Functional assessment is the method of identifying the variables that reliably predict and maintain challenging behaviours. A recent example of research in this area that is typical of the field is seen in Galiatsatos and Graff (2003). In a single-subject AB phase change design, the authors used functional analyses to develop hypotheses about the causes of (and develop an intervention programme to address) screaming in a 13-year-old boy with autism and PDD-NOS. Highest rates of screaming were observed when toys and food were removed, and when teacher attention was diverted to other students. An intervention programme using differential reinforcement of other behaviour (DRO) was implemented, leading to a 50% reduction in screaming within four weeks. A two-year follow-up revealed that the programme was still extremely successful – screaming occurred at near-zero rates.

Methodological Concerns and Limitations

There are a variety of methodological issues that limit our interpretations of the efficacy of the approaches examined in this field. Firstly, with regard to comprehensive approaches, many evaluations use IQ as a primary measure of treatment efficacy. Intelligence tests have known and important limitations in measuring outcomes for children on the autistic spectrum (Charman & Howlin, 2003), including the fact that many call for rapid shifts in material use and responses (problematic for children who rely on routine to make sense of the world) (Wolery & Garfinkle, 2002). Further, gains in such test scores could easily be interpreted as simply reflecting changes in the child's ability to conform. It should, however, be noted that there is evidence to suggest that developmental intelligence levels are strong predictors of treatment outcome (Gabriels, Hill, Pierce, Rogers & Wehner, 2001). Secondly, few studies, whether examining comprehensive or specific approaches, measure outcomes using individuals who are blind to the treatment status of the participants and independent of the research team. This concern is of particular importance given the emotive context of the research in this area, and the tendency for the majority of research on a particular approach to be carried out primarily by its proponents. Independent measurement of outcomes would lend credence to findings and reduce any bias of interventionists to teach to the test or to lean in favour of one group over another (Kasari, 2002).

It should also be noted that a significant proportion of the research in this area has been conducted without reference to any comparison group or other treatment model (although there are, of course, notable exceptions). Without such design considerations, the positive effects found cannot be unequivocally attributed to the effects of the programme. Many studies conducted have failed to control for a range of possible confounds, chief amongst which is the intensity of the approach used. This is a particularly important point for research involving EIBI (or similar) approaches, in which intensity of treatment, rather than the treatment approach per se, may underlie progress (Jordan *et al*, 1998). It should be noted, however, that in

the rare examples of studies in which intensity is controlled for (e.g. Eikeseth, Jahr, Smith & Eldevik, 2002), EIBI approaches still produce favourable results (Sallows, 2000).   Related to this, proper documentation of the actual approaches used needs to be made.   As Goldstein (2002) states, "the descriptions of the actual training procedures used by investigators are often quite sketchy" (p.391). This point is, again, particularly pertinent for the EIBI field, within which there exist a number of variations in terms of models of service delivery (Harris & Delmolino, 2002). In relation to research involving specific approaches, many studies fail to address what *specific* processes may be responsible for gains reported, e.g. are treatment effects truly reflective of the intervention, or do other, mediating variables (such as parental expectations or maturation) have a role to play?   Further, documentation of fidelity checks (ensuring the strategy is conducted in the manner it was intended) also need to become a standard of research reports. In a recent review, Kasari (2002) found that only 1 in 10 studies in this field provided evidence that such checks had taken place.

In relation to the samples used in this research field, there is a paucity of adequate summaries of developmental levels and severity of impairments of participants. Without such information, it is impossible to know to whom the results of the study apply. Further, clear documentation of the participant selection process should always be made; this transparency will enable those reading the research to evaluate its external validity (since, after all, researchers can carefully select their participants – education services must provide for all). There is also great variability in terms of randomisation and matching procedures, again leading to the possibility of confounding variables or rival explanations of results. However, the notion of randomisation itself carries with it a dangerous assumption – that when random assignment to treatment groups occurs, the groups will be equivalent. In this particular literature, in which sample sizes tend to be relatively small, it is up to the researcher to demonstrate that the groups are equivalent on major variables that might affect outcome.

In terms of actual sample size, the research in this area generally ranges from examination of single cases to groups of 8-16 individuals. Whilst the research designs generally associated with the variety of sample sizes observed all have their individual merits (e.g. single-case experimental designs generally maintain high internal validity), acknowledgement also needs to be made of their inherent problems, e.g. small samples can limit the extent to which researchers can examine individual characteristics that affect intervention outcomes, and can be limiting from a statistical power perspective (Charman & Howlin, 2003). Kasari (2002) suggests that sample sizes can be increased by employing multi-site designs involving several independent teams of researchers working collaboratively to examine intervention questions. However, it should be noted that larger samples may result in issues of treatment integrity (e.g. the extent to which the treatment is replicated in different environments) (Papps & Dyson, 2004).

Theoretical and General Limitations

This section of the article addresses more general and theoretical concerns with research on the interventions for children and young people on the autistic spectrum. Whilst some of these are grounded in methodology, we see them as being distinct from the methodological issues already raised in that they are more to do with the assumptions and implications of certain research models, rather than the 'technical' details of research design. Primarily, our major concern regarding research in this field is that the vast majority of studies are experimental in nature. Whilst such research is useful, and has traditionally been considered scientifically and methodologically 'rigorous' (although, as has been shown in the previous section, this is not always the case), external validity is a concern. Indeed, the more scientifically and methodologically rigorous an experimental approach is (e.g. appropriate sample sizes, randomisation/matching procedures, utilisation of alternative treatment/comparison groups, control of possible confounds, independent measurement of outcomes), the more detached it becomes from the extremely complex context within which the intervention takes place. Further, some methodologically rigorous design procedures, such as random assignment, may not be ethically acceptable (Papps & Dyson, 2004). Finally, with specific reference to experiments involving groups, there is an implicit assumption of homogeneity in a population who are anything but. As McConachie (2002) argues, "[the] experimental method asks a question about group effect, whereas children with autism vary tremendously as individuals and in their developmental course" (p.196).

A further concern regarding applying the experimental paradigm to interventions for children on the autistic spectrum relates to the growing push for comparative studies, in which the effects of several interventions are directly compared (e.g. Jordan *et al*, 1998; Jordan & Jones, 1999). Whilst there are several sound methodological reasons for such research, there are also a number of associated problems. Rigorously designed comparative studies, by their very nature, imply that the goal of research in this area is to find the single 'best approach'. This is misleading. As Howlin (1998b) states, "it is… important to help parents understand that there can be no universal panacea" (p.308). Indeed, research has supported the effectiveness of a range of approaches (Dawson & Osterling, 1997). Further, educators rarely adopt a 'single approach' in practice (Gabriels *et al*, 2001; Sallows, 2000; Siegel, 2000). As Stahmer, Collings and Palinkas (2005) report, "[practitioners] combine and modify these techniques based on child, personal and external factors" (p.66). Furthermore, the lines that distinguish between approaches that are identified as being 'different' from one another can be extremely blurred (e.g. some contemporary EIBI approaches share many characteristics with developmental approaches) (Prizant & Rubin, 1999). What is perhaps needed, then, is more research that examines how approaches can be effectively combined in practice. For example, one study has suggested that an EIBI-based classroom approach used in conjunction with the TEACCH approach produces a greater success rate (for imitation, fine and gross motor skills, and non-verbal communication) than EIBI alone (Ozonoff and Cathcart, 1998). Furthermore, the South West Autism Project, considered to be an extremely successful endeavour (with developmental quotient gains of 45 points for one-third of the sample, and 20 for half of the

Paper Presented at the AARE Annual
Conference, Adelaide 2006
Australian Association
for Research in Education

sample), combined elements of behavioural approaches, intensive interaction, PECS-style picture symbols, and TEACCH-style visual timetables (Webster, 2003; Webster, Feiler & Webster, 2003). However, it is worth noting that there is also some evidence that diluting such approaches with different interventions can compromise the effectiveness of each one (Mesibov, 1998). Hence, there is a distinct need for research on how the various approaches may interact with one another.

Another more general concern regarding research in this area is the common focus on child variables and child outcomes. This trend is problematic for a number of reasons. At a general level, it reinforces the notion that the problem is rooted firmly 'within the child' and underplays, or even ignores, the impact of environmental factors (Lindsay, 2003). However, this approach also fails to consider the social validity of the research itself. Social validity examines the extent to which "individuals other than the researchers value the study goals, procedures or results" (Wolery & Garfinkle, 2002, p.466). Only a small proportion of studies (less than 10%) in a review by Wolery and Garfinkle (2002) reported social validity measures. The failure to examine the social validity of such studies not only undermines the role of research users (e.g. teachers, parents, children and young people) in the research process at a time when building meaningful partnerships is a key concern (DfES, 2003), but also means that potentially important data is lost. It should be noted, however, that some recent UK studies *have* included elements of social validity measures in their designs (e.g. Salt, Sellars, Boyd & Shemilt, 1999; West Midlands SENRP, 2001). Finally, with specific reference to early intervention, the focus on child variables/outcomes and failure to consider *family* variables (such as family structure, socioeconomic status, parent education and occupation, formal and informal support, additional stressors on the family) provides an extremely narrow view of the intervention process (Prizant & Rubin, 1999). The importance of examining family variables cannot be understated, especially given the evidence from research with children with a range of disabilities that suggests that such factors are the best predictors of early intervention outcome (Shonkoff, Hauser-Cram, Krauss & Upshur, 1992).

It is also important to discuss the theoretical and practical limitations of the approaches under scrutiny. Since, as already mentioned, EIBI and TEACCH are the most widely used in the UK, discussion of these will be our primary focus. Regarding EIBI, a major concern is the under-appreciation of some advocates (e.g. Smith, 1996) of the contributions of other disciplines/intervention approaches. EIBI is often heavily promoted as *the* approach for autism (Prior, 2004; Shea, 2004; Siegel, 2000) It should be noted, however, that some authors (e.g. Sallows, 2000) have suggested that this is a fallacy, and that EIBI is often used in conjunction with augmentative communication strategies (such as the aforementioned PECS) *where this is deemed appropriate*. What does remain somewhat troublesome is the notion that EIBI can be used to address all aspects of the challenges associated with ASD (Prizant & Rubin, 1999). It is clear that different aspects of functioning may require different approaches than the discrete-trial format that characterises traditional EIBI. A possible case in point is the development of language, in which the EIBI approach (where words are built up from imitated

sounds) has been criticised for failing to address functional, intentional and pragmatic aspects of language (Jordan *et al*, 1998). It has been suggested that the discrete trial approach is directly responsible for the lack of generalisation of communicative use of language in many children undergoing EIBI (Prizant & Rubin, 1999; Prizant & Wetherby, 1998; Schreibman, 2000). Further, EIBI has been widely criticised because of the intensive and intrusive nature of its format and delivery (Schoen, 2003; Siegel, 2000). It should be noted that these concerns are not solely related to the use of aversives, which are no longer a part of EIBI practice (other than a firm "No") (Jordan *et al*, 1998). Rather, they are related to the irrefutable emotional, physical and financial costs of the approach. Proponents of this approach reject such concerns, claiming that they are based on outdated information and misunderstandings about the Lovaas model (Sallows, 2000; Lovaas, 2000).

The TEACCH approach is also not without criticisms. The main concern with the approach is the underlying philosophy regarding the prognosis for individuals with autism. Proponents believe that ASD cannot be remediated, and must therefore be accommodated (Sallows, 2000). Consider the following quote, "With the exception of a very few high-functioning individuals, our students' difficulties… will be a lifelong handicap" (Watson, Lord, Schaffer & Schopler, 1989, p.6). The goal of TEACCH, therefore, is not to treat autism, but to provide a "prosthetic environment" (Jordan *et al*, 1998, p.79) in which many of the child's difficulties can be circumvented. As such, the approach has drawn criticism for 'giving in' to autism (Siegel, 2000). The philosophy is also at odds with numerous examples in the research literature of interventions where some aspects of participants' ASD were successfully remediated (even in the long-term) (e.g. Greenspan, Wieder & Simons, 1998; Howlin, Baron-Cohen & Hadwin, 1999). Related to this, the underlying philosophy of TEACCH necessitates lifelong care (in the form of the TEACCH environment); indeed, Jordan *et al* (1998) describe it as providing "a continuity of services from preschool to adult life" (p.79). To some (e.g. Sallows, 2000), this indicates little belief or expectation that an individual with autism can ever function independently in society. As Sallows (2000) states, these views are "somewhat out of step with current thinking in the field of autism" (p. 26). This is somewhat controversial though – proponents of TEACCH argue that the approach promotes independence and does not presume that every individual will need to make use of the aforementioned services.

A final concern regarding the research in this area relates to the way in which certain findings are often misleadingly publicized as compelling evidence for the adoption of a particular approach. A strong case in point is EIBI (Shea, 2004), in which claims of 'recovery' and 'normal functioning' have been reported in up to 47% of cases (Lovaas, 1987). Despite such claims having been shown to be erroneous (see Shea, 2004), they are still frequently cited within the psychological, educational and advocacy communities. The dangers inherent in this are self-evident.

Gaps in the Literature and Directions for Future Research

There has been a great deal of high quality research in this area. It is clear from the preceding sections, however, that there is still much to be done. As Jordan and Jones (1999) report, "no approach has been entirely successful in producing methodologically sound evaluation" (p.106). Researchers examining the efficacy of approaches to educating individuals on the autistic spectrum face a difficult challenge. Whilst all should strive to meet the theoretical and methodological challenges laid out in papers such as this, they must also strike a balance with what is practical, ethical and possible within the difficult and complex environments in which the research takes place. As such, a primary direction for future research should be an increase in collaboration and communication among researchers (and, indeed, between researchers and research users), which will undoubtedly facilitate better quality research.

In examining the literature in preparation for writing this article, we identified two key areas in which there were very clear 'gaps': research on the teaching and learning for children and young people with Asperger syndrome/high-functioning autism, and research on individualised approaches to intervention. We hope, through examining the issues surrounding these areas and building clear rationales, to stimulate research to effectively 'fill' them. These are by no means the *only* two gaps in the literature; rather, they should be regarded as examples of some of the missing pieces of the puzzle.

With regard to research on the teaching and learning for children and young people with Asperger syndrome/high-functioning autism, we were struck by the fact that much of the research on intervention centres on approaches that were developed with children with more severe ASD in mind (e.g. those referred to as having 'classic' or 'Kanner's' autism), such as the aforementioned applied behavioural analysis. By contrast, there has been little research on the effective education of those at the higher-functioning and more verbal end of the spectrum. As Howlin (1998b) states, "our knowledge of how to help this particular group [those with AS/HFA] effectively lags far behind" (p.317). In particular, we know very little about how to provide effectively for such individuals in mainstream schools (Davis & Florian, 2004). This has become more pertinent issue in recent years, in which there has been a significant increase in attempts to educate pupils on the autistic spectrum in inclusive settings[1]. Successful inclusion of such pupils in mainstream education is both a challenging and rewarding endeavour, but the current body of knowledge in this area indicates that a great deal of work needs to be done to meet their needs effectively. For instance, several authors (e.g. Bauminger and Kasari, 2000; Connor, 2000; Ochs, Kremer-Sadlik, Solomon and Sirota, 2001) have noted that social isolation, loneliness and bullying are commonplace for pupils on the autistic spectrum who attend mainstream schools. Further, research has indicated that although many

---

[1] This is a result of two interconnected factors: (a) the growing momentum for mainstream inclusion of children and young people with special educational needs (e.g. Farrell & Ainscow, 2002), and (b) the growing realisation that grouping pupils with ASD together in classes (as happens in specialist schools) may not always be in the best interests of the child (Connor, 1999).

teachers in mainstream schools are firmly committed to inclusive principles, they do not feel that they have the necessary training and support to adequately provide for such pupils (Ministerial Advisory Committee for Students with Disabilities, 2000; Robertson, Chamberlain and Kasari, 2003). Such findings indicate that whilst children and young people on the autistic spectrum may be increasingly enrolled as pupils at mainstream schools, they still face a number of barriers that may prevent them from making the most of their education. As Ochs *et al* (2001) state, "physical placement of children [on the autistic spectrum]… in inclusive educational settings *alone* is not sufficient" (p.400). Clearly, there is a need for research on how such problematic issues can be best addressed in practice.

The need for research on a more individualised approach to interventions for pupils with ASD is based on the fact that, as already mentioned, there is not and will never be a single 'most effective' method which works with all pupils on the spectrum. As Heflin and Simpson (1998) state, "there is not a single method that should be exclusively used to meet the varied needs of children and youth with autism and their families… the most effective programs for students with autism are those that incorporate a variety of best practices" (p.207). Research in this area has progressed to a point that as a community of researchers and research users, we have a fairly good idea about what such best practices are (see next section). The logical next step is to embark on detailed, systematic, collaborative inquiries which examine how approaches can be developed, combined, modified and implemented in the complex array of educational settings, contexts and circumstances in which children and young people with ASD find themselves (Schreibman, 2000; Schoen, 2003) - through examination of individualised approaches. Hurth *et al* (1999) describe individualisation as referring to,

> "adjustments in goals, intervention strategies, and evaluation criteria for each child and family receiving services. Individualisation means that each child and family's program is determined by the child's needs, strengths, and interests and the family's concerns, priorities and resources… [individualisation] also means that families have a decision-making role and that each family's individual needs for support and participation are honoured." (p.21)

Further research on individualised approaches would redress the current imbalance between what happens in practice and what is represented in the research literature. For instance, developmental programmes such as that reported by the Scottish Centre for Autism, place a great deal of emphasis on individualisation of treatment (Salt, Shemilt, Sellars, Boyd, Coulson & McCool, 2001), but empirical reports relating to them focus on outcome measures (e.g. Salt, Shemilt, Sellars, Boyd, Coulson & McCool, 2002). Likewise, although there is a great deal of experimental group research on Applied Behavioural Analysis, there is little that has explored the process of tailoring the behavioural programmes to meet the needs of the individual. As any therapist will testify, EIBI is not an 'out of the box' package; successful programme implementation is a dynamic process involving complex and continual

assessment of the child's (and family's) needs, and modification and adaptation of programme content (including drawing upon other techniques, such as PECS, where necessary).

In conclusion, we suggest that whilst there are clearly difficulties associated with interpreting the results of research in this area, this does not necessarily have to detract from how such work can be used to inform practice. Through meaningful collaboration between researchers, educators, parents, other professionals and individuals with ASDs themselves, we can develop more effective provision for those on the autistic spectrum which allows them to achieve their full potential. This process will undoubtedly be one marked by change, discovery and innovation.

References

Asperger, H. (1944) Die 'autistischen psychopathen' im kindesalter, *Archiv fur Psychiatrie und Nervenkrankheiten*, 117, 76-136.

Bauminger, N. & Kasari, C. (2000) Loneliness and friendship in high-functioning children with autism, *Child Development*, 71(2), 447-456.

Baranek, G. T. (2002) Efficacy of sensory and motor interventions for children with autism. *Journal of Autism and Developmental Disorders*, 32(5), 397-422.

Birnbrauer, J. & Leach, D. (1993). The Murdoch early intervention programme after two years. *Behavior Change*, 10(2), 63-74.

Bondy, A. & Frost, L. (1994). The picture exchange communication system. *Focus on Autistic Behaviour*, 9, 1-19.

Boston Higashi School (2003). *Daily Life Therapy: A Unique Educational Approach*, www.bostonhigashi.org/html/dlt.html, accessed on 13/11/03.

Carr, E.G., Horner, R.H., Turnbull, A.P., Marquis, J.G., Magito-McLaughlin, D., McAtee, M.L., Smith, C.E., Anderson-Ryan, K.A., Ruef, M.B. & Doolbah, A. (1999). Positive behaviour support for people with developmental disabilities: a research synthesis. *American Association on Mental Health Monograph Series*, Washington DC, AAMH.

Charlop-Christy, M. H., Carpenter, M., Le, L., LeBlanc, L. A. & Kellet, K. (2002). Using the Picture Exchange Communication System (PECS) with children with autism: assessment of PECS acquisition, speech, social communicative behaviour, and problem behaviour. *Journal of Applied Behavior Analysis*, 35(3), 213-231.

Charman, T. & Howlin, P. (2003). Research into early intervention for children with autism and related disorders: methodological and design issues. *Autism*, 7(2), 217-225.

Connor, M. (1999) Children on the autistic spectrum: guidelines for mainstream practice, *Support for Learning*, 14(2), 80-86.

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

Davis, P. & Florian, L. (2004) *Teaching Strategies and Approaches for Pupils with Special Educational Needs: A Scoping Study*, Research Report 516, Nottingham: DfES Publications.

Dawson, G. and Osterling, J. (1997). Early intervention in autism: Effectiveness and common elements of current approaches. In Guralnick, M.

J. (ed.) *The Effectiveness of Early Intervention*, pp. 307-326. Baltimore, MD: Paul H. Brookes.

Dempsey, I. & Foreman, P. (2001). A review of educational approaches for individuals with autism. *International Journal of Disability, Development and Education*, 48(1), 103-116.

Department for Education and Skills (2001) *Special Educational Needs Code of Practice*. Nottingham: DfES.

Department for Education and Skills (2003) *Learning in Partnerships Toolkit*, accessed at www.dfes.gov.uk/learningparttoolkit, November 2003.

Department for Education and Skills/Department of Health (2002). *Autistic Spectrum Disorders: Good Practice Guidance*. Nottingham: DfES.

Division TEACCH (1996). *TEACCH Research Report: Current and Past Published Research on Autistic Children and Their Families*. Chapel Hill, NC: Division TEACCH.

Division TEACCH (2003) *Treatment and Education of Autistic and Related Communication Handicapped Children*, www.teacch.com, accessed on 13/11/03.

Eikeseth, S., Smith, T., Jahr, E. & Eldevik, S. (2002) Intensive behavioral treatment at school for 4- to 7-year-old children with autism: A 1-year comparison controlled study, *Behavior Modification,* 26(1), 49-68.

Farrell, P. & Ainscow, M. (eds.) (2002) *Making Special Education Inclusive*, London, David Fulton.

Gabriels, R. L., Hill, D. E., Rogers, S. J., & Wehner, B. (2001). Predictors of treatment outcome in young children with autism. *Autism*, 5(4), 407-429.

Galiatsatos, G. T. & Graff, R. B. (2003). Combining descriptive and functional analyses to assess and treat screaming. *Behavioral Interventions*, 18, 123-138.

Goldstein, H. (2002) Communication intervention for children with autism: a review of treatment efficacy, *Journal of Autism and Developmental Disorders,* 32(5), 373-396.

Green, G. (1996) Early behavioural intervention for autism, in C. Maurice (ed.) *Behavioural Intervention for Young Children With Autism*, 15-28, Austin TX, Pro-Ed.

Greenspan, S. I., Wieder, S. & Simons, R. (1998). *The Child with Special Educational Needs: Encouraging Intellectual and Emotional Growth*. Reading, MA: Perseus.

Grofer-Klinger, L. & Dawson, G. (1996). Autistic disorder. In Mash, E. & Barkley, R. A. (eds.). *Child Psychopathology*, 311-339. New York: Guilford Press.

Hadwin, J., Baron-Cohen, S., Howlin, P. & Hill, K. (1996) Can we teach children with autism to understand emotions, belief or pretence? *Development and Psychopathology,* 8(2), 345-365.

Hall, L. J. (1997) Effective behavioural strategies for the defining characteristics of autism, *Behavior Change*, 14, 139-154.

Harris, S. L. & Delmolino, L. (2002) Applied behaviour analysis: its application in the treatment of autism and related disorders in young children, *Infants and Young Children*, 14(3), 11-17.

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

Horner, R.H., Carr, E.G., Strain, P.S., Todd, A.W. & Reed, H.K. (2002) Problem behaviour interventions for young children with autism: a research synthesis, *Journal of Autism and Developmental Disorders*, 32(5), 423-446.

Howlin, P. (1997). Prognosis in autism: do specialist treatments affect long-term outcome? *European Child and Adolescent Psychiatry*, 6, 55-72.

Howlin, P. (1998a). *Children with Autism and Asperger Syndrome*. London: Wiley.

Howlin, P. (1998b). Practitioner review: psychological and educational treatments for autism. *Journal of Child Psychology and Psychiatry*, 39(3), 322.

Howlin, P., Baron-Cohen, S. & Hadwin, J. (1999). *Teaching Children with Autism to Mind-Read*. New York: Wiley.

Hurth, J., Shaw, E., Izeman, S. G., Whaley, K. & Rogers, S. (1999) Areas of agreement about effective practices among programs serving young children with autistic spectrum disorders, *Infants and Young Children*, 12(2), 17-26.

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

Jordan, R. & Jones, G. (1999). Review of research into educational interventions for children with autism in the UK. *Autism*, 3(1), 101-110.

Jordan, R., Jones, G. & Murray, D. (1998). *Educational Interventions for Children with Autism: A Literature of Recent and Current Research* (DfEE Research Report RR77). Nottingham: DfEE.

Kanner, L. (1943). Autistic disturbances of affective contact. *Nervous Child*, 2, 217-250.

Kasari, C. (2002) Assessing change in early intervention programmes for children with autism, *Journal of Autism and Developmental Disorders*, 32(5), 447-461.

Koegel, L., Camarata, S., & Valdez-Menchaca, M. (1998). Teaching children with autism to use a self-initiated strategy to learn expressive vocabulary. *American Journal of Mental Retardation, 102*, 346-357.

Krasny, L., Williams, B. J., Provencal, S. & Ozonoff, S. (2003) Social skills interventions for the autism spectrum: essential ingredients and a model curriculum, *Child and Adolescent Psychiatric Clinics of North America*, 12, 107-122.

Lindsay, G. (2003). Inclusive education: a critical perspective. *British Journal of Special Education*, 30(1), 3-12.

Lovaas, O.I. (1987) Behavioural treatment and normal intellectual and educational functioning in autistic children, *Consulting and Clinical Psychology*, 55, 3-9.

Lovaas, O. I. (2000) *Clarifying Comments on the UCLA Young Autism Project*, Los Angeles CA, University of California.

Lovaas Institute for Early Intervention (2003). *The UCLA Model of Applied Behaviour Analysis*, www.lovaas.com, accessed 13/11/2003.

McConachie, H. (2002) Appropriate research design in evaluating interventions for children with disabilities, *Child: Care, Health and Development*, 28(3), 195-197.

McConnell, S. R. (2002) Interventions to facilitate social interaction for young children with autism: Review of available research and recommendations for educational intervention and future research. *Journal of Autism and Developmental Disorders,* 32(5), 351-372.

McEachin, J., Smith, T. & Lovaas, O. I. (1993) Long-term outcome for children with autism who received early intensive behavioural treatment. *American Journal of Mental Retardation*, 97, 4, 359-372.

Mesibov, G. (1998) Formal and informal measures on the effectiveness of the TEACCH programme, *International Journal of Autism*, 1, 25-35.

Ministerial Advisory Committee: Students with Disabilities (2000) *Secondary Schooling for Students with Autism Spectrum Disorders*, South Australia, MACSD.

National Research Council (2001). *Educating Children With Autism*. Washington DC: National Academy Press.

Ochs, E., Kremer-Sadlik, T., Solomon, O. & Sirota, K. G. (2001) Inclusion as social practice: views of children with autism, *Social Development*, 10(3), 399-419.

Ozonoff, S., & Cathcart, K. (1998). Effectiveness of a home program intervention for young children with autism. *Journal of Autism and Developmental Disorders, 28* (1).

Panerai, S., Ferrante, L. & Caputo, V. (1997). The TEACCH strategy in mentally retarded children with autism: a multi-dimensional assessment pilot study. *Journal of Autism and Developmental Disorders*, 27, 345-347.

Panerai, S., Ferrante, L. & Zingale, M. (2002) Benefits of the TEACCH programme as compared with a non-specific approach. *Journal of Intellectual Disability Research*, 46(4), 318-327.

Papps, I. & Dyson, A. (2004) *The Costs and Benefits of Earlier Identification and Effective Intervention*, DfES Research Report 505, DfES: Nottingham.

Prior, M. (2004) Intensive behavioural treatment in autism, *Journal of Paediatric Child Health*, 40, 506-507.

Prizant, B. M. & Rubin, E. (1999) Contemporary issues in interventions for autistic spectrum disorders: a commentary. *Journal of the Association for Persons with Severe Handicaps*, 24(3), 199-208.

Prizant, B. & Wetherby, A. (1998). Understanding the continuum of discrete-trial traditional behavioural to social-pragmatic developmental approaches in communication enhancement for young children with autism/PDD. *Seminars in Speech and Language*, 19(4), 329-353.

Robertson, K., Chamberlain, B. & Kasari, C. (2003) General education teachers' relationships with included students with autism, *Journal of Autism and Developmental Disorders*, 33(2), 123-130.

Sallows, G. O. (2000). Educational interventions for children with autism in the UK. *Early Child Development and Care*, 163, 25-47.

Sallows, G. O. & Graupner, T. D. (1999). Replicating Lovaas' treatment and findings: preliminary results. Paper presented at *Autism 99*, November 1999.

Salt, J. Sellars, V. Boyd, S. & Shemilt, J. C. (1999) Parental evaluation of a pre-school treatment programme for autistic children, *Clinical Psychology Forum*, 132, 15-17.

Salt, J. Shemilt, J., Sellars, V. Boyd, S., Coulson, T. & McCool, S. (2001) The Scottish Centre for Autism preschool treatment programme I: A developmental approach to early intervention, *Autism*, 5(4), 362-373.

Salt, J. Shemilt, J., Sellars, V. Boyd, S., Coulson, T. & McCool, S. (2002) The Scottish Centre for Autism preschool treatment programme II: The results of a controlled treatment outcome study, *Autism*, 6(1), 34-46.

Schoen, A. A. (2003) What potential does the applied behaviour analysis approach have for the treatment of children and youth with autism? *Journal of Instructional Psychology*, 30(2), 125-130.

Schopler, E., Mesibov, G., Devellis and Short, B. (1981). Treatment outcomes for autistic children and their families. In P. Mittler (ed.) *Frontiers of Knowledge in Mental Retardation*. Baltimore, MD: University Park Press.

Schreibman, L. (2000). Intensive behavioural/psychoeducational treatments for autism: research needs and future directions. *Journal of Autism and Developmental Disorders*, 30(5), 373-378.

Seach, D. (1998) *Positive Approaches for Teaching Children with ASD*, Staffs, NASEN.

Shavelson, R. J. & Towne, L. (eds.) (2002). *Scientific Research in Education*. Washington, DC: National Academy Press.

Shea, V. (2004) A perspective on the research literature related to early intensive behavioural intervention (Lovaas) for young children with autism. *Autism*, 8(4), 349-367.

Shonkoff, J. Hauser-Cram, P., Krauss, M. & Upshur, C. (1992). Development of infants with disabilities and their families: implications for theory and service delivery. *Monographs of the Society for Research in Child Development*, 57(6), Serial Number 230.

Short, A. B. (1984) Short-term treatment outcome using parents as co-therapists for their own autistic children. *Journal of Child Psychiatry and Allied Disciplines*, 25, 443-458.

Siegel, B. (2000) Behavioural and educational treatments for autistic spectrum disorders, *Advocate: Autism Society of America*, 33(6), 22-31.

Smith, T. (1996) Are other treatments effective? In C. Maurice, G. Green & S. Luce (eds.), *Behavioural Interventions for Young Children With Autism*, pp.45-59. Austin, TX: Pro-Ed.

Smith, T., Groen, A. D. & Wynn, J. W. (2000) Randomised trial for intensive early intervention for children with pervasive developmental disorder, *American Journal on Mental Retardation*, 105(4), 269-285.

Stahmer, A. C., Collings, N. M. & Palinkas, L. A. (2005) Early intervention practices for children with autism: descriptions from community providers. *Focus on Autism and Other Developmental Disabilities*, 20(2), 66-79.

Task Force on Autism (2001). *Educational Provision and Support for Persons with Autistic Spectrum Disorders: the Report of the Task Force on Autism*. Ireland: Ministry for Education and Science.

Trigonaki, N. & Farrell, P. (2002) *The Lancashire Under Fives Autism Project and Lovaas Programmes – An Evaluation*, University of Manchester Unpublished Report.

Venter, A., Lord, C. & Schopler, E. (1992). A follow-up study of high functioning autistic children. *Journal of Child Psychology and Psychiatry*, 33, 489-507.

Watson, L. R., Lord, C., Schaffer, B. & Schopler, E. (1989). *Teaching Spontaneous Communication to Autistic and Developmentally Handicapped Children*. Austin, TX: Pro-Ed.

Webster, A. (2003) Research into practice: South West Autism Programme, *Community Care*, May 2003.

Webster, A., Feiler, A. Webster, V. (2003) Early intensive family intervention and evidence of effectiveness: lessons from the South West Autism Programme, *Early Child Development and Care*, 173(4), 383-398.

West Midlands SEN Regional Partnership (2001) *Report on Autistic Spectrum Disorders*, West Midlands: WMSENRP.

Wing, L. (1991). The relationship between Asperger's syndrome and Kanner's autism. In Frith, U. (ed.) *Autism and Asperger Syndrome*, 93-121. Cambridge: CUP.

Wolery, M. & Garfinkle, A. N. (2002) Measures in intervention research with young children who have autism. *Journal of Autism and Developmental Disabilities*, 32(5), 463-478.