The number of children diagnosed with Autism spectrum disorders (ASDs) is rising every year. Earlier one in 10,000 children are diagnosed as having an ASD. In 2010, one in 110 children is diagnosed with an ASD (Centers for Disease Control and Prevention, 2010). Data released from the CDC in April 2012 placed the prevalence of Autism in the U.S. at approximately 1 in 88 children. No data are available from India to provide an India-specific estimate of the prevalence, and it is not known whether there are variations in this rate worldwide. Of note, however, is a study conducted in South Korea that found a prevalence rate of 1 in 38. As the number of ASD cases continues to increase, Autism research focusing on prevention, treatment, and intervention is imperative and has become a high priority for research organizations. Several different research methodologies are used with individuals with ASD; each has specific advantages and disadvantages.

To know the effectiveness of different therapies provided for Autism children there are several studies done and is still going on. Autism children have problems in communication, socialization and have self-injurious and repetitive behaviours. Behaviour training has been used to improve socialization and communication and reduce self-injurious behaviours. An analysis of literature on these aspects and also on other issues like sensory issues and anxiety reveal the following aspects.
Autism is a serious psychological disorder with onset in early childhood. Autistic children show minimal emotional attachment, absent or abnormal speech, retarded IQ, ritualistic behaviours, aggression, and self-injury. The prognosis is very poor, and medical therapies have not proven effective. Lovaas (1987) examined the results of behaviour modification treatment for two groups of similarly constituted, young autistic children follow-up data from an intensive, long-term experimental treatment group \((n = 19)\) showed that 47% achieved normal intellectual and educational functioning, with normal-range IQ scores and successful first grade performance in public schools. Another 40% were mildly retarded and assigned to special classes for the language delayed, and only 10% were profoundly retarded and assigned to classes for the autistic/retarded. In contrast, only 2% of the control group children \((n = 40)\) achieved normal educational and intellectual functioning; 45% were mildly retarded and placed in language-delayed classes, and 53% were severely retarded and placed in autistic/retarded classes.

The evidence for Early and Intensive Behavioural Intervention (EIBI) for children with Autism is well founded in several efficacy studies. However, only a few studies have investigated the effectiveness of EIBI in community settings. Eikeseth et al (2012) examined whether children receiving one year of EIBI \((N = 35)\) would make larger gains in adaptive behaviours than a group of children receiving Treatment As Usual (TAU; \(N = 24)\. At intake, the groups did not differ significantly on chronological age or level of adaptive behaviour. After one year of treatment, children in the EIBI group scored significantly higher on all scales of adaptive behaviour as compared to the children receiving TAU. Moreover, children in the EIBI group showed significant improvements in adaptive behaviours, reduction in maladaptive behaviours, and Autism symptoms after one year of treatment, and this change continued into the second year of treatment, albeit
to a lesser degree. Limitations of the study include lack of independent assessments of children receiving EIBI, and lack of random assignment of participants to treatment groups.

Rogers & Vismara (2008) examined the evidence based comprehensive treatments for early Autism. The evidence suggests that early intervention programs are indeed beneficial for children with Autism, often improving developmental functioning and decreasing maladaptive behaviours and symptom severity at the level of group analysis. Whether such changes lead to significant improvements in terms of greater independence and vocational and social functioning in adulthood is also unknown. Given the few randomized controlled treatment trials that have been carried out, the few models that have been tested, and the large differences in interventions that are being published, it is clear that the field is still very early in the process of determining (a) what kinds of interventions are most efficacious in early Autism, (b) what variables moderate and mediate treatment gains and improved outcomes following intervention, and (c) the degree of both short-term and long term improvements that can reasonably be expected.

To examine these current research needs, the empirical studies of comprehensive treatments for young children with Autism published since 1998 were reviewed. Lovaa's treatment meets the criteria for “well-established” and no treatment meets the “probably efficacious” criteria, though three treatments meet criteria for “possibly efficacious”. The results of the analysis indicate that EIBI is an effective treatment for children with Autism (the average effect size was 1.1 for change in IQ, and .66 for ABC. These effect sizes are generally considered to be large and moderate, respectively. The results of the meta-analysis support the implication that at present, and in the absence of other interventions with established efficacy, EIBI should be the intervention of choice for young children with Autism.
A study by Eldevik et al (2010) found that intensity of intervention (35 or more hours per week of EIBI) was related to both IQ and ABC gains, and that IQ and ABC scores at intake were related to gains in ABC scores. Individual data from children (n=453) were divided into three groups: those that had received behavioural intervention, those that had received another intervention of similar intensity or to a control group where no specific intervention was provided. The outcomes for the behavioural intervention group were significantly better than those for the control and comparison groups and were even demonstrated to compare well with statistics used to evaluate mainstream healthcare interventions.

Hayward et al (2009 Nov) examined progress after 1 year of treatment for children with Autism who received a mean of 36 hours per week one-to-one University of California at Los Angeles Applied Behaviour Analysis (UCLA ABA) treatment. Two types of service provision were compared: an intensive clinic based treatment model with all treatment personnel (N = 23), and an intensive parent managed treatment model with intensive supervision only (N = 21). A non-concurrent multiple baseline design across participants (N = 13) examined whether progress was associated with ABA treatment or confounders. Between intake and follow-up, children in both groups improved significantly on IQ, visual-spatial IQ, language comprehension, expressive language, social skills, motor skills and adaptive behaviour. There were no significant differences between the two groups on any of the measures at follow-up. Mean IQ for participants in both groups increased by 16 points between intake and follow-up. These findings are consistent with previous studies demonstrating the benefits of ABA treatment.
Howard, et al (2005) compared the effects of three treatment approaches on preschool-age children with Autism spectrum disorders. Twenty-nine children received intensive behaviour analytic intervention (IBT; 1:1 adult: child ratio, 25–40 h per week). A comparison group (n = 16) received intensive ‘‘eclectic’’ intervention (a combination of methods, 1:1 or 1:2 ratio, 30 h per week) in public special education classrooms (designated the AP group). A second comparison group (GP) comprised 16 children in non-intensive public early intervention programs (a combination of methods, small groups, 15 hour per week). Independent examiners administered standardized tests of cognitive, language, and adaptive skills to children in all three groups at intake and about 14 months after treatment began. The groups were similar on key variables at intake. At follow-up, the IBT group had higher mean standard scores in all skill domains than the AP and GP groups. The differences were statistically significant for all domains except motor skills. There were no statistically significant differences between the mean scores of the AP and GP groups. Learning rates at follow-up were also substantially higher for children in the IBT group than for either of the other two groups. These findings are consistent with other research showing that IBT is considerably more efficacious than ‘‘eclectic’’ intervention.

In a research conducted by Sallows and Graupner (2005), twenty-four children with Autism were randomly assigned to a clinic-directed group, replicating the parameters of the early intensive behavioural treatment developed at UCLA, or to a parent-directed group that received intensive hours but less supervision by equally well-trained supervisors. Outcome after 4 years of treatment, including cognitive, language, adaptive, social, and academic measures, was similar for both groups. After combining groups, it was found that 48% of all children showed rapid learning, achieved average
post treatment scores, and at age 7, was succeeding in regular education classrooms. Treatment outcome was best predicted by pretreatment imitation, language, and social responsiveness. These results are consistent with those reported by Lovaas and colleagues.

Aldred et al (2004) aimed to test a new theoretically based social communication intervention targeting parental communication in a randomized design against routine care alone. The intervention was given in addition to existing care and involved regular monthly therapist contact for 6 months with a further 6 months of 2-monthly consolidation sessions. It aimed to educate parents and train them in adapted communication tailored to their child’s individual competencies. Twenty-eight children with Autism were randomized between this treatment and routine care alone, stratified for age and baseline severity. Outcome was measured at 12 months from commencement of intervention, using standardized instruments. All cases studied met full Autism Diagnostic Interview (ADI) criteria for classical Autism. Treatment and controls had similar routine care during the study period and there were no study dropouts after treatment had started. The active treatment group showed significant improvement compared with controls on the primary outcome measure as could be seen from– Autism Diagnostic Observation Schedule (ADOS) total score, particularly in reciprocal social interaction – and on secondary measures of expressive language, communicative initiation and parent–child interaction. Suggestive but non-significant results were found in Vineland Adaptive Behaviour Scales (Communication Sub domain) and ADOS stereotyped and restricted behaviour domain. A Randomized Treatment Trial design of this kind in classical Autism is feasible and acceptable to patients. This pilot study
suggests significant additional treatment benefits following a targeted (but relatively non-intensive) dyadic social communication treatment, when compared with routine care.

In a study conducted by Schreibman (2000) on research needs on the treatments for Autism it is widely acknowledged that, to date, the forms of treatment enjoying the broadest empirical validation for effectiveness with individuals with Autism are those treatments based upon a behavioural model and that such treatments are best implemented intensively and early in the child’s development. This paper describes several features important in the success of this model and presents remaining issues to be addressed for improving treatment effectiveness. While it is appreciated that there is no “one size fits all” treatment for children with Autism, there is as yet no established protocol for relating specific child, family, target behaviour, and treatment variables to individualized treatment regimens. Future research needs to include well-conceived and methodologically rigorous investigations allowing for the determination of these important variables.

Behavioural skills training were used by Lafasakis, & Sturmey (2007) to teach three parents to implement discrete-trial teaching with their children with developmental disabilities. Parents learned to implement discrete-trial training, their skills generalized to novel programs, and the children’s correct responding increased, suggesting that behavioural skills training is an effective and efficient method of teaching discrete-trial teaching to parents.

Iwata, et al, (2000), found functional analysis methodology as a powerful assessment tool for identifying contingencies that maintain a wide range of behaviour
disorders and for developing effective treatment programs. Nevertheless, concerns have been raised about the feasibility of conducting functional analyses in typical service settings. In this study, they examined the issue of skill acquisition in implementing functional analyses by evaluating an instructional program designed to establish a basic set of competencies. Eleven undergraduate students enrolled in a laboratory course in applied behaviour analysis served as participants. Their performance was assessed during scripted simulations in which they played the roles of therapists’ who conducted functional analyses and trained graduate students played the roles of “clients” who emitted self-injurious and destructive behaviours. To approximate conditions under which an individual might conduct an assessment with limited prior training, participants read a brief set of materials prior to conducting baseline sessions. A multiple baseline design was used to assess the effects of training, which consisted of reading additional materials, watching a videotaped simulation demonstrating correct procedural implementation, passing a written quiz, and receiving feedback on performance during sessions. Results showed that participants scored a relatively high percentage of correct therapist responses during baseline and that all achieved an accuracy level of 95% or higher following training that lasted about 2 hour. These results suggest that basic skills for conducting functional analyses can be acquired quickly by individuals who have relatively little clinical experience.

The influence of antecedent events on behaviour disorders has been relatively understudied by applied behaviour analysts. This lack of research may be due to focus on consequences as determinants of behaviour and a historical disagreement on a conceptual framework for describing and interpreting antecedent variables. A set of studies on assessment and treatment of behaviour disorders was selected for review by Smith and
Iwata (1997) based on their relevance to the topic of antecedent events. These studies were categorized as focusing on assessment of antecedent events, antecedent treatments for behaviour disorders maintained by either positive or negative reinforcement, or special cases of antecedent events in behaviour disorders.

The recommendation to reserve the most potent reinforcers for unprompted responses during acquisition programming has little published empirical support for its purported benefits (e.g., rapid acquisition, decreased errors, and decreased prompt dependence). The purpose of the investigation by Karsten and Carr (2009) was to compare the delivery of high-quality reinforcers exclusively following unprompted responses (differential reinforcement) with the delivery of high-quality reinforcers following both prompted and unprompted responses (non-differential reinforcement) on the skill acquisition of 2 children with Autism. Results indicated that both were effective teaching procedures, although the differential reinforcement procedure was more reliable in producing skill acquisition. These preliminary findings suggest that the differential reinforcement of unprompted responses may be the most appropriate default approach to teaching children with Autism.

**SOCIALIZATION**

Social reciprocity deficits are a core feature of the Autism spectrum disorders (ASD). A review of the intervention research done by White et al (2007) summarizes the state of research in group-based social skills training programs for school-age children and adolescents with ASD. All published studies of group social skills interventions between 1985 and 2006 were reviewed, as well as dissertations examining group based social skills intervention programs. To assess the state of the science, a template
developed by National Institute of Mental Health work group was applied to 14 identified studies. Based on this review, the empirical support for this approach is incomplete, but promising intervention strategies were identified as behavioural interventions to improve socialization and communication.

In a research conducted by Koegel et al (2009), it was found that children with Autism often exhibit low levels of social engagement, decreased levels of eye contact, and low social affect. However, both the literature and direct clinical observations suggest that some components of intervention procedures may result in improvement in child-initiated social areas. Using an ABAB research design with three children with Autism, this study systematically assessed whether embedding social interactions into reinforcers, delivered during language intervention, would lead to increased levels of child-initiated social behaviours. They compared this condition with a language intervention condition that did not embed social interactions into the reinforcers. Results indicated that embedding social interactions into the reinforcers resulted in increases in child-initiated social engagement during communication, improved nonverbal dyadic orienting, and improvements in general child affect.

Zanolli and Daggett (1998) used social skills priming to increase the spontaneous social initiations of two socially withdrawn preschoolers, one of whom had been diagnosed with Autism. During priming sessions, the teacher prompted and reinforced social behaviours (e.g., smiling, verbal initiations). The rate of reinforcement during priming sessions and the measured effects of this manipulation on the rate of spontaneous social initiations during the subsequent classroom activity were varied. Spontaneous
initiations were more frequent after high rates of reinforcement than after low rates of reinforcement.

Play helps to develop social skills. Children with Autism show deviances in their play behaviour that may be associated with delays in their social development. Naber et al (2008) in a study investigated manipulative, functional and symbolic play behaviour of toddlers with and without Autism (mean age: 26.45, SD 5.63). The results showed that the quality of interaction between the child and the caregiver was related to the development of play behaviour. In particular, security of attachment was related to better play behaviour. When the developmental level of the child is taken into account, the attachment relationship of the child with the caregiver at this young age is a better predictor of the level of play behaviour than the child’s disorder.

Many children with Autism Spectrum Disorders (ASD) participate in social skills or Theory of Mind (ToM) treatments. However, few studies have shown evidence for their effectiveness. The study by Begeer et al (2010) used a randomized controlled design to test the effectiveness of a 16-week ToM treatment in 8–13 year old children with ASD and normal IQs (n = 40). The results showed that, compared to controls, the treated children with ASD improved in their conceptual ToM skills, but their elementary understanding, self-reported empathic skills or parent reported social behaviour did not improve. Despite the effects on conceptual understanding, the study does not indicate strong evidence for the effectiveness of a ToM treatment on the daily life mind reading skills.
COMMUNICATION

All children with Autism experience language and communication difficulties, although there are considerable differences in language ability among individuals. Some are non-verbal while others may have extensive language with deficits in the area of pragmatics (the social use of language). Some of these children pull the hands of their parents to get food, water or things they want but will not point out to objects. Many of them do not show meaningful communication, they use echolalia which is most of the time meaningless. Research shows that several methods are used to improve communication. They are Applied Behaviour Analysis, PECS (Picture Exchange Communication System), Discrete Trial Learning, etc.

Communication is used for serving different functions or purposes. Eight basic functions of communication include: seeking attention, greeting, requesting, protesting, choice making, commenting, recurrence (wanting more of something) and rejection (rejecting an item or wanting to cease an activity). The functions of communication that are exhibited most often by children with Autism include requesting, protesting, recurrence and rejection. Social functions of communication (i.e., seeking attention, greeting, and commenting) are often more difficult for children with Autism to learn. Functional communication means being able to effectively express wants, needs, thoughts and ideas to a variety of communication partners (both familiar and unfamiliar) throughout. Joint attention is achieved when a child looks at an object of interest and then to the parent to see if she is sharing the experience. Joint attention is of critical importance to developing communication skills. Joint attention is the foundation upon on which communication skills are developed. In general, imitation is important because of
the developing ability to construct internal representations of the behaviour of others and to duplicate them.

The effectiveness of a Behavioural Skills Training (BST) package to teach the implementation of the first three phases of the Picture Exchange Communication System (PECS) was evaluated by Rosales et al (2009) with 3 adults who had no history teaching any functional communication system. A multiple baseline design across participants was used to evaluate the effectiveness of the training package, which consisted of a video, written and verbal instructions, modeling, rehearsal, and feedback. Results showed significant improvements relative to baseline in a short duration of training time and that skills generalized to a learner with a severe developmental disability. Skills were maintained at 1-month follow-up for one participant.

A multiple baseline design across 3 children with Autism was used by Taylor and Hoch (2008) to assess the effects of prompting and social reinforcement to teach participants to respond to an adult’s bid for joint attention and to initiate bids for joint attention. Participants were taught to respond to an adult’s bid for joint attention by looking in the direction of an object at which the adult pointed, by making a comment about the object, and by looking back at the adult. Additional training and reinforcement were needed to teach the participants to initiate bids for joint attention. Findings are discussed in terms of the social relevance of teaching children with Autism to respond to and initiate bids for joint attention.

Kasari et al (2010) aimed to determine if a joint attention intervention would result in greater joint engagement between caregivers and toddlers with Autism. The
intervention consisted of 24 caregiver-mediated sessions with follow-up one year later. Compared to caregivers and toddlers randomized to the waitlist control group the Immediate Treatment (IT) group made significant improvements in targeted areas of joint engagement. The IT group demonstrated significant improvements with medium to large effect sizes in their responsiveness to joint attention and their diversity of functional play acts after the intervention with maintenance of these skills 1 year post-intervention. These are among the first randomized controlled data to suggest that short-term parent-mediated interventions can have important effects on core impairments in toddlers with Autism.

In an article published in Science Daily (Sep. 29, 2007) about language development significance of joint attention is mentioned. A hallmark of human nature is the ability to share information and to comprehend the thoughts and intentions of others. This capability involves social cognition (the cognitive processes involved in social interaction) and makes a significant contribution to the foundations for language development, as well as social competence. It also sets us apart from other primates. However, before infants have developed social cognition and language, they communicate and learn new information by following the gaze of others and by using their own eye contact and gestures to show or direct the attention of the people around them. Scientists refer to this skill as “joint attention.” Joint attention is vital to social competence at all ages: Children and adults that are unable to follow engage and react to joint attention may forever be impaired in their capacity for relatedness and relationships. In fact, clinical research indicates that Autism is characterized by chronic, pronounced impairments in initiating joint attention and autistics show a lack of spontaneous sharing experiences with others. Individual differences in joint attention are related to the intensity of social symptoms, responsiveness to interventions, and long-term social
outcomes in children with Autism. The concept of joint attention is a bit more complicated than just following others’ gaze; it requires the integration of several networks in the brain. Even though it is a vital skill, scientists know surprisingly little about the development of joint attention.

Mundy and Newell (2007) summarize recent findings supporting a theory of joint attention dubbed the “attention-systems model”. This model proposes that human social cognition is really the extraordinary result of two basic forms of attention. One type of attention, regulated by a specific set of neurons in the brain, involves paying attention to the external world and the actions of people. The second type involves paying attention to the self and is regulated by a different network of neurons. They propose that the key to human joint attention is that these two areas of the brain become interconnected throughout development and interact so we can simultaneously keep track of the direction of self and other’s attention. Interestingly, communication between brains regions, especially those implicated in initiating joint attention is one of the main cognitive impairments of Autism.

Using a multiple baseline design, Charlop-Christy et al (2002) examined the acquisition of PECS with 3 children with Autism. In addition; the study examined the effects of PECS training on the emergence of speech in play and academic settings. Ancillary measures of social-communicative behaviours and problem behaviours were recorded. Results indicated that all 3 children met the learning criterion for PECS and showed concomitant increases in verbal speech. Ancillary gains were associated with increases in social-communicative behaviours and decreases in problem behaviours. The
results are discussed in terms of the provision of empirical support for PECS as well as the concomitant positive side effects of its use.

Thiemann and Goldstein (2001) investigated the effects of written text and pictorial cuing with supplemental video feedback on the social communication of 5 students with Autism and social deficits. Two peers without disabilities participated as social partners with each child with Autism to form five triads. Treatment was implemented twice per week and consisted of 10 minutes of systematic instruction using visual stimuli, 10 minutes of social interaction, and 10 minutes of self-evaluation using video feedback. Results showed increases in targeted social communication skills when the treatment was implemented. Some generalized treatment effects were observed across untrained social behaviours, and 1 participant generalized improvements within the classroom. In addition, naive judges reported perceived improvements in the quality of reciprocal interactions. These findings support recommendations for using visually cued instruction to guide the social language development of young children with Autism as they interact with peers without disabilities.

Drasgow, et al (1998) investigated variables that may influence the generalization of a replacement and in 3 young children with severe language delays. A multiple baseline design consisting of one stimulus class of manding opportunities that were arbitrarily divided into three categories (i.e., food, toys, and events) were used for each child. During the baseline probes, all the children manded by- reaching, grabbing, or leading. They then taught each child are placement mand using a single member of the stimulus class. Acquisition of the replacement mand occurred under highly restricted conditions in a setting that was completely isolated from the generalization settings. Post-
acquisition probes revealed almost exclusive use of old manding forms. Subsequently, extinction of the old forms and reinforcement of the replacement mand were introduced in a sequential fashion. Two children manifested a substantial increase, and 1 child displayed a moderate increase in the occurrence of the replacement mand (i.e., generalization occurred). These results suggest that a differential reinforcement procedure can alter the probability of the occurrence of response class members across a variety of stimulus conditions.

Williams, Donley, & Keller (2000) in an effort to teach children with Autism to ask questions about hidden objects taught two 4-year-old children with Autism to ask questions of an adult who held a closed box with a toy inside. The treatment package (modeling, prompting, and reinforcement) was evaluated with a multiple baseline design across the three question forms during training, generalization, and follow-up evaluations. The first question form (“what’s that?”) produced the name of the hidden item. The second form (“Can I see it?”) produced sight of it, and the third form (“Can I have it?”) produced the item itself. Both children learned to ask questions about hidden objects. Although considerable progress has been made in improving the acquisition of expressive verbal communication in children with Autism, research has documented that a subpopulation of children still fail to acquire speech even with intensive intervention. One variable that might be important in facilitating responding for this nonverbal subgroup of children is the use of antecedent orienting cues. Using a multiple baseline design, a study examined whether individualized orienting cues could be identified, and whether their presentation would result in the production of verbal expressive words. The results showed that this antecedent stimulus control procedure produced improvements in
responding to verbal models in all of the children, and subsequent gains in speech for some of the children.

Schepis et al (1998) evaluated the effects of a Voice Output Communication Aid (VOCA) and naturalistic teaching procedures on the communicative interactions of young children with Autism. A teacher and three assistants were taught to use naturalistic teaching strategies to provide opportunities for VOCA use in the context of regularly occurring classroom routines. Naturalistic teaching procedures and VOCA use were introduced in multiple probe fashion across 4 children and two classroom routines (snack and play). As the procedures were implemented, all children showed increases in communicative interactions using VOCAs. Also, there was no apparent reductive effect of VOCA use within the naturalistic teaching paradigm on other communicative behaviours. Teachers’ ratings of children’s VOCA communication, as well as ratings of a person unfamiliar with the children, supported the contextual appropriateness of the VOCA. Probes likewise indicated that the children used the VOCAs for a variety of different messages including requests, yes and no responses, statements, and social comments. Results are discussed in regard to the potential benefits of a VOCA when combined with naturalistic teaching procedures. Future research needs are also discussed, focusing on more precise identification of the attributes of VOCA use for children with Autism, as well as for their support personnel.

Researchers have argued that individuals with Autism Spectrum Disorders (ASDs) use an effortful ‘‘systematizing’’ process to recognize emotion expressions, whereas typically developing (TD) individuals use a more holistic process. If this is the case, individuals with ASDs should show slower and less efficient emotion recognition,
particularly for socially complex emotions. Tracy et al (2011) tested this by assessing the speed and accuracy of emotion recognition while limiting exposure time and response window. Children and adolescents with ASDs showed quick and accurate recognition for most emotions, including pride, a socially complex emotion, and no differences emerged between ASD and TD groups. Furthermore, both groups trend towards higher accuracy when responding quickly, even though systematizing should promote a speed-accuracy trade-off for individuals with ASDs.

SENSORY INTEGRATION

Autism children have sensory issues. They are having sensory issues either hyper or hypo in visual, hearing, olfactory, Kinesthetic, vestibular or proprioception.

Grandin (1984) has mentioned that some studies have reported that light touch has an alerting effect and firm pressure has a calming effect. Patients in a coma experience a reduction in blood pressure when touched by another human being. Another study reported that pinching a rabbit's skin with rubber padded clips on 1 to 8 areas of the body created a "deactivated" EEG pattern and the rabbit had relaxed muscle tone and appeared drowsy. Yet another study found that when pressure is applied to both sides of a person's body metabolic rate usually falls, oxygen consumption decreases, pulse rate is lowered and muscle tone decreases.

Idiosyncratic responses to sensory stimuli and unusual motor patterns have been reported clinically in young children with Autism. Myriad sensory and motor based interventions have evolved for use with children with Autism to address such issues. However, much controversy exists about the efficacy of such therapies. Baranek (2002) in a review paper summarizes the sensory and motor difficulties often manifested in Autism,
and evaluates the scientific basis of various sensory and motor interventions used with this population. Given that autistic symptoms are manifested differently across development and that heterogeneity exists within the Autism spectrum, it is likely that individualized patterns of reactivity may be associated with differential treatment outcomes irrespective of the intervention category reviewed. Although outcomes for individual children have been mixed, it is possible that significant individual differences in subject characteristics may be masking significant group effects. That is, we do not know which children will benefit the most from which treatments and under which specific conditions. Several studies in the areas of sensory integration and sensory stimulation indicated that specific sensory processing subtypes (e.g., hyper- versus hypo-responsive) and other subject variables (e.g., age, developmental levels) may affect prognosis for treatment outcomes. Small sample sizes and retrospective designs limit generalization but, there appeared to be some converging evidence to suggest that a hyper-responsive pattern (i.e., high anxiety, arousal, or sensitivities) may be more amenable to sensory techniques aimed at arousal modulation and resultant gains in performance. Physiological studies of arousal indicate that younger (or less mature) children may have a higher tendency to display hypersensitive reactions and reject sensory stimuli that interfere with other aspects of functioning. If so, one implication of these findings may be that perhaps beginning some types of sensory-motor interventions at earlier ages would be more beneficial. Some studies have only been conducted with older children and adults (e.g., exercise treatments), and these results cannot be generalized to preschool populations. We cannot know the answers to these types of questions until more systematic research with increased specificity of subject variables is conducted to help distinguish various levels of response to treatments; however, these findings indicate that when provided, sensory and motor interventions need to be
individualized for a given child with Autism. A further concern of this area of intervention is that most of the studies provide limited follow-up after intervention, and so it is not known whether positive effects are sustained in the long term. A few better-controlled follow-ups have been included in some of the AIT (Auditory Integration Training) studies. However, in those studies in which positive effects were noted initially, an attenuation of responses occurred over time (over the course of 9 to 12 months). These types of findings were also true for one study on prism lenses and two on exercise treatments. This could indicate that either the treatments were not useful in the long term or, conversely, that more frequent application of treatment is needed to maintain such effects. Repeated treatments were certainly useful with exercise therapies where physiological and behaviour changes sustained for approximately 90 minutes following each treatment. The effects of treatment frequency, duration, and intensity on both short- and long-term outcomes need to be further addressed.

**SELF-INJURIOUS AND STEREOTYPE BEHAVIOUR**

Self-injurious behaviour (SIB) can be maintained through negative reinforcement when, in the context of training or task requirements, it produces escape as a consequence. Several studies have demonstrated methods for identifying and treating SIB maintained by negative reinforcement; however, few analyses of the establishing operations associated with demand situations have been conducted. The series of studies done by Smith et al (1995) illustrates a method for identifying some establishing operations for escape by systematically altering certain dimensions of the demand context while maintaining an escape contingency for SIB. Dimensions assessed in these studies included task novelty, duration of instructional sessions, and rate of task presentation. Data indicate that these variables can have establishing properties for behaviour
maintained by escape. Implications of the results are discussed, as are potential refinements and extensions of the assessment procedures.

Results from several studies have suggested that the opportunity to engage in stereotypic behaviour may function as reinforcement for alternative, more socially desirable behaviours. However, the procedural components of intervention by Hanley et al (2000) include several distinct operations whose effects have not been analyzed separately. While measuring the occurrence of stereotype and an alternative behaviour (manipulation of leisure materials) exposure was given to 3 participants to three or four components of a “stereotype as reinforcement” contingency: (a) continuous access to materials, (b) prompts to manipulate materials, (c) restricted access to stereotype (i.e., response blocking), and (d) access to stereotype contingent on manipulating the materials. Continuous access to materials and prompting (‘a’ and ‘b’) produced negligible results. Restriction of stereotype (c) produced a large increase in the alternative behaviour of 2 participants, suggesting that response restriction per se may occasion alternative behaviour. However, contingent access to stereotype (d) was necessary to increase the third participant’s object manipulation; this finding provided some support for the use of stereotype as reinforcement for alternative behaviour. Finally, when transfer of the effects of intervention was assessed during periods in which active intervention components were withdrawn, the alternative behaviour was maintained for one participant.

Morrison et al (2011) evaluated antecedent exercise for treating the automatically reinforced problem behaviour of 4 individuals with Autism. They conducted preference assessments to identify leisure and exercise items that were associated with high levels of engagement and low levels of problem behaviour. Next, they conducted three 3-
component multiple-schedule sequences: an antecedent-exercise test sequence, a non-contingent leisure-item control sequence, and a social-interaction control sequence. Within each sequence, they used a 3-component multiple schedule to evaluate pre intervention, intervention, and post intervention effects. Problem behaviour decreased during the post intervention component relative to the pre intervention component for 3 of the 4 participants during the exercise-item assessment; however, the effects could not be attributed solely to exercise for one of these participants.

Oliver et al (2001) systematically manipulated social proximity to examine its influence on multiple topographies of aggression. Aggression occurred at high levels during close-proximity sessions and at low levels during distant-proximity sessions even though social contact was presented continuously during both conditions. Topographies of aggression emerged sequentially across the close-proximity sessions, and all topographies were reduced to zero following extended sessions of this condition.

Dixon and Cummings (2001) examined the use of a progressive-delay schedule of reinforcement to increase self-control and decrease disruptive behaviour in children with Autism. When initially given the choice between an immediate smaller reinforcer and a larger delayed reinforcer, all participants chose the smaller reinforcer. When access to the larger reinforcer required either no activity or engaging in a concurrent task, during the delay, all participants demonstrated both self-control and preference for a response requirement. Disruptive behaviour decreased during delays that required a concurrent task compared to sessions without an activity requirement.
In the typical functional analysis by Worsdell et al (2000) in which the antecedent and consequent events associated with problem behaviour are manipulated, the control condition involves elimination of both the relevant Establishing Operation (EO) and its associated contingency through a schedule of non-contingent reinforcement usually Fixed-Time [FT] 30 s. In some functional analyses, however, antecedent events are manipulated in the absence of differential consequences, and a common test condition in such analyses involves the delivery of reinforcement on an FT 30-s schedule. Thus, the same schedule of reinforcement (FT30-s) is not considered to be an EO in the former type of analysis but is considered to be an EO in the latter. They examined the relative influences of EOs and reinforcement contingencies on problem behaviour by exposing 6 individuals who engaged in Self-Injurious Behaviour (SIB) to four combinations of functional analysis conditions: EO present/contingency present, EO absent/contingency present, EO present/contingency absent, and EO absent/contingency absent. Results indicated that the only condition in which high rates of SIB were observed consistently was one in which the EO and the reinforcement contingency were both present. Implications of these results for the design of functional analysis test and control conditions are discussed.

Although response blocking can decrease problem behaviour, one potential adverse side effect is the induction of aggression. Hagopian and Adelinis (2001) report on a young adult who engaged in high rates of pica maintained by automatic reinforcement. Blocking pica, however, led to aggression. When redirection to an alternative preferred food item was added to an intervention consisting of response blocking, pica was effectively treated without increasing aggression.
Three studies are presented in which environmental correlates of self-injurious behaviour were systematically examined and later used as the basis for treatment by Iwata et al. (1990). In Study 1, 7 developmentally disabled subjects were exposed to a series of conditions designed to identify factors that maintain self-injurious behaviour: attention contingent on self-injurious behaviour (positive reinforcement), escape from or avoidance of demands contingent on self-injurious behaviour (negative reinforcement), alone (automatic reinforcement), and play (control). Results of a multi element design showed that each subject's self-injurious behaviour occurred more frequently in the demand condition, suggesting that the behaviour served an avoidance or escape function.

Six of the 7 subjects participated in Study 2. During educational sessions, "escape extinction" was applied as treatment for their self-injurious behaviour in a multiple baseline across subjects design. Results showed noticeable reduction or elimination of self-injurious behaviour for each subject and an increase in compliance with instructions in all subjects for whom compliance data were taken. The 7th subject, whose self-injurious behaviour during Study 1 occurred in response to medical demands (i.e., physical examinations), participated in Study 3. Treatment was comprised of extinction, as in Study 2, plus reinforcement for tolerance of the examination procedure, and was evaluated in a multiple baseline across settings design. Results showed that the treatment was successful in eliminating self-injurious behaviour and that its effects transferred across eight new therapists and three physicians. General implications for the design, interpretation, and uses of assessment studies are discussed.

Magee and Ellis (2000) evaluated extinction effects by a multiple baseline across behaviours design with 2 boys after just one of several target problem behaviours was observed during a functional analysis. Other target behaviours emerged as extinction was
introduced sequentially across all problem behaviours. Results demonstrated an efficient strategy for simultaneously assessing multiple problem behaviours maintained by the same consequence.

**DIET**

Diet is found to play a major role in reducing behaviour problem in Autism children. Only few researches have been done on this but many are underway. Autism is a developmental disorder with a possible connection between dietary components and triggering or worsening of symptoms. An altered intestinal permeability might allow absorption of incompletely digested peptides (gluten and casein) that could produce opioid like activity on the brain, causing significant changes in behaviour. Souza et al (2012) conducted a study to assess the intestinal permeability and nutritional status of participants with developmental disorders, to determine if changes in the intestinal mucosal barrier and/or injury to the intercellular junctions have occurred that might justify application of further dietary modifications. To assess intestinal permeability, the research team analyzed participant’s urine under fasting conditions, using gas chromatography to determine chromatographic peaks. To assess nutritional status, the team determined participant’s heights and weights and performed a bioelectric bio impedance examination at least 4 hours after their most recent meal. In addition, the team determined food intake using three diet diaries. They asked participants and caregivers to register each food consumed during 2 nonconsecutive weekdays and 1 weekend day. Seven participants aged 9 to 23 years with developmental disorders (the developmental group, DG) completed the study. The control group (CG) consisted of nonsmoking healthy volunteers in the general population who were similar in age to the experimental group and did not suffer from diseases that potentially could influence nutritional status.
and intestinal function. To assess intestinal permeability, participants ingested 150 mL of an isosmolar solution of the sugars mannitol (2 g) and lactulose (7.5 g) under fasting conditions and the researchers collected all voided urine over a period of 5 hours. Outcome measures using chromatographic peaks, the research team quantified the mannitol and lactulose in participants urine by calculating the percentage excreted in relation to the ingested amounts of sugar. This calculation gave them the lactulose-to-mannitol ratio (L/M). To evaluate nutritional status, they used data regarding bio-impedance resistance, heights, and weights to estimate lean mass and body water (in liters). They classified adults and adolescents using The Body Mass Index (BMI). For children (2-10 y), they classified participants height-to-age and weight-to-height ratios. The research team used food intake to examine the macronutrient interval, the mean added sugar consumption, and the quantity of protein, in g/kg weight. Participants with developmental disorders (n = 7) were more likely to be overweight. Their usual diet revealed a high intake of lipids (%) and proteins (g/kg) (compared to reference values) and a high intake of calories (kcal) and carbohydrates (%) (compared to CG) as well as a high intake of food sources that are important contributors of casein and gluten. The DGs (n = 7) mean mannitol excretion was lower, and their L/M higher than the CGs (n = 7) (P < .05). Their increased L/M may indicate atrophy of the intestinal-mucosa surface and/or injury to the intercellular junctions or the effect of some other abnormality. The small number of participants, however, prevented more complex statistical analysis.

**DATA COLLECTION**

Only single case study has been done so far. The data collected are done on a continuous and discontinuous basis. Continuous data collection is found to be
cumbersome and interferes with intervention where as discontinuous data collection is found to be equally efficient and good.

Cummings and Carr (2009) compared two methods of data collection in a behavioural intervention program for children with pervasive developmental disorders: collecting data on all trials versus only the first trial in a session. Results showed that basing a child’s progress on first trial data resulted in identifying mastery-level responding slightly sooner, whereas determining mastery based on all trials resulted in slightly better skill maintenance. In the current replication, no such differences in indication of mastery or maintenance were observed when data were collected on all trials or the first trial.

In an article on Early Intensive Behavioural Intervention (EIBI) and Family Psychological Adjustment, Remington (2010) wrote that the simplest, and perhaps most reasonable, explanation for the absence of strong evidence for improved adjustment is that EIBI produces both benefits and costs. To investigate this further, he with co-authors carried out qualitative interviews with 53 parents whose children had received two years of EIBI intervention. All reported a balance of positive and negative outcomes for themselves, their child with Autism, and his or her siblings, a finding replicated by similar studies. Qualitative methods have also been used to identify adjustment factors that parents believe influence program delivery. Another study reported that support from the intervention team, family, and friends increased their capacity to implement EIBI, whereas family and personal resource constraints, team organization issues, and funding all limited it. Qualitative studies are best used to identify themes in parents’ experience of EIBI. If such themes can subsequently be quantified, it becomes possible to determine
their relationship with adjustment more precisely, for example by using multivariate analysis.

In a survey of parents who had opted for EIBI showed that high parental stress was associated with their children's Autism symptom, whereas lower stress was associated with better social support, good coping skills, and a greater belief in the efficacy of behavioural intervention. Although several similar studies have explored the relationships between intervention and parental adjustment indicators (e.g., depression and stress), its impact on other family members has attracted very little research. The problem with multivariate research is that, while revealing associations between adjustment and EIBI, it cannot describe the direction of any causal linkages.

Interestingly, the results of these studies and the predominance of multivariate methods in this area leads naturally to consideration of another approach to behaviour change, very different from ABA's. In the EIBI literature, however, the fact that parents must be recruited, trained, and participate as therapists is taken almost as a given, rather than seen as a target for behavioural analysis and intervention.

Qualitative Research is collecting, analyzing, and interpreting data by observing what people do and say. Whereas, quantitative research refers to counts and measures of things, qualitative research refers to the meanings, concepts, definitions, characteristics, metaphors, symbols, and descriptions of things. Qualitative research is much more subjective than quantitative research and uses very different methods of collecting information, mainly individual, in-depth interviews and focus groups. The nature of this type of research is exploratory and open-ended.
In a study by Hernandez (2008) as part of her research, work analyzed the development, implementation and success of an educational program for children with Autism Spectrum Disorder (ASD) diagnosis within a public school structure. Records reviewed for a two year time period identified four phases to program development and implementation, as well as identifying themes and barriers for specific roles, administration, staff and parents. The success of the program is evident by growth in the children and by reported satisfaction of parents and staff. A program blue print offers an outline to program development and implementation. Necessary ASD program components, based on literature reviewed are summarized. This study highlights the feasibility and benefits of implementing a program of this type within a public school structure.

Of all the interventions provided the most scientifically proven to be most effective is behavioural training. But most of the studies are based on individual training and not on group training owing to the heterogeneity of the group. From this, we can understand that intensive individualized education program which is tailor made and given in the early stages is effective but whether it leads to greater independence is not known. The studies have been done only with small sample size with most being single subject study and no study on group training for low functioning autistic children have been done. We also understand that sensory problems are major issue of autistic children and they are in a way cause for their self-stimulatory and injurious behaviour. Though no extensive research has been done on the role of diet, few studies that have been done imply that it has role on behaviour problem on autistic children. Differential reinforcement and using visual aids help in acquiring skills. Also reinforcement given
should be gradually faded so that once the skill is acquired no reinforcement need be given for the retention of the learnt skill.

Behaviour training with a program designed for group covering all aspects for the improvement of autistic traits may give inroad into the efficacy and success of such program and hence a qualitative analysis of research is planned as the samples are not homogenous and data collection for too many activities is cumbersome and may disrupt the intervention process.