

## Research Update

# Early Start Denver Model

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### **What is the Early Start Denver Model (ESDM)?**

The ESDM is an early intervention model designed to target the key features of autism. A child's early interpersonal experiences can be impeded by autism, which in turn creates barriers to their social-communication development. These barriers result in greater and greater impairment over time due to the loss of social learning opportunities. The ESDM seeks to stop this trajectory by increasing a child's social learning in two ways:

- (i) By bringing the child into coordinated, interactive social relations for most of his/her waking hours
- (ii) Using intensive teaching to 'fill in' the learning deficits which have been created by the child's past lack of access to the social world (Rogers et al., 2000).

### **How does it work?**

The ESDM involves intensive teaching within a play-based curriculum with relationship- focussed routines and strategies (KU Children's Services, 2011). It is supported by principles of developmental psychology and the pivotal response treatment component of Applied Behaviour Analysis. It draws upon several different but complementary approaches, including the Denver model (Rogers et al 1986), Rogers and Pennington's model of autism as a disorder of social motivation (1991), and Dawson and colleagues' model of autism as a disorder of social motivation (2004). It builds upon these through the following techniques (summarised from Rogers and Dawson, 2010):



#### ***Use of Positive Affect***

The ESDM focusses upon increasing the reward value of social engagement by pairing social experiences with non-social rewards or sources of pleasure for the child, such as objects. This ensures that, to attain their reward, children need to use social and communicative acts.

#### ***Play as the Frame for the Intervention***

Developmental skills which can be conveyed through play, including imitation, receptive and expressive communication, social and cognitive skills, constructive and symbolic play, and fine and gross motor development, are taught using joint activity routines. The play is child-centred, in that the child's preferred activities and

materials are featured throughout the activities, while the adult selects which objects are available as choices, which actions are modelled and reinforced, and how activities are sequenced.

### ***Intensive Teaching***

As one of the causes of developmental delay is due to a reduced number of learning opportunities, teaching is woven into every social exchange. Infants and toddlers spend the majority of their waking hours (approximately 70 hours per week) in direct social interaction with caregivers. If it takes this amount of time to create development in typically developing children, it can be assumed that infants and toddlers with ASD need at least this amount of interactive experience.

### ***Positive Behaviour Approach for Unwanted Behaviours***

Unwanted behaviours that are aggressive, destructive, disruptive or overly repetitive are replaced with more conventional behaviours, rather than being eliminated. Replacement behaviours, which are usually an intentional communication or a more mature skill level, are taught using reinforcement strategies.

### ***Family Involvement***

Parents act as co-therapists by completing the functional assessments of behaviour, helping to generate a plan for teaching alternative behaviours, and identifying routines or opportunities throughout the day to implement and generalise skills. Family intervention is embedded in natural activities such as mealtimes, play, outings, dressing, toileting, bathing and bedtime. The focus on parent-child interactions reflects research in typical child development that shows how parenting practices can affect children's rate and quality of language development, emotional development, school progress and the quality of their friendships.

### **How are children assessed?**

One of the most important parts of the intervention process in the ESDM is the creation of short-term (12 week) learning objectives for the child. These objectives are established through an assessment of the child's current skill level using the ESDM



Curriculum Checklist. Two to three targets in each relevant developmental domain (ie receptive communication, expressive communication, social skills, play skills, cognitive skills, fine motor skills, gross motor skills, and adaptive behaviour skills) are then formulated and taught over 12 weeks. The objectives should be shared with everyone who spends time with the child, for the more practice children receive, the more quickly they will learn. Each objective

should also specify the criteria for judging successful learning and mastery of it, such as the number of skills learned, the achievement of a specific level of independence, or a response time. These objectives should also be generalised in order to be considered successful (Rogers and Dawson, 2010).

### **What does the research say?**

A randomised controlled trial (the gold standard in research) published in 2009 randomly allocated 48 children with ASD between 18-30 months of age to either ESDM or a community intervention for two years (Dawson et al, 2010). The children who received the ESDM intervention improved 17.6 standard score points compared with 7.0 points in the comparison group (relative to their baseline scores). They also maintained their rate of growth in adaptive behaviour compared with a sample of typically developing children, while the comparison group showed greater delays in this area. Children who received ESDM also were more likely to experience a change in diagnosis from autism to pervasive developmental disorder, not otherwise specified, than the comparison group (Dawson et al, 2010)



A more recent randomised controlled trial undertaken with the ESDM demonstrates its effectiveness (Vivanti et al, 2014). Twenty-seven per cent of preschoolers with ASD undergoing 15-25 hours per week of ESDM in the context of a long day-care community service were compared to 30 peers with ASD undergoing a different intervention program in a similar setting. While children in both groups made gains in cognitive, adaptive and social skills, children in the ESDM showed significantly higher gains in developmental rate and receptive language (Vivanti et al, 2014).

Eapen et al (2013) studied the effectiveness of the ESDM intervention for preschool-aged children in a community-based group setting. The participants of the study were twenty-six children with autism (average age 49.6 months) in a long day child care centre for children aged two-to-six years. They received two half-hour intensive individualised ESDM therapy sessions per week, in addition to 15-to-20 hours of ESDM group intervention. Statistically significant improvements were found in children's performance on the visual reception, receptive language and expressive language domains in addition to their overall intellectual functioning. Parents also reported significant increases in their child's receptive communication and motor skills and a significant decrease in autism-specific features. These effects were of around medium size, but the results need to be confirmed in a controlled study. Nonetheless, they do suggest that there are benefits to a less intensive intervention with older children using group settings, which may be more cost-effective.



Two studies have researched the use of telehealth to train parents remotely in the ESDM intervention. Recognising that the ESDM intervention might be difficult to arrange because of daily demands or schedules, and attempting to move clinic-based ESDM intervention into the home, the researchers viewed parents' interactions with their children

(average age 28.89 months) for one hour per week through a laptop set up in different locations. After 12 weeks, parents had become skilled at using teachable moments to promote children's spontaneous language and imitation skills, and were pleased with the support and ease of telehealth learning (Vismara et al 2012). A 2013 study by Vismara et al. used two-way, live video conferencing and a self-guided website to provide parent training in the home. By the end of the 12-week intervention (with 1.5 hours of parent coaching per week), the eight families assessed reported having a better understanding and appreciation for helping their child learn new skills at home. Parents felt confident in addressing their child's needs and sharing the information with other caretakers, however, interaction with therapists via the video conferencing was important for understanding how to use the intervention in their everyday life.

A study by Fulton et al (2014) demonstrated that ESDM significantly reduced the maladaptive behaviours of 38 children with ASD age 2-6. Sixty-eight per cent of the children showed a treatment response by 12 weeks and seventy-nine per cent on exit of the program (the average program length was 11.8 months). Replication with a larger sample and control conditions is needed to determine the specific factors underlying these improvements, but they suggest that the ESDM program may be effective in improving not only core developmental domains, but also in decreasing maladaptive behaviours in preschool-aged children with ASD.

A 2015 study of 39 children with ASD who began participation in a randomized clinical trial testing the effectiveness of the ESDM at age 18 to 30 months showed evidence of efficacy after treatment (Estes et al), which was maintained two years later. The ESDM group, on average, maintained gains made in early intervention in overall intellectual ability, adaptive behaviour, symptom severity, and challenging behaviour. Although group differences in core autism symptoms were not found immediately after treatment, two years later, the ESDM group demonstrated improved core autism symptoms and adaptive behaviour as compared with the community-intervention-as-usual group. The two groups were not significantly different in terms of intellectual functioning at age six years. This study provides direct evidence that these children did



not exhibit a developmental regression, lose skills, or, in the case of standardized tests, slow their rate of development after withdrawal of early intensive services.

### **Parent ESDM Module (P-ESDM)**

A parent model of the ESDM is under development. The P-ESDM follows the same science of child development and applied behaviour analysis, but its content and approach to working with parents focuses on moments of learning inside the daily interactions and activities that make up a child's life. Its curriculum consists of 10 intervention topics, addressing one new parent skill per week, and refining those taught earlier. The 10 topics are: (i) increasing child's attention and motivation (ii) using sensory social routines (iii) promoting dyadic engagement and joint activity routines (iv) enhancing nonverbal communication (v) building imitation skills (vi) facilitating joint attention (vii) promoting speech development (viii) using antecedent-behaviour-consequence relationships ('ABCs of learning') (ix) employing prompting, shaping, and fading techniques, and (x) conducting functional assessments of behaviour to develop new interventions (Rogers et al. unpublished). This module will be available shortly.

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