

The early start Denver Model for Autism Spectrum Disorder

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Early Start Denver Model (ESDM) is a behavioral therapy for children with autism spectrum disorders (ASD) between 12 to 48 months, based on Applied Behavior Analysis (ABA). With new discoveries on ASD, recent research on behavioral interventions is required, so that evidence based therapies are properly prescribed for patients. We propose a mini-review on (ESDM) for young ASD children, to analyze recent studies regarding the effectiveness of this approach. For the research, PubMed platform was selected and the following key words were used: Autism Spectrum Disorder, Early Start Denver Model. From fifteen articles, six were selected: two meta-analysis, one observational study, one clinical trial, one genetic research and one in-depth interview research. The heterogeneous methodologies and approaches resulted in slightly different conclusions regarding the benefits of the therapy and its limitations. However, all studies reported benefits related to language skills, and the majority pointed to outcomes in cognition as well. Genetic variants, autism severity and economical limitations were found as barriers for the success of the intervention. More research in this field is needed, in order to clarify which infants could benefit best of the therapy and what are the expected results.

Introduction: Based on Applied Behavior Analysis (ABA), the Early Start Denver Model (ESDM) is a behavioral therapy for children with autism spectrum disorders (ASD) between 12 to 48 months. It was developed by Professor S.J. Rogers and other collaborators after 25 years of research and clinical trials (2012) (1). As other behavioral approaches, it is supported by radical behaviorism, science founded by B.F. Skinner (1938), which means teaching according to the three term contingency principle (Antecedent, Behavior, Consequence). With the popularization of multiple interventions with the objective of developing verbal and basic skills among autistic children, families and health professionals seek for evidence based approaches, which could lead to more efficient results. To clarify that point, many studies have been conducted during the last few years, including clinical trials and other methods of research. Since the first paper on Denver Model in 1986, much has changed in the way ASD is treated, including diagnostic criteria with the updating of Diagnostic and Statistical Manual of Mental Disorders (DSM-V, 2013) (2). This means, constant demand for more recent reviews, that could maintain or not ESDMs status as an effective approach.

Methodology: To contribute to this discussion, we propose a mini-review which intends to elucidate what has been published recently about Early Start Denver Model and its effectiveness in ASD children and to evaluate the quality of the methodology being used.

For this study, PubMed platform has been selected due to its worldwide relevance. The following key words were chosen: Autism Spectrum Disorder, Early Start Denver Model. Only articles written in English were selected. From total of fifteen articles, six have been selected. The nine papers that were not included did not present content compatible with the current review and referred mainly to other therapies and intervention.

A meta-analysis that examined the effects of ESDM on young ASD children, conducted with the collaboration of Dr. S.J. Rogers (Fuller E.A. et. al., 2019) (3), showed significant improvements in cognition and

language, but no significant effects on autism symptomatology, adaptive behavior, social communication, or restrictive and repetitive behaviors, when compared to the control groups. The results indicate that additional interventions may be required in order to address these other aspects. In a similar study, Yu Q. et al. (2020), performed a meta-analysis on interventions based in Applied Behavior Analysis for young ASD children (ESDM included) in which were verified outcomes of socialization, communication and expressive language. Nevertheless, they did not observe substantial gain on general symptoms, receptive language, adaptive behavior, daily living skills, IQ (Intelligence Quotient), verbal IQ, non-verbal IQ, restricted and repetitive behavior, motor and cognition. Even so, this study did not isolate ESDM intervention among other ABA based therapies, which could have interfered with the results.

An Israeli clinical-trial (Sinai-Gavrilov Y. et. al., 2020) corroborates to these results, showing that the children in the sample who were treated with ESDM had higher gains in cognitive functioning and in receptive and expressive behavior than the control group. This also supports the effectiveness of implementing the program in non-English speaking countries. However, there was a subgroup of children with more severe autism symptoms that made slower progress in the time they have received the therapy, which suggests the need for a more intensive approach or other different interventions as well.

A French observational study (Geoffroy M.M. et. al., 2019) also found significant gains in verbal and non-verbal cognitive skills, especially receptive language, after 10 months of intervention with the sample. Although this research observed good results with low IQ non-verbal children, there remains a need for more consistent evidence.

When discussing factors that could interfere with the success of the ESDM treatment, Cucinotta F. et. al. (2020) genetic research reported an association between genetic FARP-1 deletions, which plays a significant role in neural plasticity, with a lack of response to ESDM autism treatment in a multiplex family with two ASD children. Although it is a single family study, the results are an example of how genetic variants are important in deciding on a naturalistic environmental intervention, such as ESDM. In this case, the article shows that different approaches would be more suitable depending on the case.

Another relevant article found was a South African study (Makombe C.B.T., 2019) (8) that focused on the facilitators and barriers of implementing ESDM with non-specialist local caregiver coaches. Through individual in-depth interviews, the authors observed that a clear supervision structure session, a positive coaching experience (due to its structure) and the programs video materials facilitated the implementation of the intervention. Although, many barriers were perceived related to economical limitations such as poverty, difficulty of understanding the complexity of the interventions and lack of physical structure to conduct the therapy (space, internet). This suggests that there may be a necessity of some ESDM adaptations in economically challenged places, so the program could provide significant outcomes.

Dr. S.J. Rogers study was considered the most reliable article on the subject, for its consistent methodology and result detail. However, there is a need for more similar comprehensive studies, in order to give more reliability to the evidences.

The first meta-analysis, the Israeli and the French study agreed in affirming that ESDM intervention showed outcomes on cognitive and language/communication related skills. However, the aspects of the child that did not report satisfying results were slightly different on each research, which suggests the need of clarification on this matter, as well for their respective reasons. The different approaches on each study should be taken into consideration, for, although they indicate similar skills, they may not refer the same behaviors.

The second meta-analysis, despite the fact it did agree with others on the language outcome due to the intervention, it disagreed with the cognitive related improvements. However, this could be owned to the inclusion of other ABA based therapies in the sample, not only ESDM, changing the results. In conformity with the fist article it did not show signification change on other autism symptoms such as restrictive, adaptive and repetitive behavior, suggesting that this result should not be expected with ESDM approach.

The Israeli, Cucinotta F. et al and South-African studies indicated factors which could interfere with the outcomes with ASD children. The first pointed a possible limitation of the therapy with more severe cases of autism. The second associated the lack of response to FARP-1 deletion, which could be present, or not, in the Israeli study. The third referred to environmental and economic difficulties as barriers to the success of the treatment with ESDM. This could be an important variant when the intervention is applied in under privileged communities, where material and structural limitations are expected. Although there is a significant number and variety of relevant studies on the outcomes of Early Start Denver Model intervention on young ASD children, all the articles pointed to a necessity of more research in this field, in order to clarify which infants could benefit best of the therapy and what are the expected results.

Keywords: Autism Spectrum Disorder, Early Start Denver Model, Applied Behavior Analysis, Behaviorism