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Early Start DENVER Model: A Meta-Analysis

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Abstract

Each child with Autism Spectrum Disorder has different symptoms, skills and types of impairment or disorder with other children. This is why the word "spectrum" is included in this disorder. Eapen, Crncec, and Walter, 2013 claimed that there was an emerging evidence that early interventions gives the greatest capacity of child's development during their first years of life as "brain plasticity" are high during this period. With this, the only intervention program model for children as young as 18 months that has been validated in a randomized clinical trial is "Early Start Denver Model" (ESDM). This study aimed to determine the effectiveness of the outcome of "Early Start Denver Model" (ESDM) towards young children with Autism Spectrum Disorders. This study made use of meta-analysis method. In this study, the researcher utilized studies related to "Early Start Denver Model (ESDM)" which is published in a refereed journal which are all available online. There were five studies included which totals 149 children exposed to ESDM. To examine the "pooled effects" of ESDM in a variety of outcomes, a meta-analytic procedure was performed after the extraction of data of the concrete outcomes. Comprehensive Meta Analysis Version 3.3.070 was used to analyze the data. The effectiveness of the outcome of "Early Start Denver Model" towards young children with Autism Spectrum Disorders (ASD) highly depends on the intensity of intervention and the younger child age. This study would provide the basis in effectively implementing an early intervention to children with autism such as the "Early Start Denver Model" (ESDM) that would show great outcome effects to those children that has "Autism Spectrum Disorder".

Keywords*: Denver model, autism, meta-analysis*

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Introduction

Autism today is clearly implied to be a complex and heterogeneous set of related developmental disorders in which no single cognitive mechanism or cause can account for the variety of symptoms and range in their expression (Tager-Flusberg, 2007). Autism Spectrum Disorder (ASD) has different definitions depending on what area of specialism a certain professional defines it. McGregor, Nuñez, Cebula and Gomez (2008) claimed that there are a lot of areas of professionals who researched about Autism Spectrum Disorder, and so a lot of views regarding this disorder are also introduced. Each specialism has an understanding of the condition within a certain model of functioning, with its own circumscribed knowledge base and terminology. Children with ASD that experiences different symptoms, impairment levels and skills are the term being defined for the word "spectrum". It can refer to a child with "simple" or "fully developed" autism who is extremely affected; to a child whose impairment is understated that people cannot even notice that the child have autism. Eapen, Crncec, and Walter, (2013) claimed that there was an emerging evidence that early interventions gives the greatest capacity of child's development during their first years of life as "brain plasticity" are high during this period.

As of now, there is no official known cause yet for Autism, and no cure as well but researchers suggest that intensive early treatment can change the lives of many children. The quality of life of children with ASD relies on the early detection of this disorder since this will lead to the compelling developmental improvements of the child's disabilities. With this, it will also help the parents or caregivers of the child.

Goldstein, and Princiotta, (2013) claimed that the necessity for early interventions for toddlers has increased as the gap widens between age of identification and age of available intervention. Interventions such as "Applied Behavioral Analysis (ABA)"; "Lovaas Model"; the "Treatment and Education of Autistic and Related Communication-Handicapped Children (TEACCH)"; and "Social Communication, Emotional Regulation, and Transactional Support (SCERTS)" have received support in the treatment of ASD. Behavioral approaches dominate in the different types of interventions for children with ASD. According to Eapen et al., (2013), early intervention offers the best treatment during the 12 months of life of the child with ASD since this is where the "brain plasticity" is high. This enables the neural networks to respond to the stimulation of the environment.

The type of treatment preferred for young children with ASD is "Early Intensive Behavioral Intervention (EIBI)" which incorporates the principles of "Applied Behavior Analysis (ABA)". According to Dawson, Rogers, Munson, Smith, Winter, Greenson, Donaldson and Varley (2010), with the origins from the Denver Model of 1981, ESDM was the only intervention model validated in a "randomized clinical trial" for children as young as 18 months. In Autism Speaks website, it defines ESDM as "a comprehensive behavioral early intervention approach for children with autism, ages 12 to 48 months. The program encompasses a developmental curriculum that defines the skills to be taught at any given time and a set of teaching procedures used to deliver this content. This program does not tie to a specific delivery setting, but it can be delivered by therapy teams and/or parents in group programs or individual therapy sessions in either a clinic setting or the child's home".

During the late 1960s and early 1970s where the earliest epidemiologic studies were conducted, the global "prevalence" of autism increased twenty to thirtyfold. It is during that time, that the European studies of "prevalence" estimates were one in 2,500 children in population. Improved awareness, recognition and improvement in diagnosing autism including the availability of service were considered to be the factors that influenced the recent increase of the "prevalence" of autism. With the earliest report from the "United States Autism Developmental Disabilities Monitoring Network (ADDM)" (2010) monitoring, the cases of autism among children were about one in every 68 children. According to Buescher, Cidav, Knapp, and Mandell (2014), medical supporting adults with ASD were much higher than in children.

Here in the Philippines, according to Erlinda Borromeo of Autism Speaks Foundation, Philippines "the estimated cases of autism rose from 500,000 in 2008 to one million people at present". An informal interview with the Department of Health Cebu City personnel, it was revealed that there was supposedly a project to document the prevalence rate of autism and this project is headed by the Department of Health Philippines. But this project is suspended due to lack of financial budget. Cebu City is among the areas included in this project. Three barangays were chosen for the study namely Inayawan, Sawang Calero and Binaliw due to the national statistics population records where it showed that these barangays have big population.

Cebu City does not have data on the prevalence rate of autism. This is the reason why there is still no policy and specific budget allocated only for Autism Spectrum Disorder cases. It is still under the mental health program of Person's with Disability (PWD). Department of Health Cebu City is having a difficulty in getting the reliable number of ASD cases in Cebu City due to financial

constraints. Diagnoses test alone which will be administered by a developmental pediatrician specialist would cost the family ₱3,000.00 per child. Diagnoses are not administered once but there are series of sessions to follow (J.A, Danes, personal communication, January 27, 2015).

SPED Coordinator Division Office Region VII Cebu City stated that in Cebu City there are 11 identified public SPED centers/schools for individuals with Autism Spectrum. Various feedbacks were gathered with some of the public SPED teachers who handled autism. It was mentioned that there were no specific intervention used, no specific trainings for Individualized Education Program (IEP), intervention only depends with the teachers' strategy, some of the children with Autism Spectrum Disorder were accepted without assessment or diagnosis result from a specialists since the family cannot afford to pay the fees for diagnostic test of their child.

Intervention evidence is defined by randomized controlled trials that vary greatly in their design, the accuracy of analyses, and the relevance of conclusions and recommendations. For this reason, a meta-analysis will be used by the researcher to measure how effective the "Early Start Denver Model" (ESDM) to be used as a type of intervention to young children with autism. It will measure the magnitude and effect size. By pooling effect sizes from different international peer-reviewed articles, this would lead to greater statistical power in identifying the effectiveness of ESDM to be introduced to the parents, Special Education (SPED) teachers, SPED Centers/Schools, DOH, DepEd Personnel, School administrators and future researchers.

Because of the current situation, the researcher conducts a meta-analysis study of ESDM intervention to know if this intervention will show to be effective in terms of its outcome effects based on the five studies being analyzed and if this will be applicable to the Philippines specifically Cebu City.

Statement of Purpose

This study aimed to determine the effectiveness of the outcome of Early Start Denver Model (ESDM) towards young children with Autism Spectrum Disorders.

The study sought to address the following objectives:

1. To describe the process of implementation of the Early Start Denver Model (ESDM) intervention for children with autism;
2. To determine the effect size of the experimentation using ESDM;
3. To determine the factors that has influence on the effect size; and
4. To identify gaps and challenges in the implementation of ESDM.

Autism Spectrum Disorder (ASD)

Lancet 2006 and Dawson et al, 2009 claimed that Autism Spectrum disorder (ASD) is described by social correspondence and communication, and stereotyped and repetitive behaviors disabilities, with early childhood onset. Intellectual disability exists in a wide percentage of individuals. According to Fulton, Eapen, Crncec, Walter and Rogers, 2014, ASD is considered a major public health concern due to its high levels of impairment, early onset and most especially due to its long term persistence. Pellicano, 2007 stressed that how the improvements associated with theory of mind happens to be associated with the advancements within executive function of normative progress. Scheeren, de Rosnay, Koot and Begeer (2013) stated in their study that those specific qualities connected with impairments inside socio-communicative movements inside the individuals that bring autism spectrum disorder might be those proofs directing, including limited clue in regards to psyche possibility. The capacity to ascribe mind states in order for other children which likewise also have impairments in theory involving intellect within children having autism has been consistently reported.

As a child ages, however, joint attention skills become more elaborate and involve subtle aspects of shared attention, such as ideas, intentions, and emotions (Mundy & Thorp, 2007; Rogers & Dawson, 2010). Children with ASD often have notable impairments in gesture use including delays in the onset and frequency of gesture use as well as the lack of integration of gesture use with other forms of communication (e.g., eye contact, vocalization). Additionally, gestures and gesture-word combinations are predictive of later responsive along with significant vocabulary capabilities intended for youngsters having autism. (Sullivan, 2013). In the same study, it is noted that children with ASD demonstrate impairments in responsive along with significant vocabulary language in early development (Landa and Garret-Mayer, 2006, Yirmiya et al., 2006, Zwaigenbaum et al., 2005 and 2009) as reiterated in Sullivan (2013). Rajendran and Mitchell (2007) noted that there are possible clinical reasons why autism will not be sub-classify even though this disorder consists of multiple deficits.

Autism and Developmental Disabilities Monitoring Network, 2009, Shattuck et al., 2009, Mandell et al., 2010 and Barbao and Dissanayake, 2009 claimed that the average age of diagnosis for ASD ranges from 3 years to 5 years and it also depends on the characteristics sample and geographical location. Individual characteristics that may contribute to an earlier diagnosis include being male, having an IQ score at or below 70, and having a history of a developmental regression (Shattuck et al., 2009).

Methods and Materials

This quantitative study made use of meta-analysis method to determine the ESDM as an intervention for children with autism. Meta-analysis is a statistical method of which integrates the outcomes regarding numerous separate reports that can be combined. In this study, the researcher utilized studies related to "Early Start Denver Model" (ESDM) which are published in refereed journals and are available online.

Outcomes of each study were analyzed with the use of meta-analysis software named Comprehensive Meta Analysis Version 3.3.070-November 21, 2014. To get the effect size, the researcher made a summary on the outcomes of each study by using a table for easy comparison. Each study used different domains and different measuring assessments that were also listed down on the table. Hedges's g was calculated for each domain per study. Effect sizes were used as standardized outcomes of the effect of ESDM. The three studies that has different sample sizes like the studies of Dawson et al., 2009 and 2012 and Rogers et al., 2012, the means and SD's of these independent groups were calculated using the independent groups data format.

The studies analyzed in this study were selected from unrestricted searches electronic databases of Esbco, Pediatrics, ProQuest, and PubMed for relevant trials using search terms "ESDM", "Early Start Denver Model", "Early Start Denver Model intervention for children with Autism", "Early Start Denver Model intervention". (Search date: January 28, 2015). The search was restricted to English language only and time of publication should be 2005 and up. The study utilized the data available from different international refereed journal. An extensive literature review led to identification of variables that were identified and tested for validity and reliability. Cluster analysis method had been utilized to look for the extensive developmental behavior treatment by means of intervention called "Early Start Denver Model" (ESDM). In the 115 scientific studies (72 from ProQuest, 27 from Ebsco, 4 from Pediatrics, and 12 from PubMed) originally recognized with the researcher's technique, 105 scientific studies remained upon screening for duplicates, 99 were excluded upon analysis of inclusion by analyzing titles and abstracts, six studies remain upon assessing the articles eligibility through analyzing the full-text and there are only five identified as valid studies based upon being peer-reviewed, reported ESDM trial, and to be able to incorporate information well suited for meta-analysis Hedges' g measurement on the impact calculation.

Table 1. Summary of the Features and Characteristics of ESDM

Study Name	**Participants used**		**Methods used**		**Interventions used**			
	Diagnosis	***Age Range (months)***	***Sample size***	***Assessment methods***	***Setting***	***Person/s who delivered the intervention***	***Intensity (h/week)***	***Duration (months)***
Dawson et al., (2009)	ASD & PDD	18-30	48	DSM-IV	Centre and Home	Trained therapists of ESDM; trained parents; monitored by a graduate-level, trained lead therapist	20 hours, session of 2 hours, two times per day, 5 days a week	24
Dawson et al., (2012)	ASD	18-30	48	ADI; ADOS; DSM-IV	Centre	Trained therapists of ESDM; the therapists were monitored by a Ph.D. level, remarkably skilled lead therapist; trained parents	20 hours/2-hour session, twice per day, 5 days/week	24

Rogers et al., (2012)	ASD	12-24	98	ESAT; ITC; M-CHAT; ADOS-T; MSEL; MCDI; VABS II	Home and Centre	Trained parent; Highly experienced and credentialed therapists of ESDM trained to fidelity	1 hour/12 consecutive sessions	3
Eapen et al., (2013)	ASD	36-58	26	DSM-IV-TR	Centre	Trained therapist of ESDM	1 hour (one-to-one); 15-20 hours of group-based	10
Fulton et al., (2014)	ASD	38.8-63.7	38	DSM-IV-TR	Centre	Trained and certified therapists of ESDM; trained child's key workers	I hour intensive individualized ESDM therapy; 10 and 20 hour group ESDM intervention	12

*ADI = Autism Diagnostic Interview
ADOS= Autism Diagnostic Observation Scale
ADOS-T = Autism Diagnostic Observation Scale for Toddlers
DSM-IV = Diagnostic and Statistical Manual of Mental Disorders, 4th Edition
DSM-IV-TR = Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision
ESAT = Early Screening of Autistic Traits Questionnaire
ITC = Infant Toddler Checklist
MCDI = MacArthur-Bate Communicative Development Inventory
M-CHAT = Modified Checklist for Autism in Toddlers
MSEL = Mullen Scales of Early Learning
VABS II = Vineland Adaptive Behavior Scales, Second Edition.
Setting delivered definitions:
Home= delivered at home
Centre = delivered at centre
Home and Centre = delivered at home and centre

Contrives, or number of subjects in intervention control groupings for between group studies sample size reported as total subjects for pre-post designs. Assessments used on each study were ADI, ADOS, ADOS-T, DSM-IV, DSM-IV-TR, ESAT, ITC, MCDI, M-CHAT, MSEL and VABS II.

There were five studies used in this meta-analysis. Child age ranges from 12-63.7 months. To sum up, there were 258 samples across all studies. Different assessment methods, setting, person/s delivered, intensity h/week and duration used per study.

The initial search located 115 papers, 72 from ProQuest, 27 from Ebsco, 4 from Pediatrics, and 12 from PubMed. Upon filtering from non-related and duplicates, there were 5 unique reports remained. All reports were screened by the researcher. When information from its title and abstract does not met the inclusion criteria, the report was excluded right away. The five reports were examined to confirm if they fully met the criteria of inclusion. Five studies showed that ESDM intervention was administered by trained therapists. Only two out of five studies used trained parents as part of the program. Three studies administer the intervention through center while there were two studies that used center and home. The span of time on which the interventions took place on the five studies varied from three to 24 months with sessions per week. Their individual sessions varied on its hourly period from one to two hours. Across studies, there were 23 outcome variables with six measurement used.

Results and Discussion

As what had been discussed in the rationale regarding the characteristics of ESDM, it showed the basis on implementing the said intervention. Five articles included in this study have shown that it uses the ESDM curriculum and made sure that the therapists including the parents delivering the intervention are trained. It also showed that the delivery can be used in any type of setting. Table 3 shows the summary of the process of implementation of ESDM intervention for young children with autism per study.

Table 2. Summary of the Process of Implementation of ESDM Intervention for Young Children with Autism

Study Name	Type of Setting	Person/s who delivered the intervention	Materials used
Dawson et al., (2009)	Centre and Home	Trained therapists of ESDM; trained parents; monitored by a level of graduate, a qualified lead therapist	Detailed intervention manual and curriculum
Dawson et al., (2012)	Centre	Trained therapists of ESDM; therapists that were monitored by a level of Ph.D., qualified lead therapist; trained parents	Detailed intervention manual and curriculum
Eapen, Crncec and Walter (2013)	Centre	Trained therapists of ESDM	Individualized treatment plan and ESDM curriculum
Fulton et al., (2014)	Centre	Trained and certified therapists; trained child's key workers	ESDM curriculum and teaching principles
Rogers et al., (2012)	Home and Centre	Trained parents; Highly experienced and credentialed therapists of ESDM trained to fidelity	Detailed parent curriculum, specific coaching intervention method and a therapist fidelity measure

The success of the implementation of ESDM depends on how trained the individual who delivered the said intervention and the extensiveness of intervention. In implementing an intervention, measuring the intervention fidelity of the one who delivered is very important because it measures the degree to which an intervention or program is delivered as intended. The central popular features of ESDM are classified as the subsequent: societal trade and positive affect joint activities, language and communication, naturalistic utilized behavioral analytic tactics, vulnerable to normalcy developing series and parental involvement (Autism Echoes, 2014). Any professionals can be therapists of this intervention such as developmental pediatrician, psychologist and speech and language pathologist for as long as they are trained and are certified with this kind of intervention. Parental involvement in this intervention is also very important for the continuous application of the curriculum and so the trained therapist will explain and model the strategies to be used to their homes. There was also a separate manual intended for parents to help them with the hands-on strategies into their daily activities with their children. As discussed in Autism Speaks (2014), the training of ESDM, is comprised of 2 courses. These courses are delivered in various site locations and span across four days. The course for introductory discusses the main characteristics of ESDM but does not intend to train the professionals when it comes to fidelity of the intervention. During the training, participants are to learn the ESDM interventions background, data, its principles, and the process of assessments and how the intervention will be applied. The Advanced Course offers direct practice in the curriculum administration and delivery of the ESDM intervention, fidelity scoring, and data management systems. The course for advanced training trains the professionals by applying interactive sessions with ASD children. This training will equip them with regard to the information, skills and resources needed to properly implement ESDM. The professionals are required to submit training materials that demonstrates their continued competency by correctly following the training that they have learned as part of a follow-up in this course.

The MIND Institute (Medical Investigation of Neuro developmental Disorders) of University of California in Davis, Sacramento, discussed in their website on how to be a certified therapist with this intervention. The trainers of the ESDM training activities are ESDM Certified trainers who have achieved certification in ESDM therapy and trainer level ESDM requirements. The trainees for the introductory level intervention should have the following requirements: must possess academic degrees further than any bachelor's or this educational equivalent from their land associated with origins for instance MA or Ph.D, ought to been employed and are exposed to 12-48 of ages of children who have Autism Spectrum Disorder (ASD), must have work experience within an interdisciplinary workforce for instance general/special schooling tutor, developmental/clinical psychiatrist, and SLP, OT as well as behavior expert, need to bring their own manual towards the workshop course and should make sure that they have read the ESDM manual prior to the workshop, and for the trainees to be certified they need to have the resources of materials needed for the training workshop, these training materials will be submitted to the centers where they have been trained for fidelity review.

Professionals who were trained with the advanced course will be coached and given feedbacks as to how to make an appropriate teaching curriculum that will provide young children with ASD a naturalistic routine experience. The trainees for the advanced course should have participated during the introductory course. The entirety of the process should not exceed 9 months. Aside from the

qualifications of those who will deliver the intervention, the number of intervention hours also matters to the development of the child with Autism Spectrum Disorder (ASD). This was shown on the four studies included in this meta-analysis. This intervention is following a certain curriculum specific to the needs of the child. Prior to establishing an individualized plan, the child with autism will be diagnosed with the use of different diagnostic measurement. This will help in the establishment of the curriculum that needs to be followed to have a quality of result of the child's development during the intervention. The entirety of the intervention will have specific activities throughout the intervention program and so the number of intervention hours is also embedded wherein the development of the child was analyzed based on their needs.

In Cebu City, SPED teachers of the government schools are using different interventions which they do not know the names of the interventions being used. No specific type and name of intervention being communicated to every teacher that handles children with autism.

Effect Size of the Experimentation Using ESDM

To know how effective ESDM is, effect size was calculated to quantify the effectiveness of this intervention relative to some comparison. The size of the effect of the outcomes contribute to more scientific approach to the buildup of knowledge since it put significance on the most important characteristic of an intervention. With these reasons, Effect Size (ES) is an important tool in reporting and interpreting effectiveness. This study made use of the Cohen's *d* to show the ES of different attributes being measured and Hedges's *g* for the overall ES that was shown on the forest plot. To understand more on the magnitude being interpreted on each ES, Cohen's *d* interpretation table was used to identify each magnitude of the ES that was shown on table 2.

Table 3. Summary of the Effect Size of the Three Attributes Measured using VABS Measurement Assessment

	Cohen's *d*					
Outcomes	**Dawson et al., 2009**	**Dawson et al., 2012**	**Roger et al., 2012**	**Eapen et al., 2013**	**Fulton et al., 2014**	**Overall Average Cohen's *d***
VABS Communication	0.67	1.29	-0.13	-0.14	0.21	0.38
VABS Socialization	0.58	0.89	-0.13	0.22	0.02	0.32
VABS Daily Living Skills	0.64	1.30	-0.13	-0.01	0.05	0.37
*VABS = Vineland Adaptive Behavior Scales						

This table shows the ES using Cohen's *d* across five studies. It used the same assessment and attributes. The assessment used VABS which means Vineland Adaptive Behavior Scales that which is a parent interview that examines everyday living and also generator knowledge, communication and also the cultural aspect. The item gives similar era and normal results for various attributes offering cultural adaptive performance, receptive and significant language. In this table, it showed that the highest ES is the communication attribute followed by daily living skills and last is the socialization. But upon using the Cohen's *d* interpretation table, all of the three attributes still fall to the small effect magnitude. Table 6 summarizes the outcome ES of the three studies who used the same measurement assessment with the same attributes being measured.

Table 4. Summary of the Effect Size of Same Attributes measured using MSEL and VABS Measurement Assessment

	Cohen's *d*			
Outcomes	**Dawson et al., 2009**	**Eapen et al., 2013**	**Fulton et al., 2014**	**Overall Average Cohen's *d***
MSEL Receptive Language	0.62	-0.40	0.48	0.23
MSEL Expressive Language	0.57	-0.38	0.40	0.20
MSEL Visual Reception	0.42	-0.47	0.63	0.19
MSEL Fine Motor	0.45	-0.19	0.14	0.13
VABS Communication	0.67	-0.14	0.21	0.25
VABS Socialization	0.58	0.22	0.02	0.27
VABS Daily Living Skills	0.64	-0.01	0.05	0.23
VABS Motor Skills	0.81	-0.19	0.45	0.36
*MSEL = Mullen Scales for Early Learning, VABS = Vineland Adaptive Behavior Sclaes				

This table shows the summary of the attributes being measured by two measurement assessment which are the MSEL and VABS. Mullen Scales for Early Learning (MSEL) is used to test children from birth to five years and 7 months. Among the attributes measured, fine motor and visual reception measured through MSEL shown to be having a 0.13 and 0.19 overall average ES which can be interpreted into a no effect. This means that ESDM do not have any effect with regard to these two attributes being assessed. While the other remaining six attributes shown to have only small effect across all other attributes. To see the overall ES across all studies, a forest plot is used to understand more the ES of each study since it will show the graphical or visual picture. Figure 3 shows the Meta analysis forest plot of the intervention.

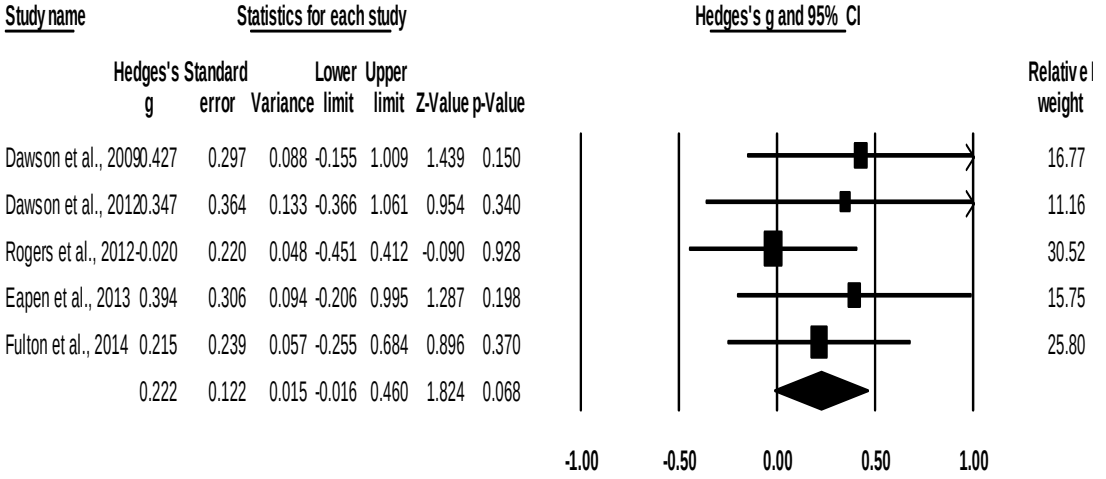

Figure 3. Forest Plot of the Sizes of Mean Effect with 95% of Confidence Interval across All Studies and Outcomes

Each study has dedicated one line starting from the column that shows the study and extends to the graphical column. The particular horizontal trace symbolizes the interval associated with confidence while the markers represent the central values. The vertical line in the middle of the graph is the "line of no effect" that has 0.0 values where the intervention has no effect in the outcome. The size of the box is related to the weight given to the studies. On the graph presented, Rogers et al., (2012) study have a relative weight of 30.52 which shows bigger box which means it has bigger weight on the study which supports the biggest number of their study's participants among others. Each of the horizontal lines emanating out of each box represents the confidence interval for each study where if it shown an arrow it means that the level of confidence is beyond the space of the graph. The value axis of the study is the magnitude of the effect. The overall estimate of size of the effect is shown on the bottom of the study statistics which is also showing the diamond on the graphical column. The peaks of the diamond relate to the overall hedge's g which is 0.222 and the edges of the diamond shows the interval of confidence of -0.016 lower limit and 0.460 upper limit. The diamond being shown on the graph does not cross the vertical "line of no effect" and so it revealed statistically significant. The figure shows that the overall effect size of ESDM across all five studies shows small effect due its overall ES 0.222 which falls to the small effect magnitude on the interpretation table of Cohen's *d.*

The pooled effect sizes for expressive language, fine motor, receptive language and visual reception across 3 studies (Dawson et al., 2009, Eapen, Crncec, and Walter 2013 and Fulton, Eapen, Crncec, Walter and Rogers 2014) showed 0.5 for expressive language, 0.3 for fine motor, 0.5 for receptive language, and 0.5 for visual reception with 95% confidence interval (CI), lower limit of -0.1 and an upper limit of 0.6. MSEL measurement was used to assess the. The overall ES across all attributes was 0.5 with 95% confidence interval which showed a magnitude of intermediate ES. The pooled effect sizes for motor and daily living skills, communication, socialization and adaptive behavior composite across five studies showed 0.0 for the adaptive behavior composite, 0.5 communication, 0.4 daily living skills, 0.6 motor skills, and 0.1for socialization with 95% confidence interval, lower limit 0.0 and an upper limit of 0.3. These attributes were assessed using Vineland Adaptive Behavior Scale 2nd edition (VABS II).

Factors that has Influence on the Effect Size

The increase or decrease of the effect size of a certain intervention outcomes in a certain study does not only rely on the sample size being used but also because of the other factors such as the child age, person/s who delivered the intervention, intensity h/week and duration. In this meta-analysis, there were two highlighted major factors that are influential on the effect size. First major factor being considered is the number of hours received by the participants and the second major factor is the younger child age. All of the studies also showed that due to the strategies and principles that ESDM intervention uses, this also added to the factors that influence the effect size.

Table 5. Summary of Factors that Influences the Effect Size

Study	Age Range (months)	Sample size	Person/s who delivered the intervention	Intensity (h/week)	Duration (months)
Dawson et al., (2009)	18-30	48	Trained therapists of ESDM; trained parents; monitored by a level of graduate, lead therapist that is trained	20 hours	24
Dawson et al., (2012)	18-30	48	Trained therapists of ESDM; therapists of ESDM were monitored by a level of Ph.D., certified therapist; trained parents	20.4 hours group-based	24
Eapen, Crncec and Walter (2013)	36-58	26	Trained therapists of ESDM	1 hour (one-to-one); 15-20 hours of group-based	10
Fulton, Eapen, Crncec, Walter and Rogers (2014)	38.8-63.7	38	Trained and certified therapists; trained child's key workers	I hour intensive individualized ESDM therapy; 10 and 20 hour group ESDM intervention	12
Rogers et al., (2012)	12-24	98	Trained parent; Highly experienced and credentialed therapists of ESDM trained to fidelity	1 hour	3

The studies of Dawson et al., 2009 and Dawson et al., 2012 applied the 24 months duration, 20 hours of intensity with child age of 18-30 months and resulted into a magnitude of intermediate effect (0.5 to 0.6 ES with 95% CI) across 18 attributes. The study of Eapen, Crncec, and Walter 2013 used 10 months duration with 15 to 20 hours of group-based intervention with child age of 36-58 months and resulted into a magnitude of small effect (0.2 ES with 95% CI). The study of Fulton, Eapen, Crncec, Walter and Rogers 2014 used 12 months duration, 10 and 20 hours group-based intervention with child age of 38.8-63.7 months. Their study resulted into a no effect and on the study of Rogers et al., 2012 that used 3 months of duration, 1hour intensity per week with 12-24 months of child age. Their study resulted into adverse effect.

The findings of the scientific studies utilized in the meta-analysis evidently demonstrates the amount of hours of intervention and the younger child age influences the effect size of the intervention.

Gaps and Challenges in the Implementation of ESDM

The studies used in this meta-analysis did not mention any gaps and challenges in the implementation of "Early Start Denver Model" (ESDM) but the researcher was able to identify some gaps and challenges in implementing this intervention here in the Philippines specifically in Cebu City. Based on the locations wherein these studies were conducted, three out of five studies conducted their study in the United States of America: North Carolina (Dawson, 2009 and Dawson, 2012), Sacramento (Rogers et al., 2012) and two out of five studies conducted at Australia: Sydney, Australia (Eapen, Crncec and Walter, 2013) and New South Wales (Fulton, Eapen, Crncec, Walter and Rogers, 2014). These countries have included early intervention in their federal law intended for children with disabilities that includes Autism Spectrum Disorder (ASD).

United States of America have a policy with regard to the early intervention for children with disabilities. They have this federal law called Individuals with Disabilities Education Act (IDEA) that governs how states and public agencies provide early intervention, special education, and related services to children with disabilities.

Part C of the IDEA is a $436 million program administered by States that serves infants and toddlers through age 2 with developmental delays or who have diagnosed physical or mental conditions

with high probabilities of resulting in developmental delays which includes autism spectrum disorder. It is the accountability of each State to improve results and provide needed services for infants and toddlers with disabilities and their families. This law also includes Individualized Family Service Plan. It is also stated in their policy that there should be appropriate early intervention services based on scientifically based research, to the extent practicable, are available to all infants and toddlers with disabilities and their families. They have comprehensive system of personnel development, including the training of paraprofessionals and the training of primary referral sources with respect to the basic components of early intervention services available in the State.

The Australian government provides a range of support for people with disabilities including ASD through various agencies. In 2008, the Federal government introduced the Helping Children with Autism (HCWA) package, supported by funding of over $190 million over four years. A major element of HCWA is that children who have been diagnosed with an ASD before the age six can access to $12,000 in early intervention support over two years from a range of authorized providers. Two key programs of early intervention are Helping Children with Autism (HCWA) and Better Start for Children with Disability (Better Start). Throughout Australia, there are more than 2,100 service providers have registered to provide early intervention through HCWA, and more than 1,900 through Better Start. These two programs will now transition to National Disability Insurance Scheme (NDIS) (Australian Government, Department of Social Services, 2015).

In the Philippines, the Republic Act No. 7277 which is called "The Magna Carta for Disabled Persons" which provides policies for disabled as special persons. This document stipulated that DOH is required to (1) institute a national health program for PWDs, (2) establish medical rehabilitation centers in provincial hospitals, and (3) adopt an integrated and comprehensive program to the Health Development of PWD, which shall make essential health services available to them at affordable cost. Persons with disabilities have 20% discount entitlements.

In January 4, 1996, the President of the Philippines also declared the third week of January as Autism Consciousness Week. In his Proclamation No. 711, it stated that the aim of the Philippine Government to develop awareness of the problems of autistic persons and promote a supportive environment among communities to enable autistic persons to live with dignity and enable them to function independently and contribute productively to society. The government recognizes the need to provide greater attention and assistance to the plight of autistic persons and mobilize its various agencies and departments, especially the Department of Health, the Department of Education, Culture and Sports, and the Department of Social Welfare and Development to look into how they can meaningfully support community-based approaches toward providing early diagnosis, therapy and education intervention to autistic reports. The Department of Health, the Department of Education, Culture and Sports, the Department of Social Welfare and Development, and the Department of Interior and Local Government will jointly serve as the national focal point for the commemoration of the said event. These agencies will take the lead in initiating activities that will increase awareness on autism and its effects, as well as its early identification (NCDA, n.d.).

In Cebu City, an informal interview on January 27, 2015 with the Research and Information Section In-Charge of Department of Health Cebu City, three different public SPED teachers of and the SPED Coordinator of Department of Education Cebu City, and two officials of Autism Society Philippines Cebu Chapter was done. During the interview, the Department of Health Research and Information Section In-Charge stated that currently, the Department of Health (DOH) disability program includes autism in the mental disability program which means that they still don't have specific policy for this disability.

During the Autism Consciousness Week Celebration of Cebu with a joint force of DepEd Cebu City and Autism Society Philippines-Cebu Chapter at Southwestern University last January 30, 2015. The researcher was able to interview the President and the Secretary of ASP-Cebu Chapter after the whole day program. The President mentioned that only the Department of Education have participated and shown support for the said event. They have not received any help or communication coming from the other government agencies assigned to lead in initiating the activities that will increase the awareness on autism.

The gaps and challenges in implementing ESDM intervention in the Philippines is that due to the fact that the Philippines does not have policy for autism unlike other countries, government agencies cannot strictly implement on the process of diagnosing autism children at a younger age and delivering evidence-based intervention applicable for the improvement of this children. The individuals that will also deliver interventions will not receive proper trainings that are very important to achieve quality intervention due to no proper support from the government.

CONCLUSION

The effectiveness of the outcome of "Early Start Denver Model" towards young children with Autism Spectrum Disorders (ASD) highly depends on the intensity of intervention and the younger child age. High frequency intervention will achieve high quality and meaningful outcomes with the development on the impairments of children with autism. The degree of "brain plasticity" of younger child is high during this time and so the better development will be seen and observed. It is also during this time that children with ASD only show minimal developmental milestone disorder.

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