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RESEARCH OF ASD

ИССЛЕДОВАНИЕ РАС

Evidence Base Analysis of the Effectiveness of Early Intervention Models the DIRFloortime Model and the ESDM Model. Part 2. ESDM Model[1]

Nikolay V. Romanovskiy
Institute of Correctional Pedagogy,
Moscow, Russia,
ORCID: https://orcid.org/0000-0002-2467-9578, e-mail: romanovskij2@gmail.com

Objectives. Describing empirically proven algorithms of the Early Start Denver Model (ESDM) is a relevant task to compare variants of the model practically presented in the correctional space and the empirically proven variant. The basic empirical studies of the effectiveness of the ESDM model are analyzed.
Methods. The review considers 9 English-language sources, 5 articles in Russian, and a textbook on the Denver Early Intervention Model, which describe evaluations mainly in the format of randomized and controlled trials of the effectiveness of the ESDM model.
Results. The results of the analysis of the cited studies indicate a significantly greater effectiveness of the ESDM approach for children with autism spectrum disorders (ASD) compared to standard available care options on such parameters as: receptive and expressive speech, socialization, daily living skills, communication, motor skills, reduction of the main symptoms of autism, and reduction of parental stress.
Conclusions. The basic evidence-based applications of the ESDM model are described, which include: writing an individualized care plan, intensive sessions with the child for approximately 15 hours per week, regular parent training, independent interaction with children for approximately 2—3 hours per day, and age of onset of care between 18 and 30 months. The conclusion has been made that the Early Start Denver Model (EDSM) is appropriate for working with early age children showing signs of ASD.

Keywords: ESDM; Early Start Denver Model; autism spectrum disorders (ASD); evidence-based early help practices; parent education; early help effectiveness; intervention intensity; evidence-based approach

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Анализ доказательной базы эффективности моделей ранней помощи DIRFloortime и ESDM. Часть 2. Модель ESDM[2]

Романовский Н.В.
Федеральное государственное бюджетное научное учреждение
«Институт коррекционной педагогики»
г. Москва, Российская Федерация
ORCID: https://orcid.org/0000-0002-2467-9578, e-mail: romanovskij2@gmail.com

Актуальность и цель. Описание эмпирически доказанных алгоритмов модели ранней помощи ESDM (Early Start Denver Model) позволяет сопоставить варианты практически представленной в коррекционном пространстве модели и эмпирически доказанный вариант. Проанализированы основные эмпирические исследования эффективности применения модели ESDM.
Методы и методики. В обзоре рассмотрены 9 англоязычных источников, 5 статей на русском языке, а также учебник по Денверской модели раннего вмешательства, в которых преимущественно в формате рандомизированных и контролируемых исследований описаны оценки эффективности модели ESDM.
Результаты. Результаты анализа приведенных исследований свидетельствуют о значимо большей эффективности подхода ESDM для детей с расстройствами аутистического спектра (РАС) по сравнению со стандартными доступными вариантами помощи по таким параметрам как: рецептивная и экспрессивная речь, социализация, повседневные жизненные навыки, коммуникация, двигательные навыки, уменьшение основных симптомов аутизма, уменьшение родительского стресса.
Выводы. Основные доказанные варианты эффективного применения модели ESDM включают: написание индивидуального плана помощи, интенсивные занятия с ребенком примерно 15 часов в неделю, регулярное обучение родителей, самостоятельное взаимодействие с детьми около 2-3-х часов в день, возраст начала помощи от 18-ти до 30-ти месяцев. Сделан вывод о целесообразности применения модели ESDM в работе с детьми раннего возраста, имеющими признаки РАС.

Ключевые слова: ESDM; Денверская модель ранней помощи; расстройства аутистического спектра (РАС); научно доказанные практики ранней помощи; обучение родителей; эффективность ранней помощи; интенсивность вмешательства; доказательный подход

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Introduction

Modern thinking on early intervention for children with developmental disorders places certain demands on it. If we consider early intervention as one of the variants of psychological and social practices, then an important requirement for it is the presence of empirical evidence of its effectiveness, which should be obtained through scientific research and presented to the professional community in the form of scientific publications [2].

Such studies are of high practical value as they allow to evaluate a specific algorithm of the application of practice in a study and its effect. The very possibility of such an evaluation allows all interested parties to make a conclusion about whether a practically presented model of early intervention corresponds to the empirically proven algorithm or differs significantly from it. The presence of inconsistencies between the practically presented model and its original source can be the basis for a closer evaluation of

[2] Часть 1 см: *Романовский Н.В.* Анализ доказательной базы эффективности моделей ранней помощи: DIRFloortime и ESDM. Часть 1. Модель DIRFloortime // Аутизм и нарушения развития. 2023. Том 21. № 4. С. 26—33. DOI: https://doi. org/10.17759/autdd.2023210403

the model and a decision to look for other available options.

Thus, the aim of this paper is to analyze the empirically proven algorithms of the early intervention model, the ESDM model.

Literature Review

The ESDM approach stands for the Early Start Denver Model and is a revised and expanded version of the Denver model of care for children with autism developed in the 1980s. The ESDM model is based on the modern scientific understanding of early childhood development and aims to reduce the severity of autism symptoms in children and to accelerate development in the cognitive, social and emotional, and speech domains. According to the authors of the approach, "ESDM takes as a basis the general direction of development of a typical child and aims to return to the same developmental trajectory children at risk of autism" [3, p. 27].

On the basis of numerous studies, the authors of the ESDM model conclude that a very important component of correctional work with a child with autism spectrum disorder (ASD) is the emotional inclusion of the child in the events around him/her, and an important declared goal is to help a child with ASD to develop his/her social interest. The necessity of interactive, emotionally rich interaction for the successful speech, social and cognitive development of the child is emphasized [3, p. 32].

An important component of the ESDM model is the emphasis on developing relationships between the child and his/her close adults and on supporting these relationships, turning them into close and trusting ones [3, p. 46], developing in parents such qualities as responsiveness, sensitivity, empathy, teaching them to understand the child's signals for more productive interaction [3, p. 15—16].

The approach emphasizes the importance of the child's own social initiative, their social inclusion and the encouragement of this initiative and inclusion on the part of adults [3, p. 16].

The authors of the ESDM model are based on the approach to the development of interpersonal relationships in autism developed by Rogers and Pennington (1991) under the influence of Daniel Stern's research. The main idea of this approach is that children with ASD have impaired imitation skills, resulting in difficulties with bodily adjustment to adults, with recognizing the feelings and moods of others, and with coordinating movements. The ESDM model pays great attention to the development of imitation in children, because, from their point of view, it is on the basis of this skill that young children develop social and communicative abilities [3, p. 47]. The authors of the ESDM model consider their model to be quite close to approaches focused on emotional interaction, such as Mahoney and Perales' "responsive intervention" method, RDI relationship development therapy (Gutstein, 2005) and the DIRFloortime approach [3, p. 73].

The main goal of the approach is to support the development of the most important "social-emotional-communicative skills by creating an emotionally enriched relationship with a sensitive and responsive adult" [3, p. 48].

The authors of the ESDM model are based on Dawson's hypothesis that autism is based on impaired social motivation, which in turn leads to impaired sensitivity towards social rewards [3, p. 48]. To overcome these social deficits, the authors of the ESDM model suggest using Pivotal Response Training (PRT) Koegel [10], from their point of view, this tool is able to increase the importance of social approval, to increase social attention, the motivation for social interaction.

The ESDM model in the context of speech development is based on the assumption that verbal speech develops only after the child has mastered the ways of non-verbal communication [3, p. 51].

The distinctive features of the ESDM model are the use of sensory and social repetitive games as the main type of developmental activities with a focus on interpersonal interaction; teaching the child to imitate gestures and facial expressions; the development of both verbal and non-verbal forms of communication; attention towards the development of the cognitive aspects of play activities and co-operation with parents. An interdisciplinary team of specialists is working on an integrated curriculum [3, p. 46].

In Russia, in the last 7 years, the ESDM approach has become increasingly popular, which is manifested in the fact that some of its variations are being introduced into the practice of state correctional care for children with ASD of early and preschool ages [1; 5; 6].

Materials and Methods

In connection with the stated circumstances, I set the task to evaluate the scientific and practical validity of the model of early ESDM assistance. The research

methods used were the theoretical analyses of current research on the evaluation of the effectiveness of the ESDM model presented in scientific publications.

The selection and analysis of the results was performed according to the following criteria: the review included studies conducted within the so-called “gold standard” — randomized controlled trials; however, the presented analytical review used data from other studies with high practical relevance. The analysis was conducted using the following electronic resources: eLIBRARY.RU, CyberLeninka, PubMed, ResearchGate. In addition, print publications available in Russia devoted to the ESDM approach were reviewed.

Results

The ESDM approach was originally created by a group of researchers in the field of early development, which is reflected in quite a large number of scientific studies on the effectiveness of this model.

The study by Vismara et al. [13] reported the results of a randomized controlled trial of a 12-week training program for non-verbal children with ASD using the ESDM model. The program involved 1 hour per week of individual therapy with the child and parent training. The results of the study stated that there were significant improvements in speech in the children of the experimental group [10].

In a 2006 study, the Early Start Denver Model was compared to another early intervention model, PROMT therapy. The children who participated in the study were randomly divided into two groups, with one group implementing the Early Start Denver Model and the other group implementing PROMT therapy. Positive dynamics (80%) were observed in both groups: children mastered the ability to communicate their intentions using words and were able to spontaneously say words on their own initiative [3, p. 66].

In 2009, Dawson and colleagues conducted a randomized controlled trial on a group of 48 children with autism (autistic disorder and pervasive developmental disorder) aged 18 to 30 months. Children with additional disorders were not included in the group. The group was divided into two subgroups according to IQ level (less than 55 points and greater than 55 points), each subgroup was divided randomly into two groups, which were later combined again into two groups, experimental and control, each containing an equal number of children with low and high IQ levels [7].

The following scales were used as research methods: the Autism Diagnostic Interview-Revised (ADI-R), the version for children under 5 years of age; the Autism Diagnostic Observation Schedule (ADOS); the Mullen Scales of Early Learning (MSEL); the Vineland Adaptive Behavior Scale (VABS); the Repetitive Behavior Scale (RBS).

In the experimental group, support was provided to children based on the ESDM model with 20 hours of sessions per week (an average of about 15 hours per week of individual sessions) for two years. In addition, parents were taught the strategies and techniques for interacting with the child, used in the ESDM approach, once every six months, also for two years. Parents were encouraged to use the strategies and techniques of the ESDM approach in the family’s daily life (in feeding, bathing, playing with the child) and to track the number of hours per day they used them. Parents reported spending an average of about 15 hours per week using ESDM strategies, in addition to reporting that their children received an average of about 5 hours of other types of support (such as speech therapy, preschool visits, etc.).

The control group received standard types of assistance, which averaged about 9 hours per week of individual sessions with a speech therapist and occupational therapist, in addition to which the control group children received an average of about 9 hours of group sessions while attending a remedial kindergarten.

Before the experiment, the children in both groups had no differences in the severity of autism symptoms, IQ level, the gender and socioeconomic status of the family.

A follow-up assessment two years later showed that children in the experimental group showed significant improvement on the Mullen Scales of Early Learning compared to the control group. The largest gains were observed on the receptive and expressive speech scales (18.9 and 12.1 points in the ESDM group, compared to 10.2 and 4 points in the control group), while significant differences were observed on the Vineland Adaptive Behavior Scale (VABS) in the areas of general adaptive behavior, socialization, daily living skills, communication and motor skills. The control group, on the contrary, showed a deterioration in adaptive behavior scores. Also, 7 children from the experimental group had their diagnosis changed from autism spectrum disorder to pervasive developmental disorder — a similar improvement was observed in only 1 child from the control group [7].

To expand on the first study, Rogers et al. conducted a study in 2019, that included 118 children

aged 14 to 24 months with the diagnosis of autism spectrum disorder; the children were randomized into two groups. The control group received standardized types of assistance for an average of 14.1 hours per week. The types of assistance varied, mentioning home-based sessions with an early childhood educator, sessions with an occupational therapist, ABA therapy, TEACCH approach sessions, speech therapy, DIR approach sessions, motor therapy, therapeutic groups for infants and toddlers, attendance of public preschools, and ESDM training hours.

The experimental group received ESDM therapy in the following modification: the parents of the children first received 3 months of weekly individual coaching, followed by 2 years of an average of 15 hours per week of individual ESDM therapy at home or in kindergartens by specialists under the supervision of more experienced therapists. At the same time, the parents of these children received 4 hours of parent coaching per month from a certified ESDM therapist (averaging 17.3 hours per week of total support for the child and the parents). The results of the study showed similar findings to the first study; however, the differences between the control and experimental samples were not as pronounced as in the primary study [12].

In 2020, D. Gao et al. conducted a comparative study of the effect of ESDM model delivery options on parental stress. The study compared two randomly selected groups of families of children with ASD. The first group received early help from the ESDM program in an intensive format, and, in addition to this help, the parents received ESDM skills training. The second group received parent training based on the ESDM program. The results of the reassessment after three months showed that progress in children was observed in each group, but stress levels were lower in the group of parents whose children received an intensive intervention program [8].

In 2019, in Austria, D. Holzinger conducted a non-randomized controlled trial of the effectiveness of a low intensity ESDM approach (4.6 hours per week) compared to a standard regional early intervention program. The results of the study indicate that after 12 months from the start of the model's use, children in the experimental group had improved speech and reduced the manifestations of the main symptoms of autism [9].

In 2018, Vismara L.A. conducted a study of the ESDM model in a low-intensity parent coaching format for parents of children with fragile X chromosome syndrome (Martin-Bell syndrome) on 4 parent-child pairs. The parents reported success in implementing the coaching program and on achieving their goals [14].

In 2023, Vismara et al. conducted a study examining the effectiveness of partially remote training in the ESDM model for parents and other caregivers of children with ASD. The accuracy of the use of this model was also assessed by the same parents. The study involved 10 pairs of parents and children with ASD. A five-day training workshop was conducted with parents, followed by six training sessions on parent coaching. The results of the study showed improvements in social communication scores in children and improvements in the accuracy of parents' use of the ESDM model [15].

A systematic review of randomized controlled trials and quasi-experimental studies by Pruneti et al. was published in 2023 to evaluate the effectiveness of behavioral interventions for autism spectrum disorders. Based on the results of this review, it can be concluded that the ESDM approach significantly improves receptive language in preschool children [11].

In the article by Starikova O.V. et al. (2022) a non-randomized, uncontrolled trial of 19 children diagnosed with childhood autism (F 84.0) is described. The study used a low-intensity ESDM program (2—3 hours of sessions per week with the child and parent training during 10 meetings) lasting 6 months. The ESDM key skills list and the RCDI-2000 scale were used to assess outcomes. Re-evaluation revealed significant progress in the development of social skills, fine motor skills, self-care, active speech development, and language comprehension [4]. The authors of the study conclude that this version of sessions based on the Early Start Denver Model for children with ASD "develops all areas of the child's life and helps to improve behavior" [4, p. 6]. In my opinion, there is insufficient evidence for this statement due to the lack of a control sample in the study and due to the diagnostic methods used with insufficient reliability.

Discussion of the Results

Thus, the ESDM Early Start Denver Model has a good evidence base in a high-intensity version of the program (15 hours per week) with parent coaching. In addition, there has been less definitive research on the effectiveness of a low-intensity ESDM program combined with parent coaching. It should be emphasized that in all studies, one or another version of parent training is mandatory. In the Russian-speaking space, although there are articles related to the topic of ap-

plying the Denver model, there are virtually no materials describing experimental studies that could claim the scientific evidence of this approach on a Russian-speaking sample.

Conclusions

To summarize the results of the analytical review, we can say that the ESDM model has a good evidence base, which is reflected in a large number of studies conducted with high methodological rigor, and can rightfully be considered an evidence-based practice of early intervention. In the Russian-speaking space, the effectiveness of the ESDM model has not been sufficiently studied, and this is an urgent task of scientific research practice in the near future.

For the ESDM model, the following experimentally proven algorithms can be distinguished:

— Creating a curriculum based on a list of key skills.

— Training (coaching) of parents from a certified ESDM therapist on a regular basis, from 1 to 4 hours per week.

— Parents using ESDM strategies with their children in everyday life situations on a regular basis.

— Conducting ESDM therapy in an individual format by specialists under the guidance of certified ESDM therapists for at least 15 hours per week.

— The duration of the intervention is about 2 years.

— Age at the initiation of ESDM therapy is from 18 to 30 months.

— ESDM therapy has been experimentally proven in children diagnosed with ASD who do not have concomitant neurological diseases, chronic somatic diseases and have an intelligence quotient (IQ) of at least 35 points on the visual perception and fine motor subscales of the Mullen Scales of Early Learning (MSEL).

Possible results from intervention based on the ESDM model if the above algorithms are followed:придать документу

— Reduction of the main symptoms of autism up to changing the diagnosis to a milder one.

— Reduced parental stress following a high-intensity intervention program.

— Improvement of receptive and expressive speech.

— Improvement in adaptive behavior, socialization, daily living skills, motor skills.

— Improved communication.

It can be concluded that the application of the ESDM model in a scientifically based version requires compliance with a fairly large number of conditions, including the level of the development of children, their age, parental participation, the intensity and duration of the intervention, and the level of competence of specialists. Specialists who recommend this option of assistance to parents of children with ASD should also clarify these algorithms for applying the ESDM model to them, which should help them navigate the variety of correctional services offered for children with ASD.

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Information about the authors
Nikolay V. Romanovskiy, PhD in Psychology, Institute of Correctional Pedagogy, Moscow, Russia, ORCID: https://orcid.org/0002-2467-9578, e-mail: romanovskij2@gmail.com

Информация об авторах
Романовский Николай Владиславович, кандидат психологических наук, Федеральное государственное бюджетное научное учреждение «Институт коррекционной педагогики», г. Москва, Российская Федерация, ORCID: https://orcid.org/0000-0002-2467-9578, e-mail: romanovskij2@gmail.com

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