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Enhancing emotional regulation in ECEC and preschools with the adoption of G-ESDM strategies

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Abstract: The Early Start Denver Model and its group adaptation, the Group-based Early Start Denver Model (G-ESDM), are naturalistic developmental behavioral interventions designed to enhance emotional regulation, social communication, and overall developmental outcomes for children with Autism Spectrum Disorder (ASD). This study discusses the educational potential of the G-ESDM, focusing on practical strategies that teachers and educators can adopt to support the emotional and social development of children with ASD. To address this purpose the paper explores how these models integrate co-regulation and self-regulation strategies to create supportive learning environments. The G-ESDM emphasizes the importance of understanding emotional arousal and regulation to optimize learning and social engagement. Implementing these strategies in early childhood education ensures that children with ASD can participate meaningfully in classroom activities, interact positively with peers, and benefit from the educational experience.

Keywords: G-ESDM; emotional regulation strategies; ASD; inclusion

1. Introduction

During the first seven years of life, a child faces several emotionally based developmental tasks. Usually, from early infancy, babies respond to emotions when interacting with others and, since the age of three they increase their ability to express emotions, both verbally and non-verbally, by modifying the intensity depending on the situation and social rules (Cole et al., 2009; Harris et al., 1989; Lewis, Todd & Xu, 2010). Preschoolers are typically able to intentionally control their emotional expressions, they learn to dissimulate, tolerate frustration, engaging with and enjoying social interactions, recognizing danger, and coping with fear and anxiety regulating their behavior in particular contexts.

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Additionally, children learn to defend themselves and their belongings with socially acceptable boundaries, tolerate being alone for reasonable periods, develop interest, motivation in learning, and friendships. Successfully navigating these tasks involves the regulation of emotions (Cole, Michel & Teti, 1994).

Hence, for a child to become emotionally competent it means he/she should develop adequate control over their emotions to regulate them in accordance with their reference group and their culture context. In this process, the regulation and control of one's own emotions play a key role (Anolli, 2002). Emotion regulation (ER) is defined as the ability to manage one's responses to the ongoing challenges posed by various experiences, employing a wide range of emotions in a manner that is both socially appropriate and sufficiently flexible. This flexibility allows for both immediate reactions and the deferral of these reactions when necessary (Cole, Michel, & Teti, 1994). ER, viewed as a developmental process, has been a field of study of extensive discussion and examined in depth in several academic works (Anolli, 2002; Campos, Barrett & Campos, 1989; Dell'Osso et al., 2023; Garber & Dodge, 1991; Goleman, 2011; LeDoux & Coyaud, 2003; Thompson, 1994).

In fact, Thompson (1994) pointed out that the concept of emotion regulation does not have a single, universal definition. Nevertheless, there are common themes that recur across various interpretations. Usually, these definitions emphasize only one of two sides of emotion regulation:

- the first one focuses on the regulatory functions of emotions, which organize internal processes such as attention, memory, and action readiness, alongside social communication. This organization enables individuals to respond swiftly to situational demands.
- The second component emphasizes the methods by which emotions are regulated, including cognitive control and the internalization of social norms. These methods allow individuals to monitor, delay and adjust their preparatory responses to accommodate the complexities and nuances of different situations (Mesquita, Frijda, 2011).

Ultimately, emotion regulation is about maintaining the ability to navigate the continuous demands of daily experiences with an array of emotions, doing so in a way that is both socially acceptable and adaptable, thus enabling both spontaneous and considered responses as needed (Cole, Michel, & Teti, 1994). Even if the focus of much research remains on intrinsic regulation (the regulation of one's own emotions), there is increasing interest in extrinsic regulation, which involves managing the emotions of others, and exploring how emotions are regulated within group contexts (Nozaki & Mikolajczak, 2020; Goldenberg, Halperin, van Zomeren, & Gross, 2016). In fact, if intrinsic ER is a self-focused process, aimed at managing one's own emotional experiences, extrinsic ER extends this management outward, influencing the emotional experiences of others in a social setting. Therefore, both forms of regulation are essential for social interactions and overall psychological health (Nozaki & Mikolajczak, 2020). ER plays a critical role in individual psychological well-being and effective social interactions. In educational settings, promoting interventions that enhance the understanding, recognition, and management of emotions from an early age fosters self-awareness of one's own and others' emotional states and contributes to emotional balance.

As suggested by Blair (2002), ER may directly impact cognitive processes essential for learning, such as working memory and attention, as well as the development of

social competence, since emotional regulation affect the way children interact with their peers and teachers. Children who regulate their emotions effectively are more likely to display greater social skills and enjoy better peer acceptance (Graziano et al., 2007). On the contrary, those with poor ER skills may exhibit behaviors like non-cooperation and hyperactivity, which pose significant interpersonal challenges (Murray & Tostevin, 2023). In fact, these difficulties may obstruct inclusive processes and full participation due to a lack of interpersonal and prosocial skills.

Thus, educational strategies should promote physical and psychological well-being, motivation, cognitive processing, and the development of interpersonal skills crucial for acquiring social and prosocial competencies (Corona, Agrillo, & De Giuseppe, 2016; Corona, & De Giuseppe, 2016, p. 104). Given that even young children can learn and adopt effective ER strategies, it is important to explore which strategies can be implemented at an early age to enhance children's ER capabilities, thereby creating effective learning environments, boosting learning outcomes, and fostering both social and emotional development (Corona, Agrillo, & De Giuseppe, 2016).

In the context of inclusive education ER strategies are not only beneficial but essential, especially at an early age and when there are difficulties on emotion regulation. In fact, children with Autism Spectrum Disorder, for example, often face unique challenges in emotional regulation due to differences in social communication and sensory processing (Mazefsky et al., 2013). Implementing ER strategies may significantly improve their ability to engage in classroom activities, interact with peers, and benefit from the educational experience (Scarpa & Reyes, 2011).

Moreover, research has shown that when teachers and caregivers are trained to recognize and respond to signs of emotional dysregulation, they can better support children's emotional needs, leading to improved academic and social outcomes (Zarafshan, Mohammadi, & Ahmadi, 2013). Therefore, integrating ER strategies into early childhood education, especially within inclusive settings, is crucial to foster an environment where all children can thrive. This involves not only adopting strategies when behaviors associated with such dysregulation occur, but also preventing them by fostering emotional literacy both for the child with ASD and their peers. It also includes selecting and providing suitable physical and social environments to promote overall development and social interactions. Additionally, it requires collaborating with all classroom colleagues and coordinating with caregivers to adjust the intensity of social stimulation before the child becomes distressed.

Based on these premises, the Group-based Early Start Denver Model (G-ESDM) is one of the educational models based on evidence-based practices which specifically addresses these challenges by integrating ER strategies within its framework. By focusing on both co-regulation and self-regulation techniques, G-ESDM helps to create a supportive learning environment tailored to the needs of children with ASD (Vivanti et al., 2017). This approach not only supports individual learning but also promotes group dynamics and inclusion, ensuring that all children can participate meaningfully in classroom activities (Rogers et al., 2021). Thus, after a brief review of ER in pupils with ASD, this study explores the educational potential of the Group-based Early Start Denver Model (G-ESDM), focusing on emotional regulation (ER) strategies that teachers and educators may adopt to support their children.

2. Emotional dysregulation of pupils with ASD: challenges and interventions

In the case of a neurodevelopmental disorder diagnosis, such as Autism Spectrum Disorder (ASD), children might experience significant emotional dysregulation (ED). This typically leads to excessive emotional reactions due to difficulties in managing and controlling their emotions. Problematic emotional behaviors, such as tantrums, irritability, aggression, self-injury, anxiety, and impulsivity are frequently reported by parents and professionals working with children who have ASD (Geller, 2005; Richey et al., 2015; Zantinge, van Rijn, Stockmann, & Swaab, 2017). These behaviors may result from compromised emotional experiences or expression. Issues contributing to these emotional behavior problems include abnormal levels of emotional arousal, insufficient emotional regulation, and inadequate coping mechanisms for managing emotions. Understanding these underlying issues is crucial for developing effective interventions and support strategies.

Several factors contribute to this dysregulation, including neurological problems, abnormal levels of emotional arousal, increased sensory sensitivities, difficulties with social communication, insufficient emotional regulation, and inadequate coping mechanisms for managing emotions (Zantinge, van Rijn, Stockmann, & Swaab, 2017). Neurological studies have shown that children with ASD may have unusual functioning in brain regions related to emotion regulation, such as the amygdala and prefrontal cortex (Kinnaird, Stewart, & Tchanturia, 2019). These anomalies may influence how children perceive and respond to emotional signals, leading to higher reactivity and trouble calming down when aroused. Consequently, children with ASD frequently experience increased anxiety and stress making it difficult for them to regulate their emotions in everyday settings (Mazefsky, 2015). This emotional dysregulation not only hinders their capacity to learn, limiting their academic and social performance but also has a negative effect on those around them. Emotion regulation is crucial for social communication, as it organizes individuals' interactions and forms the basis for socializing and sharing (Eisenberg et al., 2000, 2006; Rimé, 2007).

Regarding emotional arousal it originates from the Autonomic Nervous System which is responsible for affective, cognitive, and behavioral responses (Benevides and Lane, 2015). Arousal is essential for modulating emotions and behavior in social situations to adapt and meet social goals (Chambers et al., 2009). Research on arousal in children with ASD has shown conflicting results (Benevides and Lane, 2015). While there is evidence for normative baseline arousal, arousal levels frequently vary in response to different tasks and other people's emotions (Benevides and Lane, 2015; Rogers and Ozonoff, 2005). However, given the broad spectrum of children's characteristics and task designs, these results should be taken with caution (Benevides and Lane, 2015). Furthermore, there is little known about how young children with ASD perceive emotions. Previous research on emotion regulation in young children with ASD has demonstrated that they employ different strategies for coping than typically developing children in stressful situations (Jahromi, 2017; Jahromi, Meek, & Ober-Reynolds, 2012; Samson et al., 2015). Children with ASD use fewer constructive techniques (such as goal-directed behaviors, seeking social support, and verbal assistance) but more venting (vocal and physical venting, as well as self-speech) and avoidance strategies (distraction and alternative behavior).

Moreover, the inability to effectively regulate emotions is linked to both core symptoms of ASD and its associated comorbidities (such as anxiety, depression, etc.)

(Richey et al., 2015; Samson et al., 2014). According to the DSM 5 (APA, 2013), pupils with ASD exhibit challenges in social and communicative functioning. These issues are evident in their interactions with peers and adults, such as their inability to initiate, maintain or continue a conversation using appropriate verbal or non-verbal language. Additionally, as emphasized by Cole et al. (2009), linguistic ability plays an important part in the process of understanding and managing internal states, and unlike typically developing toddlers, toddlers with ASD frequently create their first words at the age of 36 months (Howlin, 2003). Furthermore, one-third of children identified with ASD may remain minimally verbal or completely non-verbal (Rose, Trembath, Keen & Paynter, 2016) and it may hinder the possibility to understand and adequately express feelings and emotions when an early intensive educational intervention is not adopted.

Other differences were also highlighted by Nuske et al. (2016), using eye-tracking and pupillometry, their study demonstrated that children with ASD do not exhibit the typical increase in pupil size that reflects emotional arousal when observing others' emotional expressions, suggesting a fundamental difference in how they process social-emotional information. It is linked to the concept of social-emotional calibration, where children with ASD show a diminished ability to adjust their emotional responses based on the emotional reactions of others. This deficit is critical as it affects their ability to learn appropriate emotional responses through social interactions, leading to idiosyncratic reactions to various stimuli.

Pupils with autism may also struggle to understand social rules that allow them to determine which emotion should be expressed and which behavior may be socially appropriate in different contexts. Furthermore, pupils with ASD may have difficulties in understanding, recognizing, and regulating feelings and emotions due to challenges in executive functions such as inhibition, planning, and persistence (Corbett et al., 2009; Iavarone, Aiello, Militerni & Sibilio, 2017; Loveland, 2005; Nathalie, 2011; Ozonoff, 1995). These difficulties may hinder the development of cognitive and communication skills, as well as abilities in pretend play, joint attention, and the development of Theory of Mind (Aiello & Di Tore, 2015).

This complexity calls for a holistic approach that considers the intricate interactions between the pupil's functioning and abilities with ASD, as well as the broader context of their development. It is essential to integrate a macro-level focus that includes educational interventions, comprehensive assessments, and the responsiveness of social environments to effectively support their growth and well-being (Nader-Grosbois, 2011; Nader-Grosbois & Mazzone, 2014). Thus, this holistic approach requires building cooperative relationships among teachers, other professionals, schools, families, and local communities to form a supportive network for learning and personal growth (Corona & De Giuseppe, 2016). Additionally, it may enhance social cohesion within the educational community, ensuring continuous educational engagement and maintaining high-quality educational services. This strategic synergy effort among educational stakeholders is essential for creating an environment where learning is accessible, equitable, and of high quality.

The G-ESDM addresses this purpose by suggesting how to create an environment, both social and physical, that fosters optimal arousal levels and optimizes learning for each child in a personalized manner through the synergy between educators, families, and school leaders. The following paragraph will present the educational suggestions from the G-ESDM that may be adopted in Early Childhood Ed-

ucation and Care (ECEC) settings, as well as preschools, to foster optimal arousal levels.

3. G-ESDM co-regulation and self-regulation strategies to modulate arousal in ECEC

3.1. Managing child's arousal from ESDM to G-ESDM

The Early Start Denver Model (ESDM) is a naturalistic developmental behavioral intervention, synthesizing principles from applied behavior analysis, pivotal response training, and the Denver Model. The ESDM emphasizes relational, emotional, and affective aspects of the teaching-learning experience (Rogers, Dawson, 2020). The model adopts a comprehensive approach to the development of arousal regulation in children with autism, focusing on integrating co-regulation and self-regulation strategies to optimize and modulate arousal throughout the learning experience. It also teaches adults to recognize cues of arousal dysregulation in children. By incorporating these strategies, the ESDM aims to create an environment that fosters optimal arousal levels, optimizing learning and promoting growth (Bent et al., 2023) during individual, small group, and large group activities.

Understanding emotional arousal and regulation provides valuable insights into the strategies of the ESDM and its adaptations, whether in the context of caregiver-child interaction or within group and educational settings, such as the G-ESDM. This understanding enhances various aspects of child's learning experience, including attention modulation, social preference and reference, abstract concept development, and relationship dynamics, which include emotional contagion, attunement, intersubjectivity, understanding other minds, and self-formation. At the core of both the ESDM and G-ESDM strategies is the principle that a child's arousal is influenced by their motivation in each activity and their comfort level in social and teaching interactions. Selecting activities that align with a child's current developmental profile, interests, and needs, along with expressing positive emotions and providing responsive interactions during learning activities, is crucial for modulating an optimal level of arousal conducive to readiness for learning (Capes et al., 2019).

In the 0 to 5 years of development, several cues indicate that a child is having regulation challenges that affect engagement and readiness during learning experiences. Specific behavioral examples indicating reduced engagement may include looking away, decreased responsiveness, focusing on something other than the social partner, crying, neutral or tense expressions, hiccupping, jerky movements, frowning, agitation, drowsiness, or tensing of the body. These cues reflect child's efforts to self-regulate their arousal level and adjust their interaction comfort level accordingly. While some children can regulate their emotional state independently, others require support from caregivers in maintaining a comfortable internal state, a concept known as co-regulation. Caregivers, who can identify cues indicating reduced engagement, may adjust social stimulation intensity before the child becomes distressed. By applying ESDM strategies effectively, caregivers can redirect child's focus towards engaging learning activities, fostering a positive and conducive learning environment and prevent the development of maladaptive behaviors (Rogers, S. J., Vismara, L. A., & Dawson, G., 2021).

Both the ESDM and its adapted form, the G-ESDM, rely on a transdisciplinary team to effectively address the diverse challenges faced by young autistic children.

This team typically comprises early childhood teachers, educators, occupational therapists, psychologists, and speech and language therapists. Each member of the team undergoes training in the principles outlined above and becomes an expert on various aspects of the child's profile, including their engagement or disengagement patterns and self-regulation strategies (Capes et.al., 2019). Armed with this knowledge, team members are equipped to maximize learning opportunities through personalized attention, whether in 1:1 settings or group activities. This often involves establishing adult-child engagement activities that gradually transition into motivating play routines or familiar daily life activities.

Hence with ESDM intervention and the G-ESDM, learning opportunities are adapted to each child's individual needs, with a particular emphasis on creating a supportive and engaging environment.

More particularly in a G-ESDM classroom, three key components are employed to optimize arousal regulation for the learning experience in pupils with autism: classroom setup, teachers' roles and fidelity assessment.

In the subsequent paragraph, we will delve into the methods of identifying signs of dysregulation, strategies for regulating arousal to enhance learning experiences, and how these principles are applicable to a typical preschool classroom that implements the G-ESDM.

3.2 Classroom set up

In the G-ESDM classroom, the physical environment is meticulously structured to minimize distractions, to offer sensory support and to emulate a well-organized preschool classroom, featuring various activity centers designated for distinct purposes and equipped with carefully selected materials. Each space has clear meaning, aiding children in understanding and engaging in different types of play. Drawing from educational principles like Montessori and the Reggio Emilia approach, children are encouraged to train autonomy by selecting from a range of materials within each area. This fosters individualized and immersive learning experiences tailored to their interests, thereby enhancing motivation and active participation (Vivanti et al., 2017).

Furthermore, the classroom environment in G-ESDM is intentionally crafted to guide children's attention towards their peers and adults. This involves creating a serene and welcoming atmosphere, characterized by a deliberate avoidance of excessive primary colors and visual stimuli that could overwhelm the sensory integration of autistic pupils. By minimizing distractions and promoting a conducive social learning environment, children are better able to focus on meaningful interactions and ready for a regulated learning experience (Aiello et al., 2019). The adaptation of the physical environment to the children's needs is essential to ensure the first regulatory mechanism for sensory processing and emotional expression.

3.3 The G-ESDM orchestra

In the manual published by Vivanti et al. (2017), the function of the G-ESDM classroom hinges significantly on the roles and relationship among adults. Effective teaching and learning experiences are contingent upon collaborative efforts and the implementation of co-teaching strategies among team members, ensuring that the diverse learning needs of children with autism are adequately addressed. Although

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G-ESDM teachers assume distinct roles and responsibilities throughout the day, they also operate as a coordinated unit, ensuring focused attention on children experiencing dysregulation while simultaneously facilitating learning activities for the remaining students (Vivanti et al., 2017). The delineation of these roles and the supportive mechanisms employed underscore the crucial role of adults in fostering children's emotional regulation, ultimately contributing to an environment conducive to positive learning experiences.

Firstly, the "Float" role involves monitoring the overall playroom during each activity and transition, including structured and unstructured play activities, meals, and restroom breaks. The Float supports sustained engagement in activities by redirecting children to teacher-led activities or encouraging peer-directed play. This role ensures that all children have access to curricular experiences, adjusts based on individual needs, and fosters meaningful social interactions with teachers and peers, thereby maintaining optimal arousal and engagement levels in the classroom.

Next is the "Lead" who assumes the responsibility of guiding and facilitating the curricular experience. The Lead engages and sustains children's interest throughout the learning activity, maximizing opportunities for individual learning across the group. They adapt teaching and communication styles according to each child's needs, observing and responding to cues and targeting specific learning objectives. This ensures that every child's needs are addressed, and learning is effectively facilitated.

Lastly, the "Invisible Support" role involves providing assistance during activities where children are expected to focus on the Lead. This role facilitates children's participation without diverting their attention from the Lead, thereby maximizing learning opportunities and supporting engagement with both the Lead and peers.

These three roles collaborate as a cohesive unit to support transitions within the classroom. Transitions are integral parts of the daily routine where arousal issues may arise. In the G-ESDM, transitions follow the "lead-bridge-close" procedure, with the Lead initiating the activity, the Float assisting children in transitioning, and the Close concluding the previous activity and guiding the transition to the next one. This coordinated approach ensures smooth transitions to maintain optimal affect and arousal levels in all the children (Vivanti et al., 2017; Aiello et al., 2019).

3.4 The importance of arousal in the G-ESDM Fidelity tools

Fidelity assessments are essential for ensuring that trained adults maintain the integrity of G-ESDM implementation. In fact, fidelity of implementation refers to the degree to which adults implementing the G-ESDM strategies adhere to the intended practices, monitor their practices, and demonstrate competence in executing the strategies effectively (Gresham 1989; Rabin et al. 2008; Schoenwald et al. 2011). Research supports that when fidelity is checked at regular intervals aiming at 80% fidelity, the fidelity associates with better outcomes for children (Schreibman., et al., 2015). Within the G-ESDM framework, two fidelity tools are employed to monitor adults' adherence to the model: the Classroom Group Implementation Tool and the Small Group Activity Tool. The Classroom Group Implementation Tool aims to observe the overall management of the classroom, including children's participation levels, and the roles and responsibilities of adults. Conversely, the Small Group Activity Tool focuses on the specific teaching strategies utilized by the lead, with the

assistance of invisible support during small group activities, to provide valuable learning opportunities for autistic children (Vivanti et al.,2017).

Both fidelity tools include items focused on monitoring children's arousal levels in the classroom. In the Classroom Group Implementation Tool, arousal levels are monitored to ensure a safe, lively, and pleasant atmosphere within the whole classroom group. This involves promoting consistent responsiveness from adults to all children's communication bids and dysregulation and fostering warmth and enjoyment throughout the day. Additionally, it emphasizes well-paced activities tailored to individual children's needs, with sensitivity to their arousal states and the implementation of strategies to maintain emotional regulation. Similarly, in the Small Group Activity Tool, children's affect and arousal are monitored during specific teaching activities to ensure the child's optimal learning readiness. This includes creating a pleasant and playful emotional atmosphere within the group, adjusting activities as needed to address arousal issues, and providing invisible support to children displaying dysregulation to ensure their engagement in the activity (Vivanti et al.,2017).

In conclusion, fidelity tools are pivotal in maintaining the integrity of G-ESDM implementation. They not only guide educators in adhering to the model's strategies but also support children's emotional regulation and arousal levels, thereby fostering an optimal learning environment for children with autism.

Conclusions

Socio-emotional education has a strong influence on the inclusive process because those who have good abilities can create a positive climate (Cottini, 2017) and relationships of help and support among children. But in order to do it, the action of adults is essential during the design of the activity and of the learning environment, considering all the necessary and appropriate modifications and adaptations, but during the interactions too. In fact, educators, teachers, parents and other professionals who work in educational contexts, also attended by pupils with emotional dysregulation, should be a positive role model to follow. They should be able to manage their emotional state to teach how to do the same, by inhibiting their emotions, controlling its outcomes, limiting its effects when needed (Sibilio, 2023). In this direction, the ESDM and G-ESDM may support both educators of the ECEC and preschool's teachers to integrate emotional regulation strategies into their educational settings. By focusing on both co-regulation and self-regulation techniques, these models create supportive environments that foster optimal arousal levels, essential for effective learning and social engagement. The comprehensive approach of the G-ESDM addresses the unique challenges faced by children with ASD and other children with emotional dysregulation by training teachers and caregivers to recognize and respond to signs of emotional distress. Moreover, this approach not only supports individual learning but also promotes group dynamics and inclusion, ensuring that all children may meaningfully participate in classroom activities (Vivanti et al., 2017). That's because both the models foster a collaborative network not only among the educators and teachers who work within the educational settings, but also with families and communities, ensuring continuous engagement and high-quality educational services. This holistic approach is crucial for creating an inclusive environment where all children, including those with ASD, can thrive. Felice Corona's research underscored the importance of inclusive educational strategies that promote physical

and psychological well-being, motivation, cognitive processing, and the development of interpersonal skills at an early age (Corona, 2016, 2015; Corona, & De Giuseppe, 2016). These strategies are essential for children with ASD, who may face unique challenges in emotional regulation due to differences in social communication and sensory processing (Mazefsky et al., 2013). Implementing these strategies in early childhood education settings ensures that children with ASD can engage in classroom activities, interact positively with peers, and benefit from the educational experience (Corona, Agrillo & De Giuseppe, 2016).

As research continues to evolve, the integration of evidence-based emotional regulation strategies remains a cornerstone for fostering inclusive education and supporting the overall development of children with ASD (Rogers et al., 2021).

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