

AN INTEGRATIVE ANALYSIS OF STEREOTYPIC BEHAVIORS IN AUTISM SPECTRUM DISORDERS. A CASE PRESENTATION

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ABSTRACT. Children with Autistic Spectrum Disorders (TSA) often engage in stereotypical behaviors that greatly impede interaction with the environment and the learning process. Because these behaviors are self-reinforcing, they are often difficult to reduce. Moreover, for a method to be effective, we believe it is necessary to analyze the context in which they occur and the level of development of the child in each area that may influence the appearance or maintenance of these behaviors, besides analyzing their antecedents, consequences and functions. There are few studies that approach stereotypical behaviors in an integrative perspective. The goal of the current study is to analyze the stereotypical behaviors of a child with ASD from an integrative perspective, including Applied Behavior Analysis (ABA), The Neurosequential Model of Therapeutics (NMT) and Sensory Integration Therapy. This study has a great practical relevance because, based on theoretical foundation, it presents a complex perspective of analyzing the stereotypic behaviors and provides practical recommendations for intervention. Further research could test the hypotheses derived from this case presentation.

Keywords: *autism spectrum disorders, stereotypic behaviors, integrated analysis, case presentation, vocal stereotypy*

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1. Introduction

A significant problem for persons with autism spectrum disorders (ASD) is the presence of stereotypical behaviors, which are repetitive, restrictive behaviors, without an obvious purpose or function. Stereotypical behaviors interfere with learning and the interaction with adults and peers, are unusual and often lead to stigma. Rhythmic, repetitive and uncontrolled behaviors, with no apparent immediate adaptive effects are often found among stereotypies in children with ASD (Bodfish, Crawford, Powell, Parker, Golden, & Lewis, 1995). These may include motor behaviors, such as: hand fluttering, head rotation, toe walking, repetitive object manipulation (Lewis & Bodfish, 1998), or can be vocal, the children repeating meaningless sounds or words (Turner, 1999). Stereotypic behaviors can be a combination of vocal and motor actions and the motor ones can sometimes be self-harming (Lee, Odom, & Loftin, 2007).

These behaviors can lead to social stigma and can reduce the chances for social inclusion (Durand & Carr, 1987). Also, they can interfere with daily routines (Repp, Singh, Karsh, & Deitz, 1991), with the academic learning (Koegel & Covert, 1972; Runco, Charlop, & Schreibman, 1986), with the practical application of the tasks learned (Morrison & Rosales-Ruiz, 1997), as well as with play (Koegel, Firestone, Kramme, & Dunlap, 1974; Nuzzolo-Gomez, Leonard, Ortiz, Rivera, & Greer, 2002).

According to a study conducted by Quill (2000, in Condrey, 2015), many children with ASD engage in stereotypic self-stimulating behaviors, that help them cope with the anxiety triggered by changes in their environment. It is important to understand that not all stereotypic behaviors are self-reinforcing in nature, as some children engage in repetitive movements in order to calm down, that is opposite to self-stimulation (Condrey, 2015). Therefore, it is very important to assess the function of the behaviour before any therapeutic decision. Although self-stimulating stereotypic behaviors in children with ASD are very common, there is very little research to analyze these stereotypic behaviors from the perspective of calming or avoiding aversive stimuli.

Given that the stereotypic behaviors are atypical, even odd, teachers often hesitate to include children with ASD in their classes. According to the literature, the level of comfort or discomfort that teachers have in relation to these behaviors is one of the most important factors in the assessment of self-efficacy regarding the inclusion of children. Teachers often anticipate that the students with ASD would have a multitude of behaviors in the classroom, creating constraints and challenges that overcome their ability, as teachers, to manage these behaviors (Higginson & Chatfield, 2012; Horne & Timmons, 2009; Maccini & Gagnon, 2006, in Condrey, 2015).

Stereotypic behaviors often represented a challenge for the professionals working with students with ASD. In the literature, a series of data on interventions based on antecedents or immediate consequences of stereotypical behaviors are cited, as well as their effects on behaviors: physical exercising (Tarr, 2018), noncontingent reinforcement and response interruption (Cicero, 2007), response interruption and redirection (Ahearn, Clark, MacDonald, Chung, 2007; Cividini-Motta, Garcia, Livingston, MacNaul, 2019; Joung, 2011), instruction (Lee, 2016) or effects of multi-sensory environments (Brandenburg, 2012). Most of these interventions treat the stereotypical behaviors superficially, leading to difficulties in generalization or occurrence of similar behaviors, with the same function, if the target behaviors are being reduced or eliminated.

Many therapeutic models are being tested in the field of ASD, some similar, some very different from the others, each having both supporters and critics. Each therapy has its own principles and techniques, its own “expertise zone”, and the integration of therapeutic models and strategies can compensate for the weaknesses and limitations of each therapeutic models, applied independently.

Most of the studies analyze the stereotypic behaviors from the perspective of a single therapeutic approach. Therefore, an integrative analysis of stereotypic behaviors in ASD can be a start to enrich this field and provide a useful starting point for practitioners. New research questions can be derived from case presentations that approach this particular issue.

2. An integrative therapeutic approach of stereotypic behaviors

2.1. Applied behavior analysis as a basis for intervention in ASD

Applied behavior analysis (ABA, Lovaas, 1987) is a science, based on learning techniques derived from learning theory and operant conditioning (Prizant et al. 2003, in Lilley, 2011). ABA programs are intensive intervention programs that imply working in small steps towards given objectives for each child. The carefully planned learning opportunities are offered and constantly reinforced by trained therapists, for at least 30 hours per week, for at least two years. These programs have become popular due to the publication of several studies (eg. Lovaas, 1987) and of several biographic reports (eg. Maurice, 1993) that documented remarkable progress in children with ASD, using these methods. This approach currently dominates all other forms of treatment for ASD worldwide (Corsello 2005; Sigman, Spence & Wang 2006, in Lilley, 2011).

The most often used interventions for the reduction of stereotypic behaviors can be divided into three categories: (1) punishment-based interventions: response interruption and/or instructions; (2) redirection, and (3) reinforcement-based interventions: Differential Reinforcement of Incompatible Behavior (DRI), Differential Reinforcement of Alternative Behavior (DRA) and Differential Reinforcement of Other Behavior (DRO). Besides these interventions, that act as a consequence of the behavior, several interventions are developed that target the antecedents, such as noncontingent reinforcement. The latter uses three different procedures that identify and provide stimuli with known reinforcing properties: positive reinforcement (social mediation), negative reinforcement (escape) and automatic reinforcement (without social mediation) (Cooper, Heron, & Heward, 2016). Following the functional analysis of behavior, one or more interventions are chosen and combined, until the reduction of the target behavior is obtained.

These techniques proved to be effective in the reduction of several behavioral stereotypes (Ahearn, Clark, MacDonald, Chung, 2007; Cicero, 2007; Cividini-Motta, Garcia, Livingston, MacNaul, 2019; Joung,

2011; Lee, 2016), but the studies that test the effectiveness of these techniques only report the reduction of the target behaviors, which is the main objective of the studies, without documenting the reoccurrence of the behaviors or their occurrence in other forms, which hold practical relevance.

More recent research on ABA promotes the effectiveness of three main factors: the use of positive reinforcement, the reduction of contingencies with punishment significance and the formulation of specific objectives. The policy behind this approach is the emphasis on positive aspects or the enforcement of adaptive behaviors, rather than the elimination of problematic ones.

These principles underlie several therapies and intervention techniques in ASD: Discrete Trial Teaching (DTT, Smith, 2001), Verbal Behavior (VB, Skinner, 1957), Pivotal Response Treatment (PRT, Koegel & Koegel, 2006), Floortime or DIR Model (Greenspan & Wieder, 2007), Treatment and Education of Autistic and Communication Handicapped Children (TEACCH, Schopler, 1994), and Picture Exchange Communication System (PECS, Bondy & Frost, 1994). ABA is compatible with many therapeutic techniques and can constitute the foundation of an integrative therapeutic intervention.

2.2. An integrative therapeutic model for the reduction of behavioral stereotypes in children with ASD

One such therapeutic approach relies on The Neurosequential Model of Therapeutics (NMT), that “is a developmentally sensitive and neurobiologically informed approach to clinical problem solving” (Perry & Dobson, 2013, p. 249). This model was developed and used mostly with traumatized and maltreated children and teenagers (Barfield, Gaskill, Dobson, & Perry, 2012).

The NMT is not a specific therapeutic technique and represents a multidimensional assessment that guides clinical treatment and monitoring of results. The clinical formulation encompasses the child’s skills and vulnerabilities along the developmental history, in a neurodevelopmental perspective that offers the clinical team the possibility “to select and sequence a set of enrichment, educational, and therapeutic interventions

to best meet the needs of the client” (Perry & Dobson, 2013, p. 250). The purpose of this semi-structured process is to help the therapist to systematically consider the key developmental factors that influence the client’s current functioning (Perry & Dobson, 2013).

A series of neurological modifications have been detected in patients with a history of chronic trauma and traumatic stress during childhood (Kerns, Newschaffer, & Berkowitz, 2015). These results offer a new perspective on the pathophysiology of traumatic stress and the vulnerability of children with ASD in the development of trauma-related pathology. Moreover, several pathological features of posttraumatic stress are similar with those found in ASD (Kerns, Newschaffer, & Berkowitz, 2015).

Children with ASD, compared with typical ones, proved to have an exaggerated cortisol response to novel and threatening stimuli (eg., psychosocial stress, sensory stimulation) and raised salivary cortisol level when anticipating re-exposure to perceived stressors (Corbett, Mendoza, Wegelin, Carmean, & Levine, 2008; Jansen, Gispen-de Wied, van der Gaag, R.J., & van Engeland, 2003). These results concerning neurobiology of distress in children and adolescents with ASD could indicate a pre-existent vulnerability to future trauma (eg., an inherently weak stress-response system) or an exposure to past traumatic experience, marking an ongoing circle of biological and behavioral dysfunctions (Kerns, Newschaffer & Berkowitz, 2015).

Several studies have shown that the emotional regulation deficits can predispose persons with ASD to anxious disorders and other more diffuse difficulties (eg., tantrums or emotional meltdowns) (White et al. 2014; Mazefsky et al. 2013, in Kerns, Newschaffer & Berkowitz, 2015). Biological abnormalities involved in the emotional regulation deficits, such as the cerebral structural abnormalities (eg., deficits in prefrontal medial cortex, amygdala, cingulate and orbitofrontal cortex), as well as physiological abnormalities are also found in ASD (White et al. 2014, in Kerns, Newschaffer & Berkowitz, 2015). These neurobiological vulnerabilities to emotional or arousal disturbances are one of the pathways to posttraumatic stress in trauma-exposed persons (Kerns, Newschaffer & Berkowitz, 2015).

The NMT model is a comprehensive approach that attempts to match the type of techniques to the stage of development and the brain region that mediates the child's problems. A review of the child's developmental history, followed by an assessment of the current functioning are performed, in order to identify the brain areas and neural systems involved in the neuropsychiatric symptoms (vulnerabilities) and the key strengths that the child has. Starting from the initial point, various enrichment and therapeutic activities are recommended in order to meet the child's developmental needs (MacKinnon, 2012). The sequence in which these are addressed is very important, the main idea of the model is to start with the problems that show underdevelopment of the brain areas that are expected to develop first: (1) brainstem and diencephalon (self-regulation, attention, arousal, impulsivity problems), by somatosensory activities, sensory integration activities, (2) limbic brain system (attachment and relational problems), by play and arts therapy, and (3) cortical brain (cognition, high level function problems) by verbal, insight-oriented therapies (Perry & Hambrick, 2008). The NMT model requires intensive training and has been applied by various therapeutic settings (eg., childtrauma.org, beaconhouse.org.uk), that provide a wide range of resources for professionals to use in their own work.

In order to implement this neurodevelopmentally informed, integrative model, The Beacon House team (beaconhouse.org.uk, Lyons, Whyte, Stephens, & Townsend, 2015, MacKinnon, 2012) developed a series of recommendations for therapeutic interventions, starting with sensory integration, dissociation (brainstem regulatory interventions), attachment, emotional and behavioral regulation (interventions targeting the limbic system), cognitive, identity and self-concept development (cortical brain interventions).

Regarding *sensory integration*, most persons with ASD have sensory processing and integration disorders that interfere with their capacity to interact, to behavior problems, inflexible routines and motor stereotypes (Sinclair, Oranje, Razak, Siegel, & Schmid, 2017, Cascio, Lorenzi, & Baranek, 2016), related to one or several of the seven sensory systems: vestibular, proprioceptive, tactile, visual, auditory, olfactive and taste. Sensory integration therapy begins with the organization of the first three systems, following the rest of the systems, in a manner the

facilitates positive results such as: the reduction of self-stimulative self-harming behaviors, reduction in anxiety and increase in task behavior, as documented by various studies in children with ASD, ADHD and Sensory processing disorders (SDP) (Mullen, 2009).

As a survival mechanism, *dissociation* means escaping adversity by mentally disconnecting, separating thoughts, emotions and behaviors, in order to preserve psychological survival and reach a regulated state (MacKinnon, 2012). Various types of dissociation have been described: amnesia, derealization, depersonalization, identity confusion (Lyons, Whyte, Stephens, & Townsend, 2015).

Evidence of dissociation in ASD is rather anecdotic and research on the topic is necessary. Often, ASD has been associated with various pathologies, such as trauma-related pathology and PTSD (Haruvi-Lamdan, Horesh, & Golan, 2018), a higher susceptibility to distress, anxiety and depression (Cachia, Anderson, & Moore, 2016) than typically developing individuals, but evidence of dissociative mechanisms as response to distress, adversity are not researched.

One useful technique for the decrease of dissociation is mindfulness (Kabat-Zinn, 2003), that might be helpful in the diminishment of self-stimulation, increase of attention span, by intentional awareness on breathing, walking, action, hearing, feeling, in the present moment, without judgement. Usually, the purpose of mindfulness activities in schools is the engagement in positive actions and not disciplinary practices (Grossman, Cowan & Shankman, 2010).

A number of studies have documented the positive effects of mindfulness techniques on the level of attention focus in ADHD (Zhang, Chan, Lo et al., 2017), on the mental health and well-being, social skills in young people with ASD (Keenan-Mount, Albrecht, & Waters, 2016), but evidence on their effectiveness for children is scarce. One study documented the effectiveness of mindfulness techniques on anxiety, cognitive problems, social responsiveness, psychological well-being and aggressive behavior in adolescents with ASD (Cachia, Anderson & Moore, 2016). Another study analyzed the effects of joint mindfulness practice on children with ASD and their parents, on areas like: parental distress, maternal quality of life, child's behavioral problems (Hwang, Kearney, Klieve, Lang, & Roberts, 2015), but more evidence is necessary in order to prove their effectiveness.

Attachment behaviors and strategies help the child gain the sense of security in moments of danger and threat, by ensuring the proximity of the caregiver. Attachment security within the parent – child relationship can be improved using various techniques of attachment-based play therapy, such as Theraplay intervention (Phyllis & Jernberg, 2010). Within the intervention with children with ASD, the therapist's goal is to increase closeness, by physical and visual contact, focus on the here-and-now and ignoring self-stimulating behaviors. The parents and children are brought together in therapy, in order to develop and practice a close, playful, responsive interaction, characteristic of a secure, healthy relationship (Phyllis & Jernberg, 2010). Theraplay intervention proved to be effective in the improvement of the relationship between parents and their children with ASD, in terms of emotional expressiveness, the parents' availability for the child, visual contact and positive guidance of the child. The children proved to improve in their expressive language, proximity seeking with parents and acceptance of the parents' guidance (Phyllis & Jernberg, 2010).

At an early age, the adult's contribution is the most important factor of *emotional regulation* in children. The adult co-regulates the child's emotions, accepts the child's emotional states and thus helps the development of the ability to self-soothe and regulate own emotions. Maladaptive coping strategies that can be present in children that experienced traumatic experiences are: thumb sucking, head banging, skin picking, self-harming behaviors, substance abuse, sexual promiscuity (Lyons, Whyte, Stephens, & Townsend, 2015).

Behavioral regulation strategies are connected to the child's window of tolerance (Siegel, 2010), a state of tolerable arousal that allows learning and thinking. Exposure to adversity leads to changing states, and the child swings from hyperarousal (fight/ flight reactions) to hypo-arousal (numbness, emptiness). A lack of capacity to control behaviors, a feeling of helplessness and physiological reactions are signs of dysregulation as a result of the exposure to adversity (Lyons, Whyte, Stephens, & Townsend, 2015).

Several *cognitive skills* might be under-developed in children with ASD: planning, problem solving, organizing, learning from experience. Moreover, exposure to stressful events can further lead to investment of resources in security attainment and testing of adult's trust (Lyons, Whyte, Stephens, & Townsend, 2015, MacKinnon, 2012).

Exposure to messages from adults that trigger the feeling of being unwanted, unloved leads to identity confusion, a feeling of not belonging and an intense need for external validation (Lyons, Whyte, Stephens, & Townsend, 2015).

In the MNT (Perry, 2006), the intervention needs to begin with primitive brain stabilization and sensory regulation, followed by intervention for attachment, emotional regulation and meaning making, identity development and cognitive processing of emotional information (Lyons, Whyte, Stephens, & Townsend, 2015). Various therapeutic techniques can be useful for each of the brain areas involved in the development of these capacities.

Until now, the relationship between the NMT and stereotypic behaviors in children with ASD has not been analyzed. Knowing that many children with ASD have difficulties in sensory integration, developing secure attachment, emotional and behavioral regulation, theory of mind, we believe that studying this field could be useful. Moreover, self-stimulation could be associated with the dissociation stage of the NMT model, a relation that needs deeper investigation. The current paper presents the assessment of a common case of ASD, with the goal to analyze self-stimulating behaviors from an integrative perspective and to rise the interest of researchers for studying this area more thoroughly. No intervention was implemented with the case, but several therapeutic directions were derived from the case presentation, using elements from ABA, NMT, Sensory Integration Therapy, Mindfulness and Theraplay.

3. Method

In order to emphasize the complex nature of stereotypic behaviors, several factors were considered: *distal factors*, from the case history, and *proximal factors*, derived from the current functioning in the school and therapeutic settings in which the child was immersed.

3.1. Participant and response definition

The participant, A., is a masculine gender 6 years and 7 months old child, the only child of a family living in a big city from Romania. The child's psychiatric diagnosis is ASD, ADHD and delay in expressive

language. He is enrolled in the regular school system and benefits from the assistance of a „shadow” – a therapist specialized in ABA. He is included in a specialized center, where he attends behavioural therapy.

A.'s target behaviours were: “vocal stereotypy”, defined as singing the same song and repeating noises, words or phrases, which are inappropriate for the context, “motor stereotypy”, defined as movements in hands or feet not appropriate in the context, and “combined motor and vocal stereotypies” defined as repeating words and noises during movements in hands or feet, not appropriate in the context.

3.2. Instruments and procedure

The information in the case presentation were obtained from a developmental semi-structured interview with the participant’s mother, from systematic observation performed by the first author and measuring his abilities through standard evaluation, described below.

From the *developmental semi-structured interview*, we obtained information about the case history: history of the problem, interventions, prenatal, perinatal and early postnatal history, medical history, motor and language development, academic history, history of social-emotional development, behavioral functioning and family history.

The *systematic observation* method was used for monitoring the progress in several areas: time spent in an activity, turn taking, parallel play, imitation of peers, social interactions, verbal communication, visual contact, self-stimulation and stereotypies and latency in responses. It was also used in measuring the indicators of the sensory functions in the three sensory systems: vestibular, proprioceptive and tactile sensory systems, the indicators of the attachment with parents (avoidant behaviors, proximity seeking behaviors, oppositional behaviors with the function of obtaining parental attention), emotional regulation (expressing the emotions appropriately to the context) and behavioral regulation (physical aggressivity with peers, self-stimulation, numbness).

We used continuous measurement procedures including frequency (total event count), duration (total time), rate (frequency per unit time), IRT (time between responses), and latency (time between an antecedent stimulus and the occurrence of a specific response). We used also

discontinuous measurement procedures: whole interval recording, partial interval recording and momentary time sampling method, using a structured observation form.

Meeting the diagnostic criteria and the main developmental acquisitions were measured using two *standardized measurement instruments*: the Autism Diagnostic Observation Schedule (ADOS, Lord et al., 2000) and The Assessment of Basic Language and Learning Skills, Revised (ABLLS-R, Partington, 2018).

As a diagnostic test, the Autism Diagnostic Observation Schedule (ADOS, Lord et al., 2000) was used. This instrument is a semi-structured assessment based on the operationalization of diagnostic criteria for autistic spectrum disorders in the Manual of Diagnosis and Statistics of Mental Disorders (DSM) and the International Classification of Disorders ICD. This instrument allows the evaluation of communication skills, social interactions, play or imaginative use of materials.

A.'s main developmental acquisitions were measured using the Assessment of Basic Language and Learning Skills, Revised (ABLLS-R, Partington, 2018). It is a criterion-referenced assessment, based on the systematic observation of child's skills and allows the administrator to identify deficiencies in language, academic, self-help, and motor skills and then implement and monitor individualized intervention.

4. Results of the assessment and case presentation

4.1. Case history

History of the problem

Description of A.'s problem from the mother's perspective: according to the mother, A. is a "very clever boy, with strong personality, loving child, but with an attention deficit, a boy that provokes your intelligence and creativity". Though the mother noticed A.'s progress in ABA therapy and describes the child in positive terms, the behavioral stereotypies seem not to decrease, and they still present a negative influence on the interaction between mother and child.

Parents' reactions to the diagnosis: the first worrying signs were obvious around the age of 1 ½ years, but the mother was not aware that there could be a deficit in the child until the age of 2 ½ years when he was enrolled in the kindergarten.

The first reaction was “shock and denial”, then the family realized that they needed to find services to help the child. The extended family is a support system, they try to understand the diagnosis, support and try to adapt to the child’s needs.

History of the interventions

The first ABA therapy process, shortly after the diagnosis, was unsuccessful in the mother’s opinion and the family decided to move to a larger city to find better options. The second ABA therapy process led to some progress after four months and a frequency of 2-3 sessions per week. During the same period, the child started speech therapy, which helped him verbalize, but in an echoic manner.

At the age of 3 years and 4 months the child started an intensive ABA therapy process, two hours per day, then, after two months, for 8 hours per day. Meanwhile, A. benefited from some sensory integration therapy sessions, but the mother was not satisfied with the relationship that the child had with the therapist and with the effect, so she decided to stop the therapy.

From the age of 4 ½ years, the family decided to change the therapy center again and opted for a therapy center where the child had 8 hours of therapy per day, but his progress was slow or inexistent and therefore the family decided to enroll him in a homebased ABA therapy for one year (8-10 hours per day).

In the present, the child goes to preparatory grade, 2 hours per day, then has 4/5 hours of therapy in an ABA therapy center.

Prenatal, perinatal and early postnatal history

The pregnancy period was normal, without notable problems, except some nervousness periods for the mother.

The labor was long and the birth occurred with some difficulties, but the child’s Apgar score was 9 and no postnatal complications were mentioned.

Medical history

According to the mother, A. had always suffered from sleep disorders, selective eating, and, occasionally, aphthae and skin rashes.

Around the age of one, the child recovered from a severe anemia episode, followed shortly by signs of developmental delay.

No accidents, illnesses and allergies were reported, no infection of the ears, neurological problems, genetic conditions and congenital problems were present during development. The child has no visual or auditory problems.

Diagnostic and main developmental acquisitions

A.'s scores obtained by applying the *Autism Diagnostic Observation Schedule* (ADOS) vary between the limit for Autistic Spectrum Disorder and that for a diagnosis of autism, indicating the presence of clinically relevant symptoms in this area.

The scores obtained through *Assessment of Basic Language and Learning Skills, Revised* (ABLLS) were far below average at the following subscales: *Cooperation and Reinforcer Effectiveness, Imitation, Requests, Labeling, Intraverbals, Play and Leisure, Social Interaction, Group Interactions and Class Routines*. And the scores were close to average for: *Visual Performance, Receptive Language, Vocal Imitation, Spontaneous Vocalization and Generalized responding*.

Motor development: According to the mother, no motor delays were noticed, and main milestones were attained according to chronological age: held head steady around 2-4 months, sat without support around 6 months, began to walk independently around 14 months, but currently the child manifests some mild motor coordination and balance problems (needs to find support from walls and handrails while walking and going up and downstairs, often trips and falls). A. does not pedal the bicycle with support wheels, does not jump on one leg, does not jump over an elastic band, but catches and throws ball, can use tools, strings beads on a thin lace, paper cuts. He does not use the tripod grasp correctly in writing, does not use the given space when writing letters and graphic signs, but is able to write words and short sentences. The child demonstrates right laterality.

Language development: The first articulated sounds appeared around 6 months. After the severe anemia at age of one, the use of verbal language stopped and reemerged by the age of two and a half years, after several speech therapy sessions, in an imitative, echoic manner. At present, expressive language is poorly developed: the child expresses his needs,

asks for help, answers simple questions, rarely comments spontaneously, asks questions, and uses complex sentences in communication. He does not have difficulties in pronunciation of sounds, but his vocabulary is poor, and echolalia is still present. The receptive language is better developed, and A. has a large number of words that describe the environment.

Daily living skills: A delayed autonomy in elimination is reported, the child reached day time continence at 5 years and night time continence at 6 years. He has autonomy in alimentation since age 4, at present he is autonomous in dressing and undressing, although he shows big latency, he brushes his teeth, prepares a sandwich, puts on and takes off shoes, can do easy shopping. He has difficulties in respecting safety rules and does not avoid danger.

Academic history

Experience in the school system: A. went to regular kindergarten where he was assisted by a specialized teacher. At the beginning, he spent one hour per day at the kindergarten, but as disruptive behaviors started, a decision was made to stop the attendance for a period of several months, followed by a new attempt to integrate the child, at first 40 minutes per day, than 1 hour per day. After 8 months of attendance, the progress was notable at the level of the time spent in an activity, turn taking, parallel play, imitation of peers, social interactions. The behavioral disruptions (physical aggressivity with peers, tantrums, shouting) were gradually diminished with behavioral interventions.

At present, he is enrolled in a regular school, in preparatory grade, and attends school for two hours per day with a shadow teacher. As difficulty of tasks rapidly increased, he needs curricular adaptation. A.'s difficulties at school and the possible solutions are discussed by the team responsible for A.'s integration (teacher, shadows, supervisor in behavior analysis BCBA, school psychologist, support teacher, speech therapist, nurse, and mother). Attempts to adapt the teaching methods are made, but the teacher is often reluctant to the proposals and the success of the adaptation process is limited.

A. does not go to school willingly and needs constant motivation, through positive and negative reinforcements. Most vocal stereotypies are manifested at school and significantly increase the difficulty of the learning process. These behaviors intensify when the expectations are

too high and the people around the child are too intrusive (ex., when he has to write in the notebook, when the teacher asks something or makes a demand). Following functional analysis of the behavior, two main functions were identified for the stereotypic behaviors, functions that are often combined: self-stimulation and task avoidance. The behaviors either appear or are intensified during aversive situations, targeted by the need to calm down.

Besides stereotypic behaviors, moments of absence were identified, in which redirection is almost impossible. Independent response to the teacher or peers are rare. No other behavioral disruptions were identified.

Regarding the positive aspects of school inclusion, the child is fond of his desk mate, he interacts with her from time to time, imitates her, brings her presents and hugs her.

School performance, strong and weak points: in terms of performance, the child's level matches the level of his peers: he reads words and sentences, performs basic arithmetic computations. His weak points are verbal communication, visual contact, understanding of social rules, self-stimulation and stereotypies.

Emotional, behavioral and social functioning: At the beginning of the therapeutic intervention, A. manifested withdrawal, lack of response to stimulation from the adult, avoidance of contact, rare imitative behaviors, severe reactions to frustration, even aggressivity. These problems were gradually reduced with behavioral interventions.

During this period, he exhibits high latency in responses and is dependent on the prompt. He shows difficulties in directing attention onto one single stimulus and ignoring distractors and has exaggerated reactions to some sensory stimuli (tactile, auditive, visual). In terms of social behaviors, A. often manifests atypical behaviors to show affection towards attachment figures (ex., the shadow teacher), rarely engages in functional play with peers, only if supported, sometimes imitates children, has severe difficulties in verbal communication.

Teacher's assessment: the teacher is pessimistic about A.'s evolution and inclusion in the class, compares the child with his peers and another child with ASD that she taught 19 years ago. The teacher encounters difficulties in communicating with the child.

History of social-emotional development and behavioral functioning

Temperament – during early childhood, A. had an active temperament, difficult to control, difficult to motivate and engage in any activity. His state was highly fluctuating between high activism, when he became challenging for his parents, and high apathy, when he needed important stimulation. High interference of behavioral problems was identified in both learning and the interaction with people and the environment.

Between 2.5 and 5 years, the intensity of behavioral problems diminished, but the child's level of activism remained atypical, oscillating from very agitated to highly absent. Aggressive behaviors as reactions to frustration emerged, while self-stimulating behaviors increased in intensity and complexity (vocal self-stimulation, in the form of English words, combined vocal and motor behaviors, unusual body movements). The child liked animals, letters and drawings.

At the age of 5-6 years, the child began to like animals more, to draw or build letters, to play with modelling clay, he likes books, masks (especially cosmetic ones), puzzles, picture cards, which he uses for self-stimulating purposes. The child prefers solitary activities, rarely searches for other children's company, and has a strong bond with his parents, having difficulties separating from them.

Family history

A.'s parents are highly educated persons, who have been married for 11 years and A. is the only child. The family relations were tensioned for a period following the diagnosis, but slowly the family managed to recover, and the relations became closer. It unites around A.'s needs, trying to attend to them by adapting their daily life, despite the high challenges.

The family history is not marked by any significant medical problems, genetic disorders, developmental disabilities or psychiatric conditions.

The parents' expectation regarding A.'s future is the acquisition of a higher level of autonomy, so that his inclusion in the community could be accomplished. The mother summarizes A.'s developmental track after the announcement of his diagnosis as sinuous, his progress slow, but the child's potential is seen by the mother as exceptional and the mother's belief is that the child will eventually be completely rehabilitated.

4.2. Case analysis from an integrated perspective

Following the analysis of the data collected about the case using the semi-structured interview and the systematic observations of A.'s behavior, an integrative therapeutic approach with the purpose of reducing vocal stereotypies would be proposed. The case analysis follows a transtheoretical approach, inspired by the Neurosequential model of Therapeutics (NMT, Perry & Dobson, 2013), with emphasis on multisensory integration, attachment, emotional and behavioral regulation, and cognitive higher functions. The directions proposed for the intervention in A.'s case are based on the Applied Behavior Analysis (ABA, Lovaas, 1987, Lilley, 2011 etc.), with integrated techniques from attachment-based interventions (Theraplay, Phyllis & Jernberg, 2010), occupational therapy and Mindfulness (Kabat-Zinn, 2003).

Analysis of the sensory functions

The hyperactivity of vestibular sensory system in A.'s case is manifested by problems in balance (falls suddenly, needs support when walking downstairs, avoids jumping, moves very slow, experiences nausea when swinging, runs in the wrong direction in sports classes, does not perceive distances, pushes against others, sometimes seems "lost", feels overwhelmed in crowded places and in the group of school mates). The hyperactive vestibular system is doubled by a hypoactivity in proprioceptive sensory system (runs a lot, makes many atypical moves, is hyperkinetic) and a hypoactive tactile sensory system (constantly searches for new textures, likes playing with shaving foam, modelling clay, slime, kinetic sand, tries to taste inedible foods: glue, soap, shaving foam etc.)

Analysis of the vocal stereotypies and dissociation tendencies

A tendency to escape in his own thoughts, as a defense mechanism when confronted with adverse experiences in school setting was noted (fig. 1), as well as the tendency to identify with cartoon characters under the same circumstances, both associated with behavior stereotypies, mostly vocal. Attention focus difficulties, diminished motivation, and the presence of a state of confusion are present in the school context.

We took data regarding the frequency of behavior stereotypies in school (fig. 1) and at the therapy center (fig. 2). The rate per hour of three types of stereotypies was calculated with whole interval recording method, using a structured observation form. Every experimental session lasted for 60 minutes, at a specific time in a day.

AN INTEGRATIVE ANALYSIS OF STEREOTYPIC BEHAVIORS IN AUTISM SPECTRUM DISORDERS. A CASE PRESENTATION

The results show that vocal stereotypies are more frequent than motor and combined (vocal and motor) stereotypies and that these behaviors are much more frequent in the school setting than in other settings.

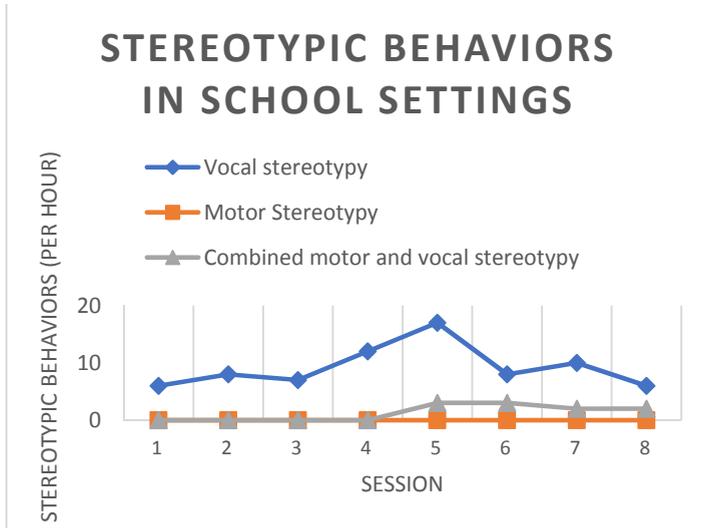


Fig. 1. Frequency of A.'s stereotypic behaviors during one-hour sessions in the school setting

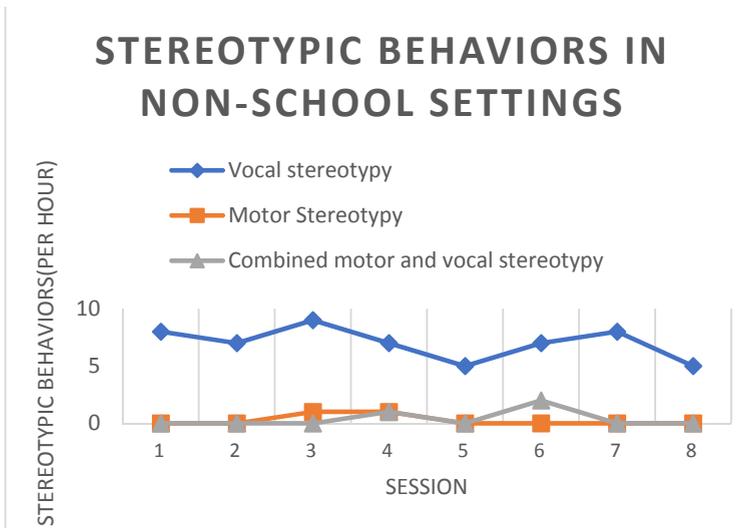


Fig. 2. Frequency of A.'s stereotypic behaviors during one-hour sessions in the therapy center

Analysis of the attachment with parents

Several signs of disorganization of attachment were observed during observations of parent-child interactions: avoidant deactivating strategies in certain instances alternating with proximity seeking and oppositional behaviors with the purpose to attract parental attention.

Analysis of the emotional regulation

His reactions are exaggerated in fearful situations, such as: door opening, door closing, a person appearing or disappearing, noises or steps on the hallway. In play situations, he shows interest in experiencing emotions, especially negative ones (creates narratives of dark places in which a monster lives, plays games in which somebody scares him). The volatility of his emotional reactions is obvious in social situations, in which A. manifests atypical reactions (hitting a child he likes until he cries, trying to hit a child who cries and at the same time telling an adult to hug the crying child).

Analysis of the behavioral regulation

A.'s behavior swings between over-activation and low impulse control (hyperactivity, doubled by self-stimulation) and low activation, numbness and absence in environments with higher expectations. In school, he is generally very slow and does not answer the teacher's questions. The main problem is self-stimulating behaviors.

Identity and self-concept

Self-concept and identity development are immature, the child shows low self-confidence, manifested as the tendency towards negative self-evaluation, especially in school (appeals to self-punishment in situations when he needs to choose between doing something that he does not want to do and a punishment, when frustrated in school, seeks to unstick the tokens given as rewards, uses negative self-labels, such as "misbehaving").

Positive characteristics and strong points

A.'s strong points are the good physical health and condition, the fact that he learns and generalizes quickly, his compliance, as well as the close relationship with his therapist.

3.3. Working hypothesis and recommendations

One of the causes for the high frequency of A.'s vocal stereotypies is the fact that he interprets events and environmental factors as aversive, which supposedly raises his distress level and the stereotypic behaviors function as defenses against perceived danger. Several difficulties were found at basic levels of A.'s functioning, as conceptualized in the NMT model: sensory integration, dissociation, attachment security, emotional and behavioral regulation. So far, the intervention was focused on cognitive development and lower levels were neglected, so the child's difficulties regarding these lower levels were not approached.

Given the developmental difficulties at each level, the sensory integration therapy could be a good point to start, following dissociation, attachment security building, emotional and behavioral regulation. All these interventions could be conducted in association with ABA therapy, that so far proved effective in many areas of the intervention in A.'s case. Avoiding child's labelling and punitive means of intervention are necessary at this level. Following this model of intervention, we expect a significant and durable decrease in A.'s vocal stereotypies.

In A.'s case, some examples of exercises useful for *sensory integration regulation* would be: (1) for the vestibular system: hammock swinging, walking on the beam, jumping over an elastic cord, swinging on the Bobath ball in various directions, rollovers, obstacle courses etc. with increasing intensity and duration of the exercises, (2) for the hypoactive proprioceptive system an intensive program of movement exercises: running, trampoline jumping, jumping on the Bobath ball, pressing, throwing and catching a ball games, pushing and pulling games, with gradual decrease of intensity and duration of the exercises, (3) for the tactile hypoactive system: tactile games, recognition of objects by touch or taste, walking barefoot on various textures, games with tactile materials (kinetic sand, stones, shells, rice, flour, maize grains), with gradual decrease of intensity and duration of exercises.

In order to approach the tendency to *dissociate* during stressful situations, learning some mindfulness techniques could lead to better management of aversive environmental stimulation and, therefore, to the reduction of vocal stereotypies. Some examples of exercises are: (1) "Mindful Posing" – taking funny body positions (ex., Superman position)

in order to feel strong, brave and happy, in a quiet, familiar setting, without distractors; (2) "Guess what it is?" (using smell, texture, taste, sound); (3) blowing soap bubbles, focusing on the long breath and on the shape, size, movement, direction, color of the soap bubbles; (4) balloon play: the purpose is to keep the balloon floating, without hitting the ground, while the focus of the players is to move slowly and delicately, imaginarily connecting with the frail balloon.

The recommendation is that these exercises should be proposed during the times when A. is motivated, involved in tasks and in a good mood, so that they would not be associated with punishment. In time, they could be used as interventions targeting the antecedents, when stereotypic behaviors are anticipated. It is expected that the more A. would learn to use these techniques independently, the higher the awareness of his environment would be.

In order to help the development of *attachment security*, several techniques from the Theraplay program, done together with the parents, could be useful (ex.: games involving physical contact and touch, visual contact, movement games). These interventions need to be structured, to follow the purpose of increasing the security in the relationship, to actively involve the parents and to be fun for all those involved.

For the purpose of developing a better *emotional regulation*, validation of positive and negative emotions, followed by the training of adequate ways to express them (by drawing, clay modelling etc.) is one of the strategies that is expected to be useful. For the development of *behavioral regulation*, the use of ABA techniques proved to be effective so far and can be further implemented. In the therapeutic approach of the problematic behaviors and the development of alternative behaviors several techniques could be useful: RIRD (response interruption and redirection), RIRD plus DRA (differential reinforcement of alternative behavior) and RIRD plus DRO (differential reinforcement of other behavior). Noncontingent reinforcement (NCR) could be a less intrusive alternative to RIRD, in case the latter is too aversive for the child. The focus of the behavioral intervention should be at this point the increase of response fluency and incidence of more adaptive behaviors and the improvement of functional communication. The intervention should be conducted in a non-aversive manner, so that it would be appropriate to the child's characteristics.

5. Directions for future research

The testing of the hypothesis derived from our case study and a more detailed analysis of the factors that can lead to the occurrence and maintenance of behavior stereotypies and their functions could be possible directions for future research. Also, it would be interesting to study the relation between NMT model and stereotypical behaviors in children with ASD in particular, or ASD traits in general.

6. Conclusion

In the case of ASD, no therapeutic program is effective if used as a single therapeutic approach. A combination of various techniques, from different therapeutic models, is necessary in most cases (Phyllis & Jernberg, 2010), leading to the necessity to implement an integrative approach to treatment.

Children with ASD are unique, each different from the other, and there will always be exceptions in which certain techniques, though empirically supported and widely used, will not have the expected effects. These exceptions represent the biggest challenges for a therapist and in most of the cases necessitate an integrative approach.

The behavioral stereotypies represent the most difficult to treat behavior problems in children with ASD, that affect their life to a large extent and deprive them of important environmental stimulation. The reduction of these behaviors is necessary in order for the learning process and the social interaction to be optimal, as well as for the inclusion of these children in a group. But in order to choose an effective intervention, the context in which they appear and are maintained should be carefully analyzed, and the child's developmental level should be carefully considered.

Our case presentation could be an outset for the implementation of an integrative approach to the assessment and intervention planning in a case in which a classical ABA approach reached its limitations. It can be a useful resource for the scientific community, as new research questions derived from it can be explored in the area of stereotypic behaviors in children with ASD.

REFERENCES

- Ahearn, W.H., Clark, K.M., MacDonald, R.P.F. & Chung, B.I. (2007). Assessing and treating vocal stereotypy in children with autism. *Journal of Applied Behavior Analysis*, 40 (2), 263-275;
- Barfield, S., Gaskill, R., Dobson, C., & Perry, B. D. (2012). Neurosequential Model of Therapeutics© in a therapeutic preschool: Implications for work with children with complex neuropsychiatric problems. *International Journal of Play Therapy*, 21(1), 30-44.
- Bodfish, J.W., Crawford, T.W., Powell, S.B., Parker, D.E., Golden, R.N., & Lewis, M.H. (1995). Compulsions in adults with mental retardation: Prevalence, phenomenology, and comorbidity with stereotypy and self-injury. *American Journal of Mental Retardation*, 100, 183-192.
- Bondy, A. & Frost, L.A. (1994). The Picture Exchange Communication System. *Focus on Autism and Other Developmental Disabilities*, 9(3):1-19.
- Brandenburg, L.A. (2012). *The effects of multi-sensory environments on the stereotypic behaviors of children with autism*, Ed. D. Dissertation, The John Hopkins University.
- Cachia, R.L., Anderson, A., & Moore, D.W. (2016). Mindfulness in individuals with autism spectrum disorder: A systematic review and narrative analysis. *Review Journal of Autism and Developmental Disorders*, 3(2), 165-178.
- Cascio, C.J., Lorenzi, J., & Baranek, G.T. (2016). Self-reported Pleasantness Ratings and Examiner-Coded Defensiveness in Response to Touch in Children with ASD: Effects of Stimulus Material and Bodily Location. *Journal of Autism and Developmental Disorders*, 46(5), 1528-1537.
- Cicero, F.R. (2008). The effects of noncontingent reinforcement and response interruption on stereotypic behavior maintained by automatic reinforcement, *Dissertation Abstracts International Section A: Humanities and Social Sciences*, 68(10-A), 4193.
- Cividini-Motta, C., Garcia, A.R., Livingston, C. & MacNaul, H.L. (2019). The effect of response interruption and redirection with and without a differential reinforcement of alternative behavior component on stereotypy and appropriate responses. *Behavioral Interventions*, 34(1), 3-18.
- Condrey, J.H. (2015). General Education Teacher Perceptions of Self-Efficacy Regarding Teaching Students with Autism in Inclusion Settings. *Education Dissertations and Projects*, 148.
https://digitalcommons.gardner-webb.edu/education_etd/148.

- Cooper, J.O., Heron, T.E. & Heward W.L. (2016). *Analiza aplicată a comportamentului. Cartea Albă*, ATCA. București: Alpha MDN.
- Corbett, B.A., Mendoza, S., Wegelin, J.A., Carmean, V., & Levine, S. (2008). Variable cortisol circadian rhythms in children with autism and anticipatory stress. *Journal of psychiatry & neuroscience: JPN*, 33(3), 227-34.
- Greenspan, S.I., & Wieder, S. (2007). The developmental individual-difference, relationship-based (DIR/Floortime) model approach to autism spectrum disorders. In Hollander, E. & Anagnostou, E. (Eds.). *Clinical manual for the treatment of autism*. Arlington: American Psychiatric Publishing, Inc.
- Grossman, L., Cowan, M. & Shankman, R. (2010). *Mindful Schools*. <http://www.mindfulschools.org> (accessed May 3, 2019).
- Durand, V.M., & Carr, E.G. (1987). Social influences on "self-stimulatory" behavior: Analysis and treatment application. *Journal of Applied Behavior Analysis*, 20, 119-133.
- Haruvi-Lamdan, N., Horesh, D., & Golan, O. (2018). PTSD and autism spectrum disorder: Co-morbidity, gaps in research, and potential shared mechanisms. *Psychological Trauma: Theory, Research, Practice, and Policy*, 10(3), 290-299.
- Hwang, Y., Kearney, P., Klieve, H., Lang, W., & Roberts, J. (2015). Cultivating mind: Mindfulness interventions for children with autism spectrum disorder and problem behaviours, and their mothers. *Journal of Child and Family Studies*, 24(10), 3093-3106.
- Jansen, L.M., Gispen-de Wied, C.C., van der Gaag, R.J., van Engeland, H. (2003). Differentiation between autism and multiple complex developmental disorder in response to psychosocial stress. *Neuropsychopharmacology*, 28(3): 582-590.
- Joung, E.G. (2011). The effects of response interruption and redirection on vocal stereotypy, *Education Dissertations and Theses*, <https://kuscholarworks.ku.edu/handle/1808/8025>.
- Kabat-Zinn, J. (2003). Mindfulness-Based Interventions in Context: Past, Present, and Future. *Clinical Psychology: Science and Practice*, 10(2), 144-156.
- Keenan-Mount, R., Albrecht, N.J., Waters, L. (2016). Mindfulness – based-approaches for young people with autism spectrum disorder and their caregivers: do these approaches hold benefits for teachers? *Australian Journal of Teacher Education*. 41(6): 68-86.
- Kerns, C.M., Newschaffer, C.J. & Berkowitz, S.J. (2015). Traumatic Childhood Events and Autism Spectrum Disorder. *Journal of Autism and Developmental Disorders*, 45 (11), 3475-3486.

- Koegel, R.L., & Covert, A. (1972). The relationship of self-stimulation to learning in autistic children. *Journal of Applied Behavior Analysis*, 5(4), 381-387.
- Koegel, R.L., Firestone, P.B., Kramme, K.W., & Dunlap, G. (1974). Increasing spontaneous play by suppressing self-stimulation in autistic children. *Journal of Applied Behavior Analysis*, 7, 521-528.
- Koegel, R.L., & Koegel, L.K. (2006). *Pivotal response treatments for autism: Communication, social, & academic development*. Baltimore: Paul H. Brookes Publishing.
- Lee, S., Odom, S.L., & Loftin, R. (2007). Social engagement with peers and stereotypic behavior of children with autism. *Journal of Positive Behavior Interventions*, 9(2), 67-79.
- Lee, J., & Porretta, D.L. (2016). The effect of instruction on stereotypic behaviors of boys with autism spectrum disorder: A pilot study. *Palaestra*, 30, 18-22.
- Lewis, M.H., & Bodfish, J.W. (1998). Repetitive behavior disorders in autism. *Mental Retardation and Developmental Disabilities, Research Reviews*, 4, 80-89.
- Lilley, R. (2011). The ABCs of Autism: Aspects of maternal pedagogy in Australia. *Social Analysis*, 55(1), 134-159.
- Lord, C., Risi, S., Lambrecht, L., Cook, Jr., E., Leventhal, B., & DiLavore, P. et al. (2000). The Autism Diagnostic Observation Schedule—Generic: A Standard Measure of Social and Communication Deficits Associated with the Spectrum of Autism. *Journal of Autism and Developmental Disorders*, 30(3), 205-223. doi: 10.1023/a:1005592401947
- Lovaas, I. (1987). Behavioral Treatment and Normal Educational and Intellectual Functioning in Young Autistic Children. *Journal of Consulting and Clinical Psychology*, 55(1), 3-9.
- Lyons, S., Whyte, K, Stephens, R. & Townsend, H. (2015). Developmental Trauma Close Up. *Beacon House Therapeutic Services and Trauma Team*. <https://beaconhouse.org.uk/useful-resources/> (accessed March 18, 2019).
- MacKinnon, L. (2012). The Neurosequential Model of Therapeutics: An Interview with Bruce Perry. *The Australian and New Zealand Journal of Family Therapy*, 33(3), 210-218.
- Maurice, C. (1993). *Let Me Hear Your Voice: A Family's Triumph Over Autism*. New York: Random House.
- Morrison, K., & Rosales-Ruiz, J. (1997). The effect of object preferences on task performance and stereotypy in a child with autism. *Research in Developmental Disabilities*, 18, 127-137.

- Mullen, B.A. (2009). An integrated multidisciplinary approach to the design of therapeutic devices for people with mental illness and pervasive developmental disorders, *Doctoral Dissertations Available from ProQuest*, <https://scholarworks.umass.edu/dissertations/AAI3379997>.
- Nuzzolo-Gomez, R., Leonard, M.A., Ortiz, E., Rivera, C.M., & Greer, D.R. (2002). Teaching children with autism to prefer books or toys over stereotypy or passivity. *Journal of Positive Behavior Interventions*, 4, 80-88.
- Partington, J.W., Bailey, A., & Partington, S.W. (2018). A Pilot Study Examining the Test-Retest and Internal Consistency Reliability of the ABLLS-R. *Journal of Psychoeducational Assessment*, 36(4), 405-410. <https://doi.org/10.1177/0734282916678348>
- Perry, B.D. (2006). Applying Principles of Neurodevelopment to Clinical Work with Maltreated and Traumatized Children: The Neurosequential Model of Therapeutics. In N. B. Webb (Ed.), *Social Work Practice with Children and Families. Working with traumatized youth in child welfare*. New York: Guilford Press.
- Perry, B.D. & Dobson, C.L. (2013). The Neurosequential Model (NMT) in maltreated children, in Ford, J., Courtois, C. (Eds.). *Treating Complex Traumatic Stress Disorders in Children and Adolescents*, New York: The Guilford Press.
- Perry, B.D. & Hambrick, E.P. (2008). The Neurosequential Model of Therapeutics. *Reclaiming Children and Youth*, 17(3), 38-43.
- Phyllis, B.B., Jernberg, A.M. (2010). *Theraplay. Helping Parents and Children Build Better Relationships Through Attachment-Based Play*, San Francisco: Jossey-Bass.
- Repp, A.C., Singh, N.N., Karsh, K.G., & Deitz, D.E.D. (1991). Ecobehavioral analysis of Stereotypic and adaptive behaviors: Activities as setting events. *Journal of Intellectual Disability Research*, 35(5), 413-429.
- Runco, M.A., Charlop, M.H., & Schreibman, L. (1986). The occurrence of autistic children's self-stimulation as a function of familiar versus unfamiliar stimulus conditions. *Journal of Autism and Developmental Disorders*, 16(1), 31-44.
- Schopler, E. (1994). A Statewide Program for the Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH). *Child and Adolescent Psychiatric Clinics of North America* 3(1):91-103.
- Siegel, Daniel J. (2010). *The mindful therapist. A clinician's guide to mindfulness and neural integration*. New York: W.W. Norton & Company, Inc.

- Sinclair, D., Oranje, B., Razak, K.A., Siegel, S.J., & Schmid, S. (2017). Sensory processing in autism spectrum disorders and Fragile X syndrome – From the clinic to animal models. *Neuroscience and Biobehavioral Reviews*, 76(PtB), 235-253.
- Skinner, B.F. (1957). *Century psychology series. Verbal behavior*. East Norwalk, CT, US: Appleton-Century-Crofts.
- Smith, T. (2001). Discrete Trial Training in the Treatment of Autism. *Focus on Autism and Other Developmental Disabilities*, 16(2), 86–92.
- Szu-Yin, C., Baker, S. (2011). Effects of noncontingent reinforcement and response interruption and redirection on a child's vocal stereotype maintained by automatic reinforcement. *Bulletin of Special Education*, 36(1), 109-127.
- Tarr, C.W. (2018). The effects of physical exercise on stereotypic behaviors in autism: A meta-analysis. *Doctoral Dissertation, Slippery Rock University of Pennsylvania*, ProQuest LLC.
- Turner, M. (1999). Annotation: Repetitive behavior in autism: A review of psychological research. *Journal of Child Psychology and Psychiatry*, 40(6), 839-849.
- Zhang, D., Chan, S.K.C., Lo, H.H.M. et al. (2017). Mindfulness-based intervention for Chinese children with ADHD and their parents: a pilot mixed-method study. *Mindfulness*, 8: 859.