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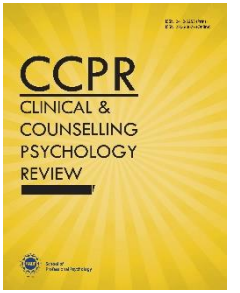

Title: **Use of Behavioral Modification and Sensory Integration Strategies to Manage Symptoms of Autism Spectrum Disorder (ASD)**

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Use of Behavioral Modification and Sensory Integration Strategies to Manage Symptoms of Autism Spectrum Disorder (ASD)

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Abstract

Autism spectrum disorder (ASD) is a neurodevelopmental condition characterized by symptoms in two domains: Social communication/social interaction and restricted, repetitive patterns of behavior, interests, or activities. The impairments associated with ASD often become challenging in the clinical setting due to their broader impact across developmental domains. Therefore, recent evidence suggests a combination of behavioral and sensory integration strategies in managing ASD. Several carefully designed interventional studies have also provided information about the effects of caregiver training and direct instruction at the interventional level. The current study presents the case of a four years and six months old boy who was referred with complaints of poor socialization and communication and repetitive behaviors. This study was based on a single case-ABA design. Initial assessment of the client involved several steps including a clinical interview, behavioral observation, administration of Sensory Screening Checklist followed by a diagnostic assessment based on the Childhood Autism Rating Scale (CARS 2) and diagnostic criteria provided by DSM-5 TR. Based on the assessment, the diagnosis of ASD was confirmed and a management plan was formulated to address the presenting issues. A total of 26 therapy sessions were carried out with the client that particularly focused on managing repetitive behaviors using a combination of behavioral and sensory integration strategies. Outcome analysis revealed that the client demonstrated a reduction in behaviors including teeth grinding and echolalia. The therapy sessions proved beneficial in addressing the client's challenges, albeit with further work needed to achieve optimal outcomes.

***Keywords*:** autism/ASD, behavioral management, echolalia, sensory integration, sensory needs, teeth grinding

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Introduction

Autism spectrum disorder (ASD), characterized by deficits in social communication, repetitive behaviors, and narrow interests; typically presents itself in one of three distinct onset patterns: Early onset, regressive onset, or plateau onset. Early onset refers to the emergence of symptoms within the first year of life, while regressive onset entails a loss of previously acquired social and communicative skills typically occurring in the second or third year. Conversely, plateau onset describes a developmental trajectory where progression beyond initial year stagnates, despite the retention of previously acquired skills (Boterberg, 2019).

Recent evidence based on a review of epidemiological studies suggests that ASDs are prevalent conditions, with a globally estimated prevalence of 7.6 cases per 100 (one in 132), (Alrehaili et al., 2023). It is regarded as a lifelong complication and has a complex etiology that involves an interplay of genetic, neurobiological, and environmental factors (Moussa et al., 2016). A growing literature supports fetal origins and also looks into various maternal conditions such as gestational diabetes, hypertension, medications, etc. (Lyall et al., 2017; Moussa et al., 2016). One of these potential risk factors is the mother's age. Evidence suggests an association between advancing maternal age and autism (Lyall et al., 2017). The findings have also shown a U-shaped relationship between these two variables. This implies that the chances of having an offspring with autistic traits are comparable in both younger and older mothers, with a higher risk among mothers who have autistic traits (Sari et al., 2022).

Considering the complexity of ASD, the diagnosis of autism provided by *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association [APA], 2013, 2022) criteria for ASD aim to make a clearer distinction between the underlying neurobiological causes and the observable behavioral symptoms. This allows individuals demonstrating the characteristic behavioral patterns of ASD from early childhood to receive a diagnosis of ASD, while also facilitating the identification of additional biomedical conditions (Lord & Jones, 2023).

In addition to behavioral difficulties, sensory issues are a common presentation in ASD. Sensory processing can be difficult among children with autism, especially insensitivity or extreme sensitivity to sensory input from the environment (APA, 2013). These difficulties are likely to

exacerbate already existing communication and anxiety among these children (Khaledi et al., 2022). These atypical patterns of sensory responsiveness may cascade into other domains of development and can significantly predict aspects of adaptive behaviors in children with ASD children (Williams et al., 2018). It has been observed that sensory impairments are often linked to problematic behaviors such as lethargy, irritability, hyperactivity, noncompliance, stereotypic behaviors, and speech issues which could be difficult to deal with (O'Donnell et al., 2012; Dellapiazza et al., 2020). It is likely that a repetitive or stereotypic behavior is functionally related to sensory sensitivity and is performed to cope with hyper or hyposensitivity in the environment (Kapp et al., 2019). So, atypical sensory processing seems to be an important contributor to the severity of ASD symptoms as well as the rate of acquisition of communication skills (Feldman et al., 2020). In general, this suggests a significant association between sensory impairments and communication difficulties (Khaledi et al., 2022) highlighting the need to focus on the sensory needs of autistic children at the interventional level along with communication and behavioral issues.

The fusion of behavioral extremes, known as behavioral excesses and deficits, often results in a repetitive and limited pattern of vocal behavior, for instance, echolalia (Edelstein et al., 2021). Echolalia is commonly described as the socially awkward or inappropriate repetition of all or part of a previously spoken phrase (Valentino et al., 2012). While some repetition of language is typical in child development, children with ASD may persist in echolalia beyond early childhood. Moreover, they may exhibit echolalia devoid of social context and at a higher frequency compared to typically developing children (Howlin, 1982). Echolalia can (a) pose challenges to educational interventions aimed at speech improvement, (b) contribute to breakdowns in communication, (c) heighten the risk of social isolation or stigma, and (d) increase the likelihood of challenging behaviors (Valentino et al., 2012). Similarly, another common example is teeth grinding behavior also known as bruxism (Kandaswamy, 2017). The association between bruxism/teeth grinding and problems with sensory processing in autistic children has been examined. Children with autism had a higher chance of developing bruxism when they had problems in their sensory processing. Bruxism may arise in this population as a result of sensory sensitivity and the

neurobiology between the connection of the gut and the brain (Kandaswamy, 2017).

Considering the challenges associated with ASD, modes of intervention are available; however, among these, early intensive behavioral intervention emerges as the sole empirically validated avenue for enhancing cognitive abilities in individuals with ASDs (Tromans & Adams, 2018). Although a handful of medications exist to mitigate symptoms like aggression, irritability, and hyperactivity, the cornerstone of ASD treatment predominantly rests upon behavioral strategies. The behavioral component encompasses a spectrum of approaches aimed at increasing positive behaviors through educational techniques, tailored learning opportunities, and modifying contingencies and associations (Whitehouse et al., 2020).

In recent years, meticulously crafted intervention studies have shed new light on the efficacy of various components within behavioral treatments, encompassing caregiver training, and direct instructional methods (Sandbank et al., 2023). However, assessing the impact of these interventions proves to be a nuanced endeavor, contingent upon the unique characteristics of the child in question as well as the skills and attitudes within the family dynamic. Interestingly, disparate interventions targeting distinct skills may yield comparable outcomes, underscoring the complexity of effective intervention strategies (Kasari et al., 2012). To that end, Al- Dawaideh (2014) identified two interventions as having initial evidence supporting their efficacy in addressing echolalia: The cues-pause-point and more general verbal prompting interventions. The cues-pause-point intervention is a behavioral approach that has been studied for management of immediate echolalia. Originally introduced by McMorrow and Foxx (1986) during the treatment of a 21-year-old male with ASD, this intervention involves the presentation of a visual cue by a trainer followed by instructions regarding the upcoming teaching session. Subsequently, the trainer poses a question and allows for a brief pause. Finally, the visual cue is pointed to prompt the learner to verbalize the answer to the question (Neely et al., 2016). This emphasizes the usefulness of strategies involving direct instructions to or involvement of the client in the management of ASD e.g., addressing speech difficulties. Similarly for sensory impairments which are common presentations in ASD, sensory integration interventions that also focus on client-directed activities and

caregiver engagement (Little et al., 2022; Pfeiffer et al., 2011) are established to improve difficulties associated such as attention span, speech, and understanding (Jamal Uddin et al., 2021). As in the case of bruxism/ teeth grinding, function-based stimulation intervention produced substantial decreases in teeth grinding among autistics (Scarff, 2016). It has been observed that sensory integration strategies are more effective than behavioral modification methods. However, a combination of behavioral and sensory integration strategies is likely to be more promising in managing difficulties associated with autism (Jamal Uddin et al., 2022).

The above mention literature holds significant implications for intervention strategies, underscoring the imperative of precisely targeted behavioral or language-focused interventions during the early developmental stages, even among children exhibiting milder manifestations of ASDs. Moreover, analyses of longitudinal data underscore the transformative impact of sustained caregiver involvement in parent-mediated interventions during the formative early preschool years. Whether through coaching or direct instruction on interacting with their children, caregivers who remained engaged in such interventions witnessed marked enhancements, nearing almost a standard deviation, in language and adaptive skills throughout the school years, in contrast to caregivers who did not participate (Anderson et al., 2011). However, scant evidence exists that employed a combination of behavioral and sensory strategies in managing difficulties associated with autism, e.g., teeth grinding and echolalia. Therefore, the present study examines a combination of these strategies in managing the behavioral difficulties associated with ASD.

Clinical Case Description

The client was a four year and six months old boy. He was referred by his teacher for assessment of complaints such as poor communication and socialization, repetitive behaviors including teeth grinding, and echolalia of last spoken word/sound. The client lived in a nuclear family system with his mother and three sisters, while his father has been living abroad due to his job. He reported having a satisfactory relationship with his parents and three elder sisters. It was informed that the client's mother had a stressful pregnancy and experienced complications at the time of birth due to her age as she was in her 40s, however, the client was a healthy

child at the time of his birth. It was reported that since the client's birth, his family was living abroad; however, they had to move back to Pakistan with his mother and sisters following COVID-19. Before the pandemic when the client was about two and a half years old, he was an active healthy child. However, due to the pandemic situation, the client was restricted to his home and could only socialize with his immediate family. Furthermore, the client's family experienced some financial difficulties upon which they had to move back to Pakistan. The client was three years old at that time. Soon after the client moved back, he experienced difficulties in adjusting to the new environment as well as due to the absence of his father. Although client used to socialize and interact with people in his immediate circle like other children of his age, however, at that time he often showed tantrums and disliked interacting with relatives/acquaintances and playing with children of his age. He also experienced speech regression which remained non-concerning for the family. However, when the client became three and a half years old, these issues remained and his family sent him to an institute, for his regressed speech and behavioral difficulties, at the suggestion of a psychiatrist and a clinical psychologist where he received regular sessions for three months. Relying on the slight improvement in tantrums, his parents decided to send him to kindergarten at the age of four years. The client's social and communication difficulties worsened when he had to relate with his peers and participate in the classroom. Considering the client's repetitive behaviors and poor language ability, compared to the children of his age, his teacher referred him for the clinical assessment. Presently, this case is focusing on interventions employed for sensory concerns, teeth grinding behavior, and echolalia in the client.

Initial Screening

The initial screening of the client was done through a clinical interview with his mother, behavioral observation, baseline for teeth grinding, and reinforcer identification.

Table 1

Possible Factors Underlying Client's Condition

Predisposing factors	Mother's stress and high blood pressure during pregnancy Mother's age at the time of pregnancy

Precipitating and Maintaining factors	Lack of opportunities to socialize during lockdown due to COVID-19 Adjustment problems on moving back to Pakistan
Protective factors	Early intervention Family's concern

Behavioral Observation

The client was a physically healthy child with age-appropriate height and weight. He greeted the therapist with a handshake and maintained appropriate eye contact when directed by his mother. However, when tried to engage in a conversation or addressed directly, he often lowered his gaze, showed an indifferent attitude, or gave odd responses by making loud noisy sounds. He often engaged in repeating the last word/sound of a sentence said in front of him. When observed during play activities, he preferred playing alone and used color-sorting puzzles while also grinding his teeth during play. He displayed a good one-word vocabulary, named animals with toy prompts, and sniffed objects. He repeatedly checked his mother's bag for food and cried when denied. The echolalia and teeth grinding behaviors were observable throughout the session and were present even when the client was not directly involved in a conversation or any activity.

Baseline for Teeth Grinding

The mother was provided with a baseline assessment to monitor teeth grinding behavior displayed by including. This behavior was characterized by clenching or moving the lower jaw to produce sounds as the teeth rubbed together.

Table 2

Pre-Assessment of Teeth Grinding

Teeth Grinding	Rating (pre-assessment)
Average Frequency	7 times (when not involved in any tasks) 3 times (when involved in a task)
Average Intensity	7
Average Duration	10 seconds

Baseline for Echolalia

A baseline assessment to monitor echolalia was done. This behavior was characterized by the client's repetition of words spoken by an adult in an hour.

Table 3

Pre-Assessment of Echolalia

Echolalia	Rating (pre-assessment)
Average Frequency	6 times (when not involved in any tasks) 4 times (when involved in a task)
Average Duration	13 seconds

Sensory Screening

Sensory Screening Checklist. This checklist is described as a preliminary non-diagnostic assessment tool designed to identify a child's sensory processing preferences, patterns, and sensitivities. It consists of categories representing various sensory modalities and behaviors commonly associated with sensory processing challenges. Its scoring typically involves checking the items to each category in either the hyper-responsive or hypo-responsive domain based on observed behaviors. These scores reflect the frequency, intensity, or severity of sensory processing difficulties within each modality (Aquilla et al., 2015).

Table 4

Categories and Description of Sensory Screening Checklist

Auditory Behaviors	Hypo-responsive
Proprioception Behaviors	Hypo-responsive
Gustatory (Smell/Taste)	Hyper-responsive
Tactile Behaviors	Hyper-responsive
Vestibular/Balance	Hyper-responsive
Visual Behaviors	Hypo-responsive

Reinforcer Identification

The identification of reinforcers is important to increase the frequency of desired behavior (Gomez & Cooper, 2008). In identifying reinforcers for individuals with neurodevelopmental disabilities, the client's mother identified tangible items and discussed his preferences, including colors, chips, and biscuits. Colors were incorporated into therapy, while chips and

biscuits were initially used as reinforcers to engage him in writing tasks. Eventually, the use of tangible reinforcers will transition to the client's preferred "thumbs up" gesture.

Diagnostic Assessment

The diagnostic assessment of the client was done through the Childhood Autism Rating Scale (CARS 2; Schopler et al., 2010) and the criteria of DSM-5-TR (APA, 2022).

The Childhood Autism Rating Scale (CARS 2; Schopler et al., 2010)

CARS 2 was used to assess the symptoms of the client. It is a validated 15-item rating scale used to differentiate children with autism from those with developmental disabilities. It offers objective ratings based on behavioral observation, with total scores ranging from 15 to 60. A cut-off score of 30 is typically used to diagnose autism (Schopler et al., 2010). In the present case, the client's score suggested that he has mild to moderate autism.

Table 5

Total Raw Scores and Category on CARS 2

Raw scores	Category
30	Mild to Moderate

Procedure

A total of 26 sessions were held, with each session lasting 60 minutes and tasks being divided accordingly (at both individual and group levels). The management plan was developed by the client's behavioral difficulties that had a significant impact on his social and communication skills. The activities were divided into an hour with tasks devoted to enhancing his performance in developmental domains such as language as well as addressing his sensory needs using behavior modification and sensory integration techniques. Following the completion of the client session, the mother was given parental training and homework assignments.

Intervention

Rapport Building. Reciprocity and pairing were employed to establish rapport with the client, involving actions such as imitating his behavior and engaging in preferred activities. Utilizing the client's preferred reinforcers, such as coloring and painting, helped foster comfort.

Singing his favorite poems together further eased the atmosphere, leading to increased interaction and happiness at the start of therapy sessions.

Behavior Modification Techniques. In an effort to facilitate the client with echolalia, cue-pause-point (CPP), natural language paradigm, and verbal modeling plus positive reinforcement for appropriate responses were used.

Cues-pause-point was introduced by McMorrow and Foxx (1986). The cues-pause-point intervention consists of the therapist providing a visual cue to the client to remain silent (cue). During the administration of this technique, the therapist provided a visual cue to the client and simultaneously provided instructions regarding the correct response. For example, the therapist posed the question "What is your name?" and provided a short pause following the question (pause). If the client repeated the question, he was the verbal prompt of "No" to make him stop. Finally, the therapist pointed to a page with his name written or his picture to prompt the client to verbalize the answer to the question with his name (point).

Modeling in the form of recasting was also used with the client to increase his speech and lower the frequency of echolalia. In recasting, the therapist repeated an error utterance back to the client with the error corrected. The mother was also instructed to correct the child whenever he was interacting with the mother.

Differential reinforcement of lower rates of behavior was used to reduce the repeating behavior of teeth grinding. The client was presented with a verbal cue, "no grinding", paired with the touch of the therapist's index finger on his chin with a gentle push downwards to cue him to open his mouth for 10 seconds. If resistance was met the cue was re-presented only once. The client was given reinforcement when he stopped. He was introduced to competing behaviors of eating carrots, cucumbers, hard vegetables, and fruit to fulfill his sensory needs. Additionally, this technique was also used to foster his social and communication skills such as reinforcing the client's interaction with peers and others, responding to instructions, etc. This was done in collaboration with other therapists through planning group sessions.

Sensory Integration Activities. To address the client's oral hyposensitivity, sensory integration activities were introduced

(Glennon, 2021). The client's mother received instruction on performing gum massages through instructional videos, which were encouraged to be incorporated into the client's daily routine. Additionally, the use of a teether and vibrating toothbrush was recommended. The mother was advised to provide vegetables such as carrots and cucumbers for the client to chew when the frequency of teeth grinding increased.

Outcomes of Interventions

After completing a total of 26 sessions with the client, a comprehensive assessment was conducted to evaluate his progress. The client's prognosis was assessed as fair, indicating a positive trajectory. Satisfactory progress was observed across the targeted domains. The reduction in repetitive behaviors was significant as teeth grinding showed a notable decrease. This decline was substantiated by reports provided by both the client's mother and sisters. Additionally, there was a discernible decrease in echolalia tendencies, indicating improvement in communication patterns. The positive outcomes observed after the intervention period reflect the effectiveness of the implemented strategies and interventions. These findings provide optimism for continued progress and development in the client's journey toward improved communication and behavior management. Furthermore, strides in socialization were evident as the client began to engage more with his siblings and peers, displaying a newfound willingness to share belongings. Alongside his progress, the client's mother demonstrated commendable commitment, actively engaging in the therapeutic process. Early counseling sessions regarding autism proved beneficial, assuaging her anxieties about her son's condition, and fostering a sense of resilience and optimism. This newfound motivation empowered her to remain steadfast in her support for her son throughout his journey.

Post-Assessment for Teeth Grinding and Echolalia

Table 6

Post-Assessment of Teeth Grinding

Teeth Grinding	Rating (mid-assessment)
Average Frequency	3 times (when not involved in any tasks) 0 (when involved in a task)
Average Intensity	3
Average Duration	10 seconds

Table 7
Post-Assessment of Echolalia

Echolalia	Rating (pre-assessment)
Average Frequency	3 times (when not involved in any tasks) 1 times (when involved in a task)
Average Duration	9 seconds

Discussion

The present case study presents the use of behavioral modification and sensory integration strategies that were expertly employed to address the client's behavioral challenges. The study provides evidence to use a combination of behavioral and sensory integration strategies as promising to manage symptoms or problematic behaviors associated with autism which is also evident by existing literature (Jamal Uddin et al., 2021). It also focuses on the use of direct instructions and client-caregiver involvement in achieving ultimate therapeutic outcomes (Little et al., 2022; Pfeiffer et al., 2011). Present findings underscored the overall efficacy of behavioral and sensory interventions in mitigating problem behaviors among individuals with autism. Notably, in tackling the issue of echolalia, the implementation of the cue-pause-point (CPP) technique yielded promising results, indicative of tangible improvements in the client's condition. Indeed, preceding studies, as noted by Valentino et al. (2012) and Al-Dawaideh (2014), have demonstrated the applicability of the cue-pause-point (CPP) procedure in effectively reducing echolalia during echoic training while concurrently bolstering correct responding. Furthermore, the efficacy of the CPP procedure extends beyond singular targets, as evidenced by its ability to swiftly induce behavioral changes across subsequent objectives.

Addressing the client's repetitive behaviors, such as teeth grinding, involved the strategic application of differential reinforcement. Existing literature, as expounded by Efaw (2021), acknowledges both techniques as effective in facilitating skill acquisition. However, the differential reinforcement approach emerges as the more dependable method, consistently yielding favorable outcomes. Preliminary findings, therefore, advocate for the adoption of the differential reinforcement of unprompted responses as the default approach in instructing children with autism.

To manage the client's oral hyposensitivity, sensory integration activities were utilized, unveiling a significant positive impact on his behavioral patterns (i.e., teeth grinding). Research insights, as elucidated by Park & Kong (2015), affirm the efficacy of sensory integrative interventions in eliciting notable improvements in motor performance and effecting sensory-based and behavioral changes. However, it's worth noting that these interventions may not necessarily translate into enhancements in academic skills.

Integral to the therapeutic process was the active involvement of the client's family, a component supported by extensive research findings. Garbacz et al. (2016) highlight the myriad benefits associated with family engagement in therapy, citing enhanced academic achievement, decreased levels of problem behavior, and heightened social-emotional skills among children, both with and without ASD. Thus, the inclusion of the client's family in the therapeutic journey is not only empirically supported but also holds promise for fostering positive outcomes.

Limitations

The generalizability of the present case study is concerning since it is based on a single subject. In addition, it relies on subjective measures of evaluation. Further, it presents a case of a client with mild to moderate autism, however, different findings may be observed with varying severity of autism.

Conclusion

The significance of thorough assessments and individualized intervention strategies for individuals with ASD is demonstrated by this case study. The effectiveness of behavioral modification strategies in combination with sensory integration techniques and CPP intervention concludes the usefulness of these integrated interventions in treating the main symptoms of ASD rather than solely relying on behavioral methods.

Implications and Suggestions

The findings of this study would be useful in developing individualized treatment plans, clinicians should give priority to multidimensional evaluations such as behavioral observation, diagnostic testing, and family interviews. For circumstances comparable to this, clinicians ought to think about implementing these evidence-based

strategies into intervention procedures. For those with ASD, early detection and intervention are essential to achieving the best possible results. This study underlines the advantages of starting therapy early and the possibility for major advancement with focused interventions during crucial developmental stages. Future research could examine the value of customized treatment programmes, the efficacy of combined interventional strategies, and the impact of therapy on broader developmental domains. Additionally, a larger sample size and following proper interventional protocols would be beneficial to collect data related to the generalizability of the study findings.

References

Al-Dawaideh, A.M. (2014). The effectiveness of cues - pause - point method for overcoming echolalia in Arabic-Speaking children with autism. *Life Science Journal*. *11*(1), 72–82.

Alrehaili, R. A., ElKady, R. M., Alrehaili, J. A., & Alreefi, R. M. (2023). Exploring early childhood autism spectrum disorders: A comprehensive review of diagnostic approaches in young children. *Cureus*, *15*(12), Article e50111. https://doi.org/10.7759/cureus.50111

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). https://doi.org/10.1176/appi.books.9780890425596

American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders* (5th ed., text rev.). https://doi.org/10.1176/appi.books.9780890425787

Anderson, D. K., Maye, M. P., & Lord, C. (2011). Changes in maladaptive behaviors from Midchildhood to young adulthood in autism spectrum disorder. *American Journal on Intellectual and Developmental Disabilities*, *116*(5), 381–397. https://doi.org/10.1352/1944-7558-116.5.381

Aquila, P., Yack, E., & Sutton, S. (2015). *Building bridges through sensory integration, 3rd edition: Therapy for children with autism and other pervasive developmental disorders* (3rd ed.). Future Horizons.

Boterberg, S., Charman, T., Marschik, P. B., Bölte, S., & Roeyers, H. (2019). Regression in autism spectrum disorder: A critical overview of retrospective findings and recommendations for future

research. *Neuroscience & Biobehavioral Reviews, 102*, 24–55. https://doi.org/10.1016/j.neubiorev.2019.03.013

Dellapiazza, F., Michelon, C., Oreve, M. J., Robel, L., Schoenberger, M., Chatel, C., Vesperini, S., Maffre, T., Schmidt, R., Blanc, N., Vernhet, C., Picot, M. C., Baghdadli, A., & ELENA study group (2020). The impact of atypical sensory processing on adaptive functioning and maladaptive behaviors in autism spectrum disorder during childhood: Results from the ELENA Cohort. *Journal of Autism and Developmental Disorders*, *50*(6), 2142–2152. https://doi.org/10.1007/s10803-019-03970-w

Edelstein, M.L., Sloman, K., Selver, K. (2021). Effects of demand complexity on echolalia in students with autism. *Behavior Analysis in Practice*, *14*(4). 984–990 https://doi.org/10.1007%2Fs40617-020-00535-7

Efaw, H. E. (2021). *Review of the use of differential reinforcement in skill acquisition* [Master's thesis; University of South Florida]. Digital Commons @ University of South Florida. https://digitalcommons.usf.edu/cgi/viewcontent.cgi?article=9961&context=etd

Feldman, J. I., Cassidy, M., Liu, Y., Kirby, A. V., Wallace, M. T., & Woynaroski, T. G. (2020). Relations between sensory responsiveness and features of autism in children. *Brain Sciences*, *10*(11), Article e775. https://doi.org/10.3390/brainsci10110775

Garbacz, S. A., McIntyre, L. L., & Santiago, R. T. (2016). Family involvement and parent–teacher relationships for students with autism spectrum disorders. *School Psychology Quarterly*, *31*(4), 478–490. https://doi.org/10.1037/spq0000157

Glennon, T. J. (2021). Sensory integration (SI) therapy. In F. R. Volkmar (Ed.) *Encyclopedia of autism spectrum disorders* (pp. 4243-4250. Springer. https://doi.org/10.1007/978-3-319-91280-6_1199

Gomez, R., & Cooper, A. (2008). Reinforcement sensitivity theory and mood induction studies. In P. J. Corr (Ed.), *The reinforcement sensitivity theory of personality* (pp. 291-316). Cambridge University Press. https://doi.org/10.1017/CBO9780511819384.010

Howlin, P. (1982). Echolalic and spontaneous phrase speech in autistic children. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *23*(3), 281–293. https://doi.org/10.1111/j.1469-7610.1982.tb00073.x

Jamal Uddin, M., Hasan, M. M., & Parvin, M. S. (2021). A comparative study on sensory integration treatment and behavioral modification treatment for the children with hyperactivity and autism spectrum disorder. *International Journal of Intellectual Disability*, *2*(1), 18–23.

Kandaswamy, R. (2017). Bruxism (teeth grinding) in autism and how to stop it: The permanent solution. *International Journal of Development Research*, *7*(1), 11343–11345.

Kapp, S. K., Steward, R., Crane, L., Elliott, D., Elphick, C., Pellicano, E., & Russell, G. (2019). 'People should be allowed to do what they like': Autistic adults' views and experiences of stimming. *Autism: The International Journal of Research and Practice*, *23*(7), 1782–1792. https://doi.org/10.1177/1362361319829628

Kasari, C., Gulsrud, A., Freeman, S., Paparella, T., & Hellemann, G. (2012). Longitudinal follow-up of children with autism receiving targeted interventions on joint attention and play. *Journal of the American Academy of Child & Adolescent Psychiatry*, *51*(5), 487–495. https://doi.org/10.1016/j.jaac.2012.02.019

Khaledi, H., Aghaz, A., Mohammadi, A., Dadgar, H., & Meftahi, G. H. (2022). The relationship between communication skills, sensory difficulties, and anxiety in children with autism spectrum disorder. *Middle East Current Psychiatry*, *29*, Article e69. https://doi.org/10.1186/s43045-022-00236-7

Lyall, K., Croen, L., Daniels, J., Fallin, M. D., Ladd-Acosta, C., Lee, B. K., Park, B. Y., Snyder, N. W., Schendel, D., Volk, H., Windham, G. C., & Newschaffer, C. (2017). The changing epidemiology of autism spectrum disorders. *Annual Review of Public Health*, *38*, 81–102. https://doi.org/10.1146/annurev-publhealth-031816-044318

Little, L. M., Ausderau, K., Freuler, A., Sideris, J., & Baranek, G. T. (2022). Caregiver strategies to sensory features for children with autism and developmental disabilities. *Frontiers in Psychology*, *13*, Article e905154. https://doi.org/10.3389/fpsyg.2022.905154

Lord, C., & Jones, R. M. (2013). New strategies and findings for behavioral interventions in autism spectrum disorders. *Annals of the New York Academy of Sciences*, *1304*(1), 70–76. https://doi.org/10.1111/nyas.12311

McMorrow, M. J., & Foxx, R. M. (1986). Some direct and generalized effects of replacing an autistic man's echolalia with correct responses to questions. *Journal of Applied Behavior Analysis*, *19*(3), 289–297. https://doi.org/10.1901/jaba.1986.19-289

Moussa, H. N., Srikrishnan, A., Blackwell, S. C., Dash, P., & Sibai, B. M. (2016). Fetal origins of autism spectrum disorders: the non-associated maternal factors. *Future Science OA*, *2*(2), Article eFSO114. https://doi.org/10.4155/fsoa-2015-0001

Neely, L., Gerow, S., Rispoli, M., Lang, R., & Pullen, N. (2016). Treatment of echolalia in individuals with autism spectrum disorder: A systematic review. *Review Journal of Autism and Developmental Disorders*, *3(1)*, 82–91. https://doi.org/10.1007/s40489-015-0067-4

O'Donnell, S., Deitz, J., Kartin, D., Nalty, T., & Dawson, G. (2012). Sensory processing, problem behavior, adaptive behavior, and cognition in preschool children with autism spectrum disorders. *The American Journal of Occupational Therapy: Official Publication of the American Occupational Therapy Association*, *66*(5), 586–594. https://doi.org/10.5014/ajot.2012.004168

Park, Y., & Kong, I. (2015). A systematic review of effects on sensory integration intervention based on the vestibular-proprioceptive system for children in Korea. *Journal of Korean Society of Sensory Integration Therapists*, *13(2)*, 53–61. https://doi.org/10.18064/jkasi.2015.13.2.053

Pfeiffer, B. A., Koenig, K., Kinnealey, M., Sheppard, M., & Henderson, L. (2011). Effectiveness of sensory integration interventions in children with autism spectrum disorders: A pilot study. *The American Journal of Occupational Therapy: Official Publication of the American Occupational Therapy Association*, *65*(1), 76–85. https://doi.org/10.5014/ajot.2011.09205

Sandbank, M., Bottema-Beutel, K., Crowley LaPoint, S., Feldman, J. I., Barrett, D. J., Caldwell, N., Dunham, K., Crank, J., Albarran, S., &

Woynaroski, T. (2023). Autism intervention meta-analysis of early childhood studies (Project AIM): Updated systematic review and secondary analysis. *BMJ*, *383*, Article e076733. https://doi.org/10.1136/bmj-2023-076733

Sari, N. P., Jansen, P. W., Blanken, L. M. E., Ruigrok, A. N. V., Prinzie, P., Tiemeier, H., Baron-Cohen, S., van IJzendoorn, M. H., & White, T. (2022). Maternal age, autistic-like traits and mentalizing as predictors of child autistic-like traits in a population-based cohort. *Molecular Autism*, *13*(1), Article e26. https://doi.org/10.1186/s13229-022-00507-4

Scarff, M. (2016). *Functional analysis and treatment of bruxism in children with autism spectrum disorder* [Master's thesis, University of South Florida]. Digital Commons @ University of South Florida. https://digitalcommons.usf.edu/cgi/viewcontent.cgi?article=7778&context=etd

Schopler, E., Van Bourgondien, M. E., Wellman, G. J., & Love, S. R. (2010). *Childhood Autism Rating Scale (CARS 2)* (2nd ed.). Western Psychological Services.

Tromans, S., & Adams, C. (2018). Brief report: Autism spectrum disorder: A comprehensive survey of randomized controlled trials. *Journal of Autism and Developmental Disorders*, *48*(9), 3228–3232. https://doi.org/10.1007/s10803-018-3569-y

Valentino, A. L., Shillingsburg, M. A., Conine, D. E., & Powell, N. M. (2012). Decreasing echolalia of the instruction "say" during echoic training through the use of the cues-pause-point procedure. *Journal of Behavioral Education*, *21*(4), 315–328. https://doi.org/10.1007/s10864-012-9155-z

Whitehouse, A., Varcin, K., Waddington, H., Sulek, R., Bent, C., Ashburner, J., Eapen, V., Goodall, E., Hudry, K., Roberts, J., Silove, N., & Trembath, D. (2020). *Interventions for children on the autism spectrum: A synthesis of research evidence.* Autism Cooperative Research Centre. https://www.autismcrc.com.au/sites/default/files/interventions-evidence/Full_Report_Interventions_for_children_on_the_autism_spectrum_-_A_synthesis_of_research_evidence.pdf

Williams, K. L., Kirby, A. V., Watson, L. R., Sideris, J., Bulluck, J., & Baranek, G. T. (2018). Sensory features as predictors of adaptive behaviors: A comparative longitudinal study of children with autism spectrum disorder and other developmental disabilities. *Research in Developmental Disabilities*, *81*, 103–112. https://doi.org/10.1016/j.ridd.2018.07.002