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RELATIONSHIP BETWEEN PLAY AND THE SENSORY PROFILE OF CHILDREN WITH AUTISM SPECTRUM DISORDER

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ABSTRACT

Autism Spectrum Disorder (ASD) presents itself as a neurodevelopmental disorder that impacts development, and the individual may exhibit deficits in communication, social interaction and Sensory Integration Dysfunction (DIS), which can cause impairments in play. Playing is the child's greatest occupation, being essential for development and learning. This study aimed to investigate the relationship between playing and the sensory profile of children with ASD. During the research, 16 parents and/or guardians and their respective children, aged between 3 and 6 years, with a diagnosis of ASD and who attended an Association dedicated to the care of children with ASD and a Specialized Rehabilitation Center II, linked to a university, participated. The evaluations used were: Instruments for the Evaluation of the Playful Model for Children with Physical Disabilities and the Child's Sensory Profile 2. For the analyses, the data were tabulated in the Excel program and, for the correlational statistical analysis, the SPSS program was used. As a result of this study, it was possible to observe that the children presented an ISD profile in relation to tactile stimuli, oral sensitivity and in relation to the conduct associated with sensory processing, in addition to alterations in the Sensitivity and Avoidance quadrants, mainly. Regarding the correlational analysis, a correlation was identified between Playful Behavior with Conduct and with the Exploration Quadrant. In view of the above, it was observed that there is a scarcity of studies that address this theme. Therefore, it is suggested that further research be carried out on the subject.

Keywords: Play. Sensory Processing. Autism Spectrum Disorder. Occupational therapy.

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INTRODUCTION

Autism Spectrum Disorder (ASD) presents as a neurodevelopmental disorder characterized by alterations in communication, social interaction and the presence of restricted and repetitive patterns and Sensory Integration Dysfunction (DIS) (APA, 2023). Among the characteristics mentioned, it is known that ISDs are often found in children with ASD, and changes in sensory processing along with spectrum characteristics can lead children with ASD to face barriers that can hinder their participation and occupational performance (Barros, 2019; Rock; Santos, 2023).

Sensory Integration (SI) refers to the neurological process responsible for organizing sensory information coming from the body and environment, making it possible to use the body effectively in space. Thus, according to Jean Ayres, precursor of the IS theory, the Central Nervous System (CNS) must be able to process sensory information and return adaptive responses, so that there is availability for learning and motivation for new experiences (Ayres, 2008).

Winnie Dunn, an occupational therapist, based on Ayres' assumptions, proposed the Sensory Processing Model that will analyze the patterns of responses to environmental stimuli and explain children's behaviors, relating them to the neurological thresholds of the CNS, understanding how it interacts with the environment and whether its sensory processing is facilitating or interfering with the participation in daily activities (Dunn, 1997; 2017).

Dunn proposes that there are types of behavioral responses resulting from neurological thresholds, which are divided into four quadrants: Exploration, Avoidance, Sensitivity, and Observation (Dunn, 2017). The quadrants proposed by Dunn (1997) are associated with the amount of sensory stimuli necessary for a neuronal response, that is, the neurological threshold and the way individuals behave to obtain their self-regulation.

The Exploration quadrant refers to the high neurological threshold, with active self-regulation strategies. In this way, individuals with this type of sensory processing may exhibit behaviors such as running, jumping, excessive chewing, among others. Meanwhile, Observation, despite also having a high threshold, is characterized by passive self-regulation, so the individual may have difficulties in perceiving that he is dirty, not noticing when he is called among others (Almeida, 2025; Dunn, 2017; Monteiro, et al., 2019).

The Avoidance quadrant, on the other hand, is characterized by low neurological thresholds, with active self-regulation strategies. In this case, it is common to escape from

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situations that may contain untolerated sensory stimuli, withdrawal from group activities and the need for routine. Finally, in the Sensitivity quadrant, self-regulation occurs passively, being characterized by individuals who ask for silence, are easily distracted by stimuli, put their hands to their ears, among others (Dunn, 2017; Monteiro, 2019).

When the CNS is not able to properly process this information, what is called Sensory Integration Dysfunction arises (Ayres, 2008; Bundy; Lane, 2019). Ayres characterized ISD as the difficulty of the CNS to perceive, transmit, integrate or organize sensory information to generate adaptive responses. ISDs can be divided into three groups: Modulation Dysfunction, Sensory-Based Motor Dysfunction and Sensory Discrimination Dysfunction (Ayres, 2008; Rock; Santos, 2023; Serrano, 2016).

Sensory Modulation Dysfunction is characterized by excessive or insufficient responses to sensory stimuli, with difficulty in filtering and regulating and responding appropriately to the intensity and degree of the sensory stimulus. It is possible to find three patterns of Sensory Modulation Dysfunction: 1) hyper-reactivity, which presents exaggerated responses; 2) hyporeactivity, when they have less or no response to stimuli; 3) sensory demand that requires more sensory information to activate sensory systems (Kilroy; Aziz-Zadeh; Celmark, 2019; Monteiro et al., 2019; Rock; Santos, 2023).

Sensory Discrimination Dysfunction, on the other hand, is characterized by difficulty in effectively interpreting sensations and identifying the specific qualities of sensory stimuli. And finally, the Sensory-Based Motor Dysfunctions, which are divided into Dyspraxia, represented by individuals with difficulties in motor ideation, planning and execution, and Postural Control, characterized by the challenge in postural control in static and dynamic movement (Rocha; Santos, 2023).

The literature points out that about 69 to 90% of children with ASD have some DIS, and these alterations can bring challenges in participating in Activities of Daily Living, playing, social interaction and education, which are occupations expected for childhood (Oliveira; Souza, 2022).

According to the American Occupational Therapy Association (2020), it is through play that children develop motor, sensory, cognitive, and socio-affective skills that will facilitate their involvement in other occupations in the future (Deliberato; Adurens; Rocha, 2021). Thus, it is understood that when the child does not develop play or this playful action is private, child development can be impaired (Silva; Buffone, 2021).

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Ferland (2006) defines play as a subjective attitude, originating in the child's mind. Culturally, playing is seen as a free and recreational activity, but it has been recognized as a therapeutic tool. In the clinic, it can be used in a structured way to stimulate and improve different aspects of child development (Silva; Buffone, 2021).

The Playful Model proposes a conceptual framework with the main essential characteristics for playing: attitude, action and interest. Based on this, playing generates in children the pleasure of performing the action and the ability to act, developing autonomy and well-being. Thus, the Playful Model prioritizes ensuring the development of a playful attitude, interest in play and action, so that the child is able to manage his life and freely determine the rules of his actions (Sant'Anna *et al.* 2015).

In relation to the play of children with ASD, it is possible to observe difficulties related to interaction, imitation and handling of objects, as well as the short time spent in the game and difficulties in sequencing the actions necessary to start and end the game and the restricted and repetitive behaviors and interests that influence the use of toys. In addition, sensory alterations related, for example, to the tactile and vestibular systems, can prevent the participation of children with ASD in play, since certain textures can bother or cause more exacerbated reactions, as well as the movement and height of playground toys can cause insecurity and prevent these children from engaging in games that have these characteristics (Serrano; Reis, 2023; Mantovani, 2024).

Considering the difficulties presented by children with ASD and recognizing the importance of playing for the development of important skills for child development, The occupational therapist is the professional qualified to stimulate and value play as an important occupation, understanding being a player (fun and time to play), doing (developing skills, games, gifts and skills), in addition to becoming a participant in play (joining other colleagues during it). Thus, it is up to the occupational therapist to understand the role of play in a child's life and, only then, will the professional be able to get involved with him and help him in this process (Stagnitti, 2021; Lucisano; Pfeifer; Stagnitti, 2022).

The intervention in Occupational Therapy based on the Ayres Sensory Integration Approach has demonstrated significant results in clinical practice, especially when applied to children with ASD. Scientific evidence indicates that this approach contributes to sensory modulation, self-regulation and the improvement of functional skills, favoring the participation and engagement of children in different occupational contexts. Interventions through this approach act on the regulation of sensations, where sensory experiences

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should help in the development of adaptive responses to the environment, that is, provide adequate responses for a better learning process (Gama *et al.*, 2020; Rock; Mantovani; Monteiro, 2023).

The scientific literature points to a gap in knowledge about the relationship between sensory integration difficulties (DIS) and play in children with Autism Spectrum Disorder (ASD), with few studies dedicated to this topic (Sant'Anna et al., 2022). In view of this scenario, it is essential to deepen this investigation, since playing plays a central role in child development, favoring the acquisition of motor, cognitive, social and emotional skills. In addition, the identification of the relationship between the sensory profile and the characteristics of play can provide support for the work of occupational therapists and other health and education professionals, allowing a more effective planning of interventions aimed at promoting the child's participation and engagement in playful and meaningful activities. Thus, this study presents itself as a relevant contribution to clinical practice and to the improvement of therapeutic approaches aimed at this public.

Thus, based on the information previously presented, this study has the following question: does the presence of ISD in children with ASD impact play? The hypothesis is that these children with ASD have a higher prevalence of DIS, which has significant impacts on play and, consequently, impairments in the acquisition of new skills important for their development. That said, the objective of this study is to identify the relationship between playing and the sensory profile in children with ASD. The specific objectives were: to characterize the playful behavior in children with ASD; characterize the sensory profile of children with ASD.

METHOD

The present research was approved by the Research Ethics Committee of the Faculty of Philosophy and Sciences of UNESP – Marília Campus/SP, respecting the prerogatives of resolution 510/16 of CONEP that deals with ethics in research with human beings, with favorable opinion No. 5.537.525, CAAE: 57065622.8.0000.5406.

16 parents and/or guardians and their respective children participated in the research, 16 children who had difficulties in playing and who had a diagnosis of ASD. Parents were informed about the project, its objectives, the data collection process, duration time, about the participant's privacy and the use of the knowledge obtained for educational and scientific purposes. Therefore, the Informed Consent Form (ICF) was

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delivered and signed by those responsible for them. The research was carried out in a Specialized Rehabilitation Center II (CER II), linked to a university in the interior of the state of São Paulo and in an association that aims to provide services to the population with ASD, carrying out evaluation, guidance, treatment, school counseling and parental training.

The inclusion criteria established for participation in this research included children aged between 3 and 6 years with a confirmed diagnosis of ASD. Those with physical, auditory, or visual disabilities as comorbidities were excluded from the study, in order to ensure the homogeneity of the sample and the reliability of the analysis of the results.

The instruments used in this study were the Child's Sensory Profile 2 (DUNN, 2017) and the Instruments for the Evaluation of the Playful Model for Children with Physical Disabilities (EIP-ACL) (Ferland, 2006; Ferland; Sant'Anna; Pfeifer, 2022; Sant'anna *et al.*, 2015).

Sensory Profile 2 is an assessment based on a sensory processing model proposed by Dunn (2017). The conceptual model seeks to find the relationship between the self-regulation of the individual's conduct and the neurological threshold. The information collected is able to determine how sensory processing may be contributing to or interfering with the child's participation in different aspects of their social life (Dunn, 2017).

The Child's Sensory Profile 2 evaluates children from 3 to 14 years and 11 months and consists of 86 items. The first part of the form has items to describe the children's responses to daily sensory experiences, related to the visual, auditory, tactile, movement, body position, oral sensitivity and behavioral sections that talk about behavior associated with sensory processing and socio-emotional and attention responses associated with sensory processing. The questions were filled out by the evaluators, based on the caregivers' perceptions, using a 5-point scale, with each answer on the weighted scale with a score from 1 to 5: Almost always = 5; often = 4; half the time = 3; occasionally = 2; almost never = 1 and does not apply = 0 (Dunn, 2017).

In addition to the sensory and behavioral sessions, the assessment also makes it possible to analyze the child's behavior in quadrants classified as: Exploration, which refers to the search for sensory stimuli at a higher level than other children; Avoidance, which refers to the behavior of moving away from sensory stimuli more than other children of their age; Sensitivity, which refers to the child who perceives sensory stimuli at a higher rate than others and, finally, the Observation quadrant that refers to the child who does not

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perceive sensory stimuli when compared to children who are of the same age (Dunn, 2017).

The results of each section of the Child's Sensory Profile 2 (Sensory, Behavioral and Quadrants) follow the classification system of the instrument itself, which is composed of five categories that, in turn, reflect specific groups: 1) "Much less than others"; 2) "Less than others"; 3) "Just like most"; 4) "More than others"; 5) "Much more than others".

For the descriptive statistical analysis of the results of this research, the five categories presented above were grouped into three groups: categories 1 and 2 were unified into "Less and Much less than others"; category 3 represents the classification "Exactly like the majority" and categories 4 and 5 represent, together, the classification "More and Much More than others".

For the correlational statistical analysis of the data from Sensory Profile 2 with the Evaluation of Playful Behavior (ACL), the categories were grouped in order to represent patterns of sensory processing, which can be: Typical Sensory Processing Pattern; Sensory Processing Pattern with Possible Alterations; and Sensory Processing Pattern with Definitive Alteration. The grouping described in Table 1:

Table 1: Classification groups of the Sensory Processing Pattern

Classification Groups	Grouped Sensory Profile Categories
1 - Typical Sensory Processing Pattern	Just like most others
2- Sensory Processing Pattern with Possible Changes	Less than others and More than others
3- Sensory Processing Pattern with Definitive Dysfunction	Much Less than Others and Much More than Others

Source: Prepared by the authors

In relation to the Instruments for the Evaluation of the Playful Model for children with Physical Disabilities, the following evaluations were applied: Initial Interview with Parents (EIP) or guardians, used to understand the child's interests and ability to play at home, and the Evaluation of Playful Behavior (ACL), which enabled a detailed analysis of the child's play, through clinical observation (Ferland, 2006; Sant'Anna *et al*., 2015).

The application of this evaluation in an audience different from the one to which its production was initially intended should ensure the possibility of responding to the needs of these children, understanding the dynamics of each one of them so that the model can be adequately adapted. When considering children with ASD, the focus of this study, functional problems are identified in relation to pretend play, the inability to initiate interactions in play

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or react to them; stereotyped play, or even the absence of play resulting from cognitive, emotional or sensory disorders (Ferland, 2006; Ferland; Sant'Anna; Pfeifer, 2022; Sant'Anna *et al.*, 2015).

Interprofessional education is an assessment that consists of a script of structured and semi-structured questions, with the objective of collecting data on the child's playful performance at home, from the perspective of parents or direct guardians. Through this evaluation, it is understood what the child's interests are, how he reacts at home, how he plays, with whom, what he likes and dislikes (Ferland, 2006; Ferland; Sant'Anna; Pfeifer, 2022; Sant'Anna *et al.*, 2015). This information was extremely important, as it allowed for a better understanding of the child, which contributed to the preparation of the playful context that would later be used in the LCA.

After the application of interprofessional education, the data collected were used to perform the LCA with the children. For this, toys were selected in order to evaluate each item that makes up the evaluation. The toys used were: dolls, kitchen items, modeling clay, cars, tool items, marbles, trucks with lights and sound, toy horses, amoeba, scissors, printed drawings of geometric shapes for cutting, printed character drawings, colored pencils, toy tweezers, telephone, and bowling (Ferland, 2006; Ferland; Sant'Anna; Pfeifer, 2022; Sant'anna *et al.*, 2015).

The ACL is based on two elements that are fundamental to characterize play: the child's pleasure and his ability to act. To carry out the assessment, it is necessary for the therapist to create a playful environment. In addition, it should be part of the game proposed by the child, expressing pleasure in relation to the child's action and establishing a warm and playful relationship with him. Thus, through this evaluation, the following data were collected: general interest of the child; playful interest and basic playful skills; playful attitude; expression of needs and feelings (Ferland, 2006; Ferland; Sant'Anna; Pfeifer, 2022; Sant'Anna *et al.*, 2015).

The various elements of the evaluation are assigned scores, which refer to the child's interest: **0-** no interest expressed; **1-** medium interest and **2-** great interest, aim to highlight what characterizes it. For the classification of the forms of expression of needs and feelings, the scores are: **0-** no expression; **1-** facial expression; **2-** gestures; **3**:=- screams/sounds; **4-** Words/phrases. In addition, the evaluation enables an analysis of playful behavior in a table of synthesis of the results, based on the following domains:

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general interest, playful interest, playful ability, playful attitude and expression (Sant'anna *et al.*, 2015).

In order to perform the correlational analysis of LCA with Sensory Profile 2, the interests were listed from 1 to 3. To this end, in this study it was established as a criterion that the total value of the score that the child could achieve in the evaluation would be divided into three groups, considering that from 0 to 25% of the score would be classified as "No interest"; 26% to 74% of the score would be classified as "Medium interest" and, finally, 75% to 100% would be classified as "Very interest". Thus, the following were considered:

Chart 2 - Classification of the Domains of Playful Ability

Domains	Punctuation
General Interest	**1** - no interest (0 - 7); **2** - medium interest (8 - 18); **3** - Great interest (19 - 26).
Playful Interest	**1** - no interest (0 - 16); **2** - medium interest (17 - 47); **3** - great interest (48 - 64).
Playful Capacity	**1** - no interest (0 - 28); **2** - medium interest (29 - 82); **3** - Great interest (83 - 111).
Playful Attitude	**1** - no interest (0 - 3); **2** - medium interest (4 - 8); **3** - Great interest (9 - 12).
Total areas	**1** - no interest (0 - 61); **2** - medium interest (62 - 179); **3** - great interest (180 - 241).

Source: prepared by the authors.

Regarding the expression of needs and feelings, the score established for the tabulation is from 1 to 5, with **1** being - no expression; **2** - facial expression; **3** - gestures; **4** - screams/sounds; **5** - words/phrases. Thus, the predominant form of communication was considered during the evaluation and, in case of a tie, the highest score was considered.

For the data analysis of the evaluations mentioned above, the organization and tabulation of the data collected through the evaluation instruments in the Excel® Program was carried out and, subsequently, the descriptive statistical analysis was carried out in order to characterize the Sensory Profile 2 and the Playful Behavior of children with ASD.

To analyze the relationship between the variables collected by the instruments, the Statistical *Package for the Social Sciences* (SPSS version 25) was used. First, it was necessary to evaluate the Distribution of Normality by means of the Shapiro-wilk test, and after the analysis it was observed that the variables did not present normal distribution, so it

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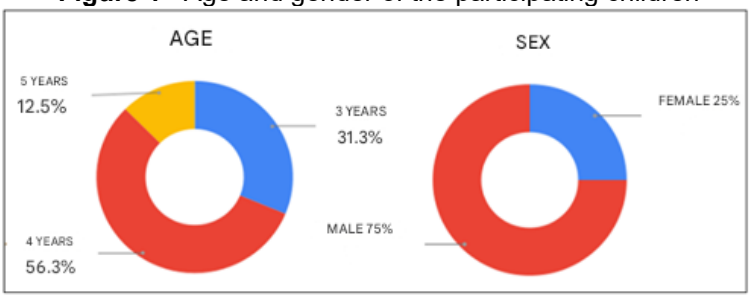
was necessary to use a non-parametric version to analyze these results. The Kendall tau test was selected as a non-parametric option because it has more reliable significance levels in small samples. The correlations between Playful Behavior and Sensory Profile of children with ASD were analyzed.

RESULTS AND DISCUSSION

The following results present the analysis of the sensory processing of the 16 children with Autism Spectrum Disorder (ASD) who made up the sample of this study. Initially, Figure 1 illustrates the distribution of participants according to age and sex, providing an essential demographic overview for contextualizing the findings.

Figure 1 - Age and gender of the participating children



Source: Prepared by the authors

According to the study by Arvigo and Schwartzman (2020), it is around 3 and 4 years of age that the behavioral characteristics of ASD can appear or become more stable, which increases the prevalence of diagnosis in this age group. Regarding the sex of the children, there is a predominance of males (75%), an important data that corroborates the literature that indicates a four-fold higher prevalence of males compared to females in ASD (Christensen *et al*., 2018).

Regarding the descriptive statistical analysis, the data of Sensory Profile 2 were organized into three categories: "Exactly like most of the others", "Less and Much Less than others" and "More and Much More than others". Figure 2 shows the distribution of participants in each of these categories, considering the four quadrants evaluated: Exploration, Avoidance, Sensitivity and Observation.

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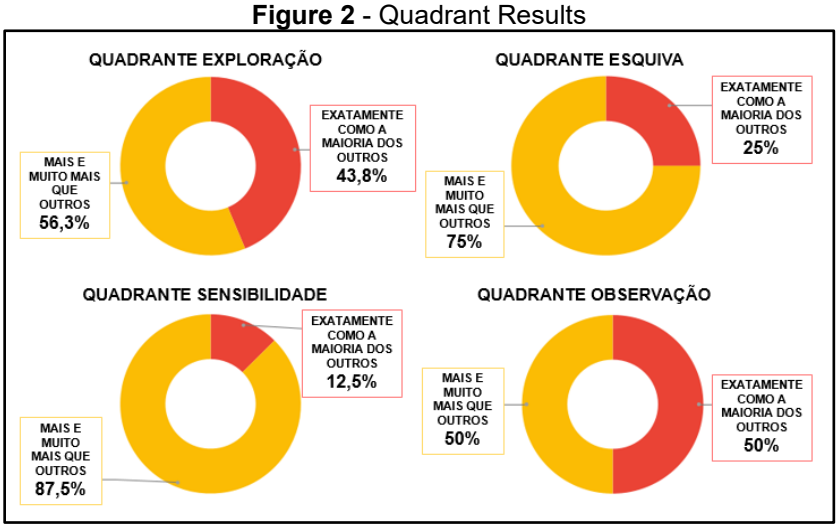
Figure 2 - Quadrant Results



Source: prepared by the authors.

The results show a prevalence of the profile "More or much more than others" in all quadrants. The results of this study showed that 87.5% and 75% of the children presented a profile "More and much more than others" in the Sensitivity and Avoidance quadrants, respectively.

The study by Simpson et al. (2019), in which the objective was to identify sensory subtypes in children with ASD, the highest results found were in the Sensitivity (65.7%) and Avoidance (62.1%) quadrants in the profile "More and much more than others", which is in line with the results presented by the present study. In addition, other studies also prove the prevalence of the classification "More and Much more than others" for the Sensitivity quadrant (Eloi, 2021; Cardoso, 2023).

Corroborating the findings of the present research, the study conducted by Almeida (2025), which aimed to analyze the sensory profile of children with ASD based on the perception of teachers, identified that 83.3% of the sample was classified in the category "Much more and more than others" in the Sensitivity and Avoidance quadrants. Similarly, the investigation carried out by Oliveira and Dultra (2023), which analyzed the sensory and functional profile of children with ASD, presented convergent results, showing that the highest proportions of classification in the category "More and much more than others" were also observed in the Avoidance and Sensitivity quadrants.

In the Exploration quadrant, it was found that 56.6% of the children presented a profile "More and much more than others", this data reveals that more than half of the children in this study may be interested in seeking different stimuli in the environment.

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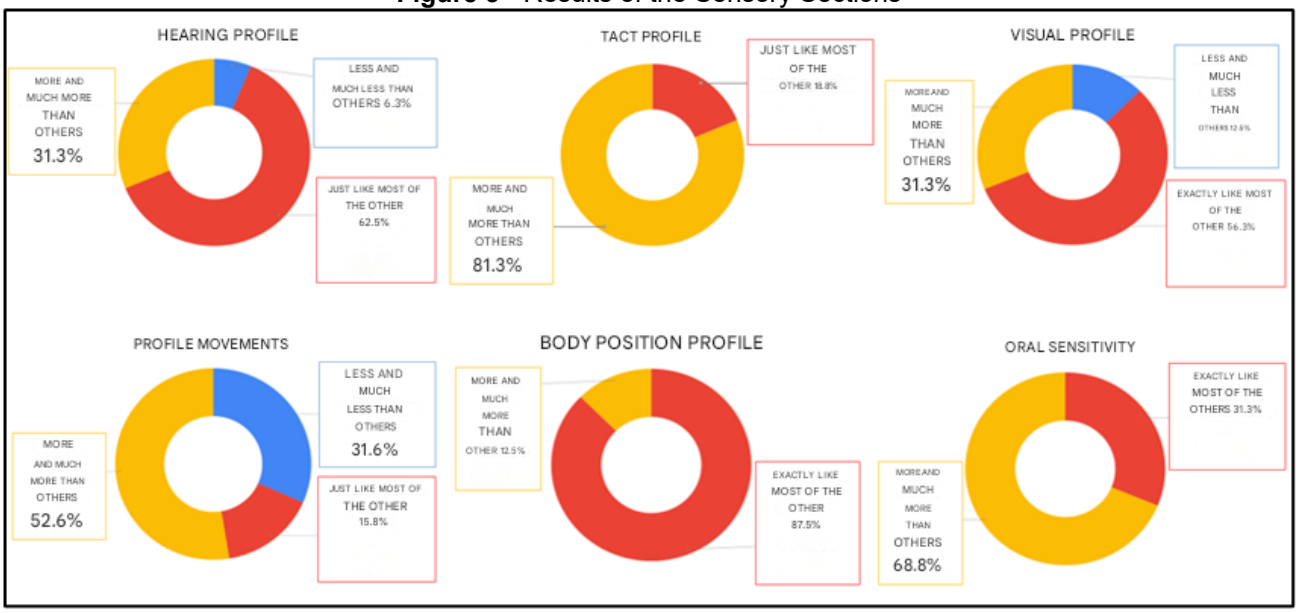
Thus, when this exploitation happens disproportionately, it can cause losses in the activities developed in their daily lives, such as in their main occupation, playing (Dunn, 2017).

The study carried out by Mantovani (2024) aimed to evaluate the relationship between engagement and sensory changes of children with ASD in school routines also corroborates the findings of this present research, since 76.47% of the 51 children who participated in the study were classified as "Much more and more than others" in the Exploration quadrant. This quadrant, in the study by Almeida (2025), also presented significant percentages for the same classification (66.4%).

The graphs of the Sensory Sections are presented in Figure 3, containing the results obtained according to the descriptive statistical analysis of the different sensory systems (auditory, tactile, visual, vestibular, proprioceptive, and oral).

Figure 3 - Results of the Sensory Sections



Source: prepared by the authors.

Regarding the processing of movements, associated with the functioning of the vestibular system, the results showed that 84.2% of the children presented alterations in this domain. Among these, 52.6% were classified in the category "More and much more than others", while 31.6% were included in the category "Less and much less than others". It is noteworthy that this was the only domain of sensory processing in the present study in which the classification "Less and much less than others" presented a significant percentage, suggesting substantial variations in the vestibular performance of the children evaluated.

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The other domains of sensory processing that presented the highest percentages indicative of sensory alterations were related to tactile stimuli and oral sensitivity, with classifications of 81.3% and 68.8% in the category "More and much more than others", respectively. Tactile processing, responsible for capturing stimuli through the skin, plays a fundamental role in body awareness, motor planning and tactile perception, in addition to being directly related to the feeling of security in the environment. Alterations in this domain of sensory processing can result in hyper-reactivity to subtle stimuli, leading the child to behaviors such as discomfort with clothing etiquette, refusal to wear fitted clothes or socks, discomfort when cutting nails and combing hair, among other sensory challenges (Santana; Saints; Rocha, 2020; Andrade, 2020).

Regarding oral sensitivity, the study by Do Carmo et al. (2019), which aimed to carry out a systematic review of studies on eating disorders and the gastrointestinal tract in individuals with ASD, highlighted that this condition represents a major factor in the nutritional aspects of this public. The results indicate that oral sensitivity can significantly influence eating behavior, leading to selectivity or even refusal of certain foods, which can impact nutritional intake and child development (Carmo *et al.*, 2019).

The graphs in Figure 4 present the results of the descriptive statistical analysis of the Behavioral Sections involving Conduct, Socio-Emotional Responses, and Attention Responses.

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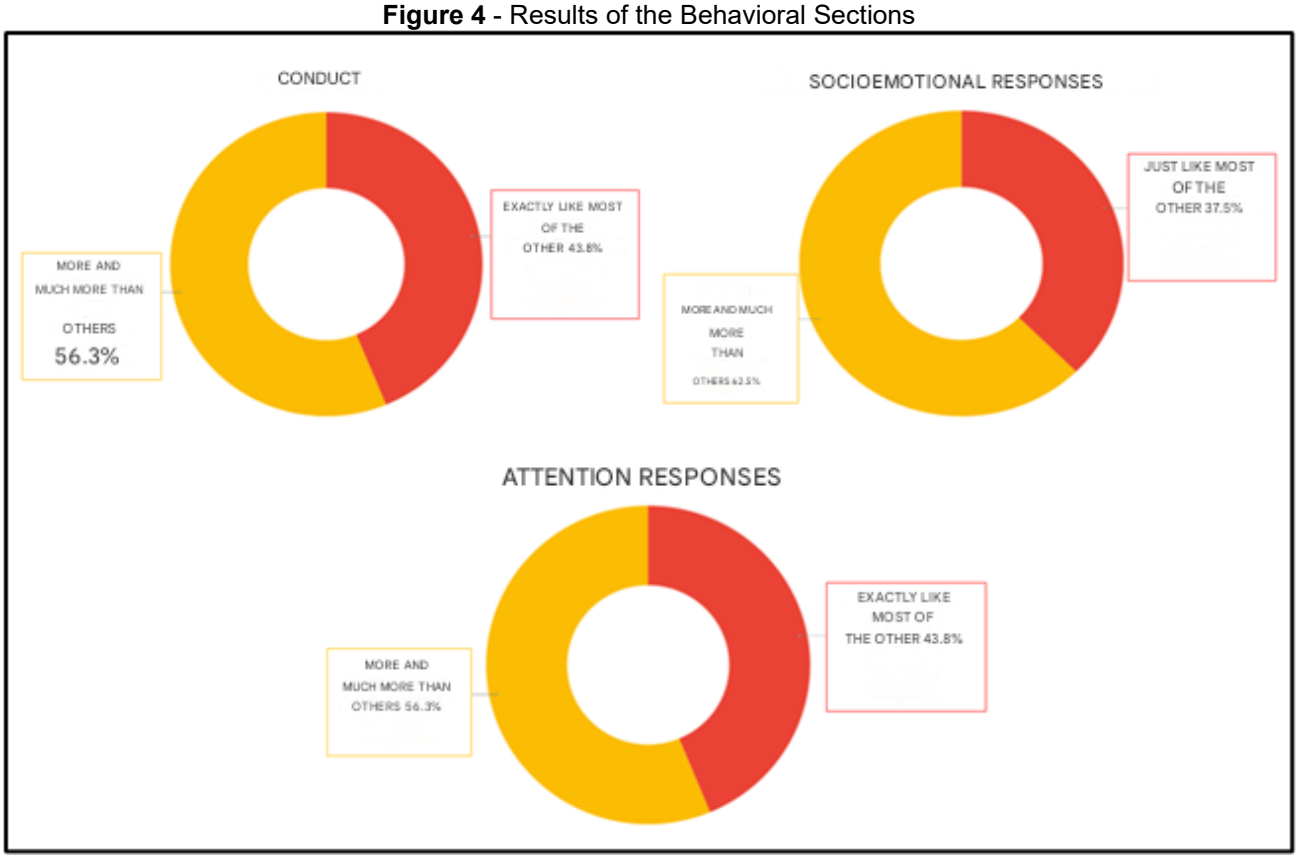
Figure 4 - Results of the Behavioral Sections



Source: prepared by the authors.

The results referring to the behavioral section showed that the socio-emotional responses presented more expressive indexes, with 62.5% of the children obtaining a profile "More and much more than others". Next, a high proportion was observed in relation to attention and conduct responses, in which 56.3% of the children obtained a profile "More and much more than others" in both sections.

Corroborating these findings, the study by Rocha and Dounis (2013) identified that alterations in these behavioral domains may be associated with manifestations of aggressiveness, irritability, explosive behavior, slowness in understanding information and executing commands, in addition to difficulty in maintaining attention. Such characteristics were also reported by the parents of the children participating in this study, reinforcing the relationship between the sensory profile and the behavioral aspects observed (Rocha; Dounis, 2013).

Studies show that there is a correlation between changes in sensory modulation and behavioral problems, suggesting that some challenges in the behavior presented by children with ASD may, in fact, also be consequences of ISDs (Almeida, 2025; Gonthier; Longuépée; Bouvard; 2016; Kern et al., 2008). In this sense, Gentil-Gutiérrez et al. (2021)

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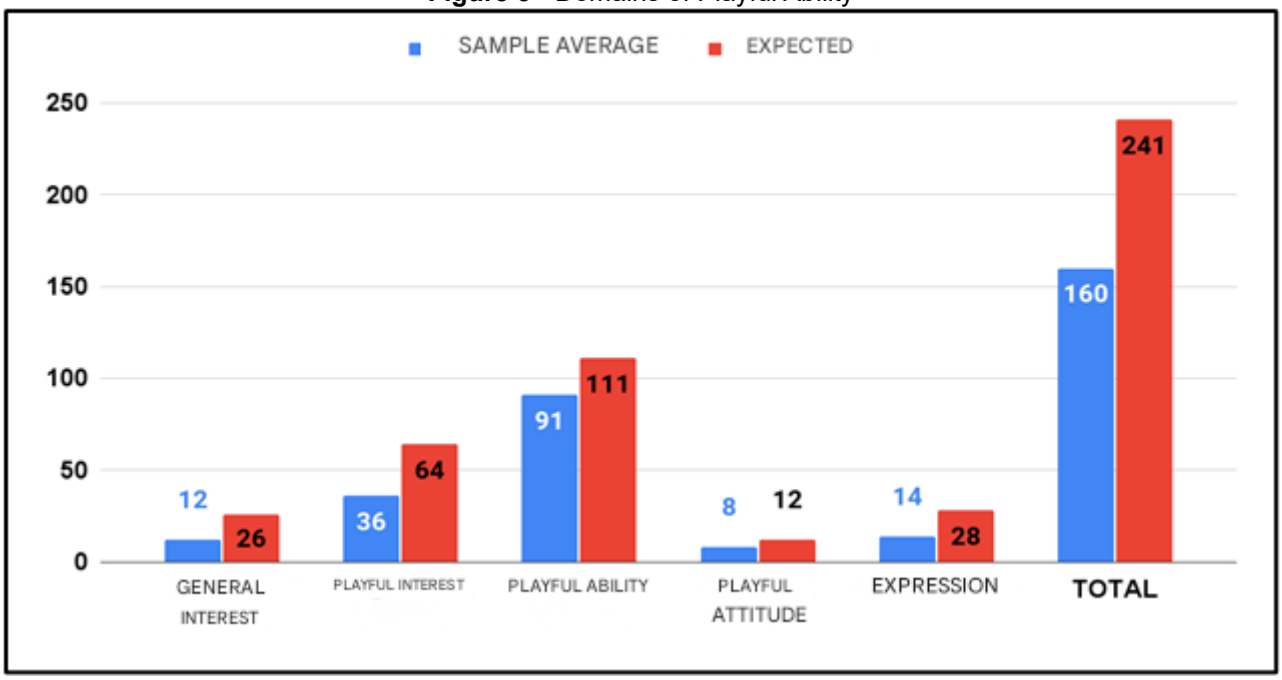
found similar results when applying Sensory Profile 2 School Follow-up with teachers of 36 children with ASD and 24 children without any diagnosis. The authors highlight that children with ASD have greater sensory changes, usually accompanied by challenging behavioral responses. These findings reinforce the relationship between ISDs and significant impacts on the behavior of children with ASD, evidencing the influence of these changes on emotional regulation, social interaction, and adaptation of responses to the demands of the environment.

Figures 5 and 6 below present the data obtained from the ACL (Sant'anna *et al.*, 2015).

Figure 5 - Domains of Playful Ability



Source: prepared by the authors.

Figure 5 refers to the results of the domains of playful ability, in which, for the analysis, the average of the sample of each specific domain was performed. Regarding the general interest domain, 46% of the children showed a medium interest in the items evaluated. This finding may be associated with the absence of partners during play, as well as difficulty in exploring the sensory environment.

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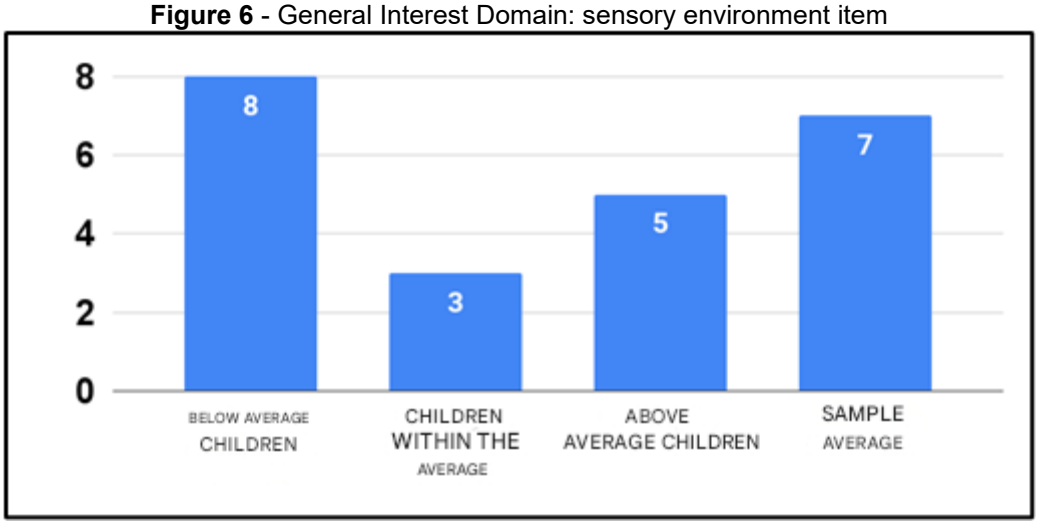
Figure 6 - General Interest Domain: sensory environment item



Source: prepared by the authors.

Figure 6 illustrates the distribution of children in relation to performance in the sensory environment, one of the items belonging to the "general interest" domain. The data indicate that 50% of the children had a performance below the average of the sample, while 31% of the children were classified above this average, suggesting individual variations in the interaction with environmental stimuli during playful activities.

This finding indicates that some children may have greater difficulty in exploring the environment, while others may demonstrate an excessive exploratory search. The sensory environment encompasses visual, auditory, tactile, vestibular and olfactory stimuli that make up the space around the child (Sant'anna *et al.*, 2015). In the context of this study, it is observed that most of the children evaluated do not interact with the sensory environment in an expected way, which may impact their engagement in playful activities and their adaptation to different contexts.

In the domain of "playful interest", 56% of the children showed medium interest in the items evaluated, indicating that most were involved in the manipulation of objects and in the exploration of the space around them. However, 44% of the children did not reach the expected level in relation to the sample mean, which represents a relevant finding. This result becomes even more significant when contrasted with the data on the domain of playful ability, which indicate that 81% of the children have adequate motor skills to perform such actions. This discrepancy suggests that, although they have motor potential, some children may face sensory or behavioral barriers that limit their involvement in play activities.

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Regarding the domains of "playful attitude" and "expression", the results indicate that 66% and 50% of the children, respectively, presented a satisfactory performance in these areas. These findings suggest a positive level of engagement in play, possibly influenced by the frequency of children in institutions that promote early stimulation. This context can be decisive for the development of curiosity, initiative and interest in challenges in play.

In addition, the literature highlights playing as an essential tool for the expression of needs and emotions in childhood, being a moment in which the child manifests his feelings and strengthens affective bonds (Mendes, 2015).

Finally, the general analysis of the results, considering the sum of all the domains evaluated, revealed that 66% of the children achieved the expected performance in the skills related to play, demonstrating a consistent pattern of playful skills when observed globally.

In the correlational statistical analysis, the categories of Sensory Profile 2 were reorganized to classify the children evaluated in this study according to their Sensory Processing Pattern, categorized as: Typical, with Possible Alterations and with Definitive Alteration. Figures 7, 8 and 9 below present the results of the different sections of the Sensory Profile, according to this classification, allowing a more detailed understanding of the variations in sensory processing among the participants.

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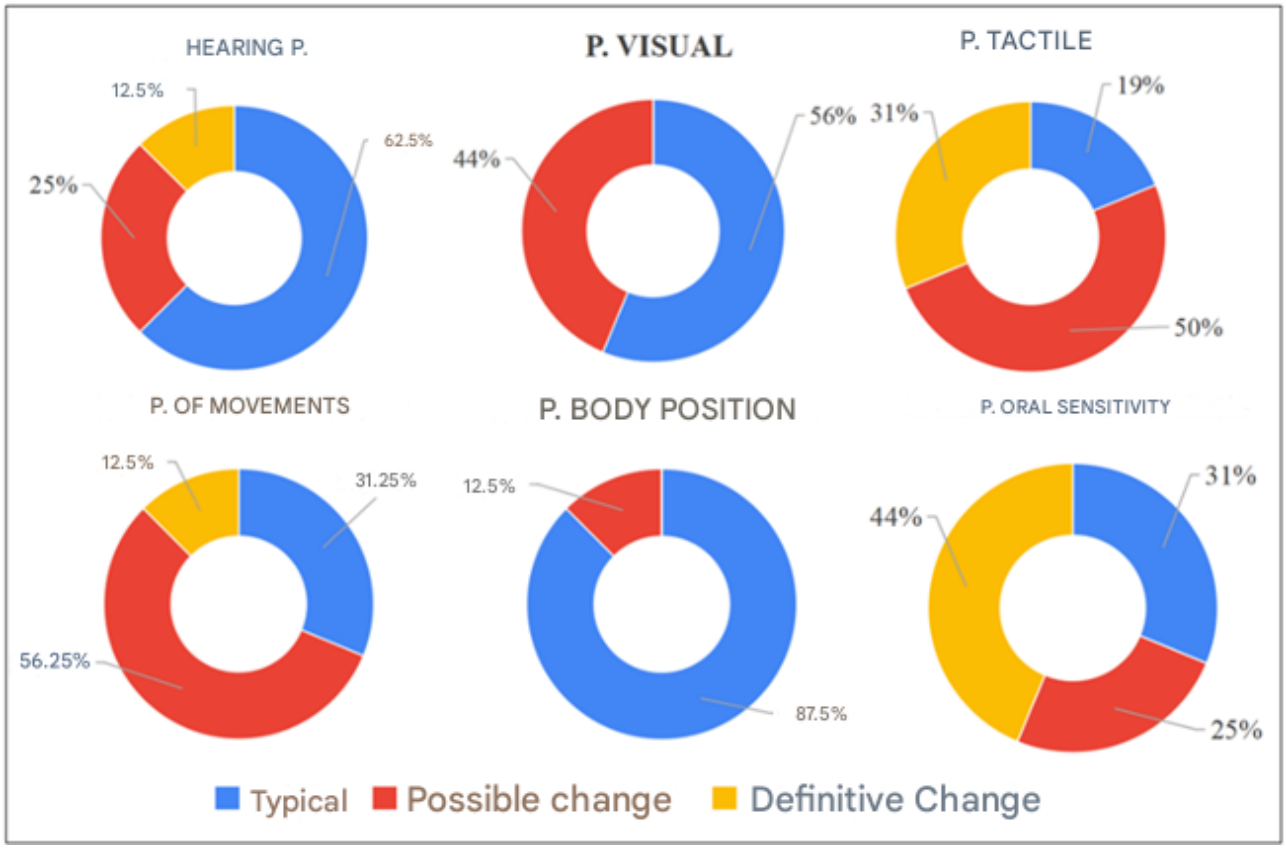
Figure 7 - Sensory Section according to correlational statistical analysis



Source: Prepared by the authors

The results of this research indicate that the highest percentages of Definitive Change in the Sensory Processing Pattern were observed in tactile stimuli (31%) and oral sensitivity (44%), evidencing significant challenges in these domains. On the other hand, the auditory (62%), visual (56%) and body position (87.5%) systems presented their highest proportions classified as Typical Sensory Processing Pattern, suggesting a functioning within the parameters expected for most of the children evaluated.

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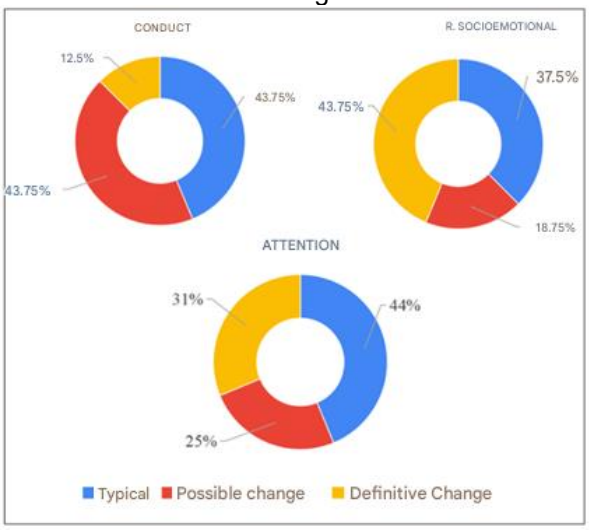
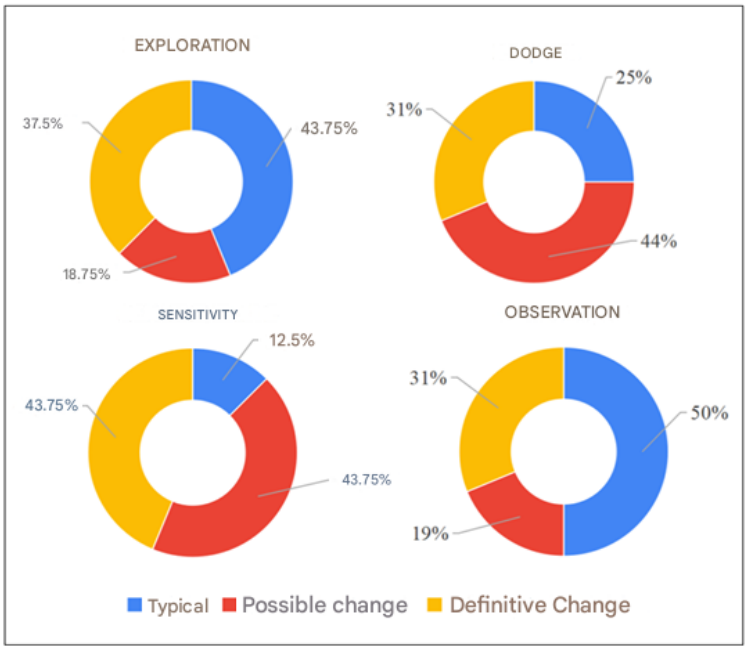
Figure 8 - Behavioral section according to correlational statistical analysis



Source: Prepared by the authors

Figure 8 shows that the highest proportion of Definitive Alteration in the Sensory Processing Pattern was observed in the domain of Socio-emotional Responses, with 43.75% of the children classified in this category. This finding reaffirms a strong association between challenges in sensory processing and difficulties in socio-emotional regulation.

Figure 9 – Quadrants according to correlational statistical analysis



Source: Prepared by the authors

The results indicate that the Sensitivity Quadrant had the highest proportion of Processing Pattern with Definitive Alteration, with 43.75% of the children classified in this category.

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The analysis of Sensory Profile 2 revealed that, within this sample, the Sensory Sections with the highest incidence of Definitive Alteration were touch and oral sensitivity. With regard to the Conduct Section, the socio-emotional responses associated with sensory processing also presented a significant number of classifications in this category. Finally, among the Quadrants, Sensitivity was the most impacted domain, standing out as a central aspect in the sensory processing alterations identified in this study.

From the reorganization of the data, a correlational analysis was conducted between the findings regarding the playful behavior and the sensory profile of the children with ASD participating in the study. This approach made it possible to identify relationships between sensory patterns and aspects of play, contributing to a deeper understanding of how sensory characteristics can influence participation and playful engagement. The results of this analysis are systematized in Chart 3, presented below.

Chart 3 - Relationship between Playful Behavior and Sensory Profile

Sensory Profile		**Playful Behavior**	
		Correlation Coefficient	p-value
Sensory Section	P. Auditory	-0,07	0,389
	P. Visual	0,073	0,389
	P. Tactile	-0,097	0,346
	P. of Movements	-0,034	0,446
	Body Position	-0,218	0,199
	Oral Sensitivity	-0,095	0,349
Behavioral Section	Conduct	0,477*	0,027
	Socio-emotional responses	-0,032	0,448
	Attention Responses	-0,079	0,373
Quadrants	Exploitation	0,497*	0,021
	Dodge	-0,222	0,182
	Sensitivity	-0,016	0,474
	Observation	0,143	0,276

* Correlation is significant at the p-value level ≤ 0.05
** Correlation is significant at the p-value level ≤0.001
Source: prepared by the authors

The correlation analysis between the Playful Behavior and the Sensory Profile of children with ASD revealed the existence of statistically significant associations between these variables. Specifically, a significant correlation was identified between Playful Behavior and the Conduct Section, with a p-value of 0.027 (≤ 0.05), indicating a relevant relationship between these domains. In addition, the Exploration Quadrant also showed a

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significant correlation, with a p-value of 0.021, suggesting that the characteristics of sensory processing directly influence the way children interact and explore the playful environment.

The results of this research indicate that, in the analyzed sample, the Playful Behavior of children with ASD is directly influenced by sensory processing. Behavior Associated with Sensory Processing refers to the way the individual interprets and responds to stimuli in the environment, which can significantly impact their interaction with the world around them. Children classified as explorers, in turn, tend to seek sensory stimuli at a higher frequency compared to others (Buczkoski, 2019; Dunn, 2017). In view of these findings, this study shows that the way children explore the sensory environment exerts a direct influence on their playful behavior, reinforcing the interdependence between sensory processing and engagement in play.

Mantovani (2024) conducted a study with 28 teachers of 51 children with ASD enrolled in Early Childhood Education in order to analyze their perceptions of the correlations between sensory processing patterns and the level of engagement of children in the school context. Applying the Sensory Profile 2 School Monitoring and the Classroom Measure of Engagement, Independence, and Social Relationships – ClaMEISR which aims to analyze the functional profile of children between 3 and 5 years of age. The results found that 68.62% of the sample presented "Non-Functional Profile" and 78.43% received the classification of "Non-Engagement" in the Free Play routine. The results of the Sensory Profile showed that "The Socio-emotional Responses Associated with Sensory Processing" correlated with the Free Play routine, so that the greater the challenge in the child's sensory processing, the greater the chance of him presenting inflexible behaviors and not presenting engagement and functionality in activities such as Play.

Silva and Buffone (2021) investigated play as a therapeutic resource for the development of social interaction in a child with ASD, highlighting its potential as an intervention strategy in Occupational Therapy. The study used the Childhood Autism Rating Scale (CARS) to confirm the diagnosis and assess the level of support needed, the Canadian Occupational Performance Measure (COPM) to identify and quantify therapeutic goals, and an observation script to analyze therapeutic bonding, social interaction, communication, toy sharing, and functional use of play objects. The research was carried out with a six-year-old boy, submitted to five 40-minute intervention sessions, based on the Playful Model, conducted by an occupational therapist in a School Clinic. After the intervention, the CARS reassessment revealed a 2.5-point reduction in the ASD severity

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rating, with improvements in emotional response, adaptation to change, sensory perception (taste, smell, and touch), fear or nervousness, and verbal and nonverbal communication.

Also in relation to the results of the study by Silva and Buffone (2021), at COPM, the child's guardian had indicated the following goals: homework, interaction with other children, leaving parks, attending parties, and bathing. For the study, three of these goals were analyzed: social interaction, leaving parks, and participating in parties. Although there was no progress in social interaction, the other two goals showed significant improvements in both performance and satisfaction, according to the person in charge. Finally, the analysis of the observation script indicated advances in the sharing of objects, functional use of toys, time of engagement in the activity, social interaction and communication. Based on these findings, the authors reaffirm playing as an effective therapeutic resource, which can be used both as a means of intervention and as a final therapeutic goal for children with ASD (Silva; Buffone, 2021).

Raditha et al. (2023) conducted a study to evaluate the effects of occupational therapeutic intervention based on the Ayres Sensory Integration Approach (ISA) in 36 children with ASD and 36 children in the control group, aged 2 to 3 years. Participants received interventions twice a week, lasting 1 hour each session, over 12 weeks, totaling 24 sessions. To measure the impacts of the intervention, the Vineland Adaptive Behavior Scale-II was applied, both before and after the conclusion of the sessions. This instrument assesses three fundamental domains of development: communication (expressive, receptive, and written), socialization (interpersonal relationships, play and leisure time, and coping skills), and daily living skills (personal, domestic, and community).

The results of the study by Raditha et al. (2023) indicated that ISA-based communication skills resulted in significant advances in expressive and receptive communication skills, daily living skills (especially in the personal and community domains), and social coping skills. According to the authors, the improvement in sensory modulation and praxis favors the development of socialization and behavior, allowing children to be more engaged in social activities that require flexibility and adaptation to the demands of the environment, such as playing (Raditha *et al.*, 2023).

Given that playing is an essential occupation for child development, and considering the impact of changes in sensory processing on the performance of this activity, it is essential to implement interventions that minimize the challenges arising from Sensory Integration Difficulties (DIS). In this context, Ayres' Sensory Integration Approach emerges

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as an effective strategy to favor the participation of children with ASD in play, using it both as a therapeutic means and as the final goal of the intervention (Almeida; Guedes, Rocha, 2023; O'Keeffe; McNally, 2021).

CONCLUSION

With regard to play skills, the findings indicate greater difficulty in the domain of general interest, which involves sensory aspects, in addition to challenges in the development of expression skills. The correlational analysis revealed a significant association between playful behavior and the domains of sensory conduct and exploration, suggesting that sensory processing directly influences the way these children interact with the playful environment.

In the correlational analysis, this study identified a correlation between Playful Behavior and Conduct and in relation to the Exploration Quadrant. However, the data should not be generalized, as the evaluations used in the study were carried out in a specific sample. Therefore, it is recommended that new surveys be carried out with a larger sample, so that they can be generalized to the population in question.

However, it is important to emphasize that the data obtained cannot be generalized, since the evaluations were carried out in a specific sample. Thus, it is recommended that new studies be carried out with larger samples, in order to enable the extrapolation of the results to the population with ASD in a more representative way.

Sensory difficulties can impact the child's ability to maintain attention and engagement in daily activities, since the constant search for stimuli can interfere with their occupational performance. In view of this, the occupational therapist can play an essential role by providing diversified sensory experiences, promoting a therapeutic environment that favors engagement and self-regulation. The intervention should be planned individually, respecting the specific demands of each child and balancing challenges and support, in order to facilitate a more efficient sensory organization during play.

Thus, the present research contributes to the advancement of evaluative practices proposing therapeutic hypotheses aimed at children with ASD, highlighting the importance of playing as a central element in child development. In addition, considering the scarcity of studies investigating the relationship between alterations in sensory processing and play, it is recommended that further research be conducted to deepen this theme and expand knowledge in the area.

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