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RESEARCH ARTICLE

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Sensory Processing Difficulties and Academic Performance in Children with Autism Spectrum Disorder

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Abstract: The purpose of the present study was to examine the association between sensory processing difficulties and academic performance among children with Autism Spectrum Disorder (ASD) in Pakistan. Sensory processing difficulties are common among children with Autism Spectrum Disorder and include hypersensitivity and hyposensitivity to environmental stimuli. Such difficulties can affect the ability of a child with Autism Spectrum Disorder to perform effectively in the classroom and can impact academic performance. Quantitative correlational research design was adopted for the purpose of the study. The Short Sensory Profile Scale and the Academic Performance Scale were administered to the total population of 202 participants with Autism Spectrum Disorder to assess the sensory processing difficulties and academic performance of the participants, respectively. Reliability analysis of the study revealed good internal consistency reliability of the Short Sensory Profile Scale and the Academic Performance Scale with Cronbach's alpha reliability coefficient .74 and .75, respectively. However, the findings of linear regression analysis of the study revealed a non-significant association between sensory processing difficulties and academic performance among the participants ($R^2 = .004$, $p = .372$). This study contributes to the scarcity of research on the topic and provides a platform to consider more variables like cognitive abilities of the students and teaching strategies and environmental factors to improve the academic performance of the students with Autism Spectrum Disorder.

Keywords: ASD, Sensory Processing, Academic Performance, Hypersensitivity, Hyposensitivity, Sensory Integration

Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition characterized by a persisting deficit in social communication and interaction, and restricted and repetitive patterns of behavior, interests, and activities. Sensory processing issues, such as hypersensitivity and hyposensitivity, are commonly noted in children with ASD and are included in the diagnostic criteria for ASD (American Psychiatric Association, 2013). Studies suggest that abnormal sensory processing is highly prevalent in children with autism and can affect several senses, such as auditory, visual, tactile, and proprioceptive senses, as noted in Maqsood et al. (2025).

Academic performance in school-aged children involves cognitive, behavioral, and sensory aspects. This includes the capacity to focus on teacher instruction, visually process information in the classroom, integrate sensory information, and respond to task demands (Butera et al., 2020). Several studies have proven the sensory processing differences in children with ASD. However, there is limited literature on the direct association between sensory profiles and structured academic performances, such as reading, writing, and class engagement, in children with ASD. For example, a recent study found the association between modality-specific sensory processing differences and academic achievement in children with autism. This showed the

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importance of auditory processing in academic performance in children with autism (Sensory Processing Modalities and Their Associations With Academic Achievement in Autism and ADHD, 2025).

There is limited literature on this topic in Pakistan. (Javaid et al., 2023) For example, previous studies in Pakistan have mainly found sensory profiles and sensory dysfunction in children with autism, such as problems in visual processing and sensory vulnerability in the classroom (Tahir et al., 2022). A recent observational study carried out in Pakistan has also established that there are significant correlations between difficulties related to sensory processing and key aspects of ASD, indicating that issues related to vestibular and auditory filtering are related to patterns of development and severity (Khawer et al., 2025). Nevertheless, there is a research gap related to the relationship between specific difficulties related to sensory processing and academic performance in educational settings in Pakistan.

The main purpose of the investigation is to assess the link between difficulties experienced during the processing of sensory inputs and academic performance among children with Autism Spectrum Disorder (ASD). To assess the response of children with ASD to certain sensory inputs such as sound, touch, motion, taste, and vision in the school setting. To measure the performance of the children in certain areas of academics such as reading, writing, paying attention, participating in class, and overall academic performance. To assess whether difficulties experienced during the processing of sensory inputs such as hypersensitivity and hyposensitivity impact the overall academic performance of the child. To assess the areas of sensory processing with which the overall academic performance is closely linked. To develop research-based findings on the appropriate interventions for children with ASD.

The significance of understanding the relationship between difficulties in sensory processing and academic performance in children with ASD cannot be overstated, as these difficulties are not limited to mere discomfort, as they may affect academic performance in a direct manner. Sensory difficulties in children with ASD and their implications for education have been recognized, and there has been a need to examine the integration of the two to promote better intervention strategies in the education of children with ASD.

Past studies have focused on the relationship between sensory processing difficulties and general classroom behaviours. However, none have focused on the relationship between difficulties in sensory processing and specific and structured aspects of academic functioning, which include reading, writing, mathematical, and other task-oriented behaviours. Furthermore, none have focused on the relationship between difficulties in sensory processing and teacher-rated aspects of academic functioning. Additionally, differences in research design and sample sizes have created a lack of understanding about the relationship between difficulties in sensory processing and academic functioning.

The majority of the research on difficulties in sensory processing has been conducted in Western cultures. Very little research has been conducted in developing countries. Cultural, educational, and environmental differences could have a bearing on how difficulties in sensory processing could be manifested in different cultures. There is a need to conduct research that focuses on the relationship between difficulties in sensory processing and academic functioning in ASD children.

The main goal of the present research is to explore the relationship between sensory processing issues, such as hyper- and hypo-responsivity, and academic achievement among children with ASD. In particular, the present research will focus on the sensory responses to different types of stimuli, such as auditory, visual, tactile, movement, and proprioceptive, and the relationship between these sensory responses and different types of academic achievement, such as reading, writing, attention, class participation, and overall achievement. This research will be conducted in the context of Pakistan.

The current research seeks to explore the relationship between sensory processing challenges such as hyper- and hypo responsivity and academic performance among children with ASD. For example, the research will explore the sensory responses of children with ASD to different types of stimuli, such as sounds, vision, touch, movement, and proprioception, and the relationships between these sensory responses and academic

performance, including reading, writing, attention, participation, and performance. Such a study will be useful for the development of evidence-based practice for the education of children with ASD in the Pakistani context.

Literature Review

Sensory processing can be defined as the neurological process by which an individual receives and processes information from the environment. Sensory integration, according to Ayres, A. Jean, plays an essential role in adaptive functioning, learning, and behavior. Children with Autism Spectrum Disorder (ASD) show unusual sensory responses to their environment. This may include hypersensitivity, hyposensitivity, and sensory-seeking behavior. This may have a major impact on academic engagement and academic performance.

Studies have consistently shown a strong correlation between sensory processing and school achievement in children with ASD. In a study done on children with High-Functioning Autism Spectrum Disorder, Rodger, Sylvia (2020) found that children with sensory sensitivity and reduced sensory avoidance behavior showed a strong correlation with school competence scores. Although intelligence quotient (IQ) positively predicted academic performance, sensory processing explained additional variance beyond cognitive ability. This indicated that children with heightened sensory sensitivity and poor coping mechanisms may show underachievement in academic performance.

Previous research by Rodger (2008) continued to investigate the outcome of children with ASD in terms of emotional, behavioral, and educational issues. The findings of this study revealed that difficulties in auditory filtering and sensory under-responsiveness were significant predictors of academic performance. For example, auditory filtering difficulties were related to inattention to cognitive activities, while hypersensitivity to touch was related to hyperactivity. Furthermore, intelligence was not a predictor of academic performance, which confirms that sensory issues play a major role in academic performance.

An integrative review carried out by Mallory, Christine, and Keehn, Brandon (2021) reviewed and discussed issues related to sensory and attentional differences in academic settings. This review revealed that atypical sensory responses often result in a discrepancy between children's intelligence academic performance. For example, these children are often unable to respond to academic stimuli due to a highly stimulating academic environment, which is rich in auditory and visual stimuli. This often makes children with ASD less efficient in academic settings.

In terms of academic performance, children with ASD are often efficient, but sensory processing is also related to learning experiences. Jones, Emily (2021) conducted a comprehensive mixed-methods review to discuss issues related to children with ASD.

Investigation into the effect of sensory variations on school life for children with autism. Results showed that difficulties in sensory integration contributed to distraction, emotional difficulties, anxiety, and decreased participation. Experimental research findings revealed that visually and audio-visually stimulating environments increased distractibility in children with autism and neurotypical children. However, children with autism were more affected. Interestingly, a small but positive relationship was established between aspects of sensory sensitivity and reading achievement, which suggested that sensory sensitivity might act as a strength and a difficulty in children with autism.

Difficulties in sensory integration have also been related to performance in motor skills, which might affect academic performance, such as writing and participation. Liu, Ting (2013) investigated children with ASD and revealed that children with autism showed atypical sensory processing and delayed fine and gross motor skills. Positive correlations were established between sensory processing and motor performance, which suggested that difficulties in sensory integration might affect performance in executing motor skills related to class participation.

Recent studies have focused on modality-specific sensory processing and its link to academic performance. Bullen, Jessica C., et al. (2025) studied children with ASD and ADHD to observe their performance in auditory processing and academic outcomes. The results revealed that abnormal auditory processing was linked to differences in reading and mathematics performance among children with ASD and ADHD. Both groups of children showed similar sensory topicalities, which indicates that similar mechanisms may operate in children with ASD and ADHD in inclusive classrooms.

Sensory processing differences, aside from their impact on academic performance, have been linked to differences in perception and emotions. Webber et al. (2024) observed that individuals with high sensory sensitivity preferred soft colours and smooth textures, which they associated with feelings of comfort and reduced sensory overload. The study, which involved aesthetic preferences, may have implications for inclusive classrooms, where design changes may help minimize sensory overload and increase student engagement in the classroom.

Further support for the significance of the concept of sensory processing comes from a research study carried out in Pakistan. The research was a cross-sectional study on children with and without ASD. It was revealed that children with ASD had a higher level of sensory vulnerability than those without ASD, especially with reference to social participation and praxis. It is also significant to note that some level of sensory difficulties was also found among normally developing children.

On an overall note, the literature indicates that sensory processing difficulties are significantly related to children's academic performance, behavioral patterns in the classroom, emotional stability, and motor patterns in children with ASD. The literature further indicates that sensory processing difficulties play a significant role in explaining children's educational problems, which cannot be explained by their intellectual ability alone. In particular, children's difficulties in filtering sounds, hypersensitivity to sounds, and sensory under-responsiveness play a significant role in influencing their academic performance in the classroom. In spite of the literature, further quantitative studies exploring the direct link between sensory processing difficulties and children's academic performance, especially in a multicultural setting, and children with developmental disabilities, is recommended.

This study aims to contribute to the body of knowledge by quantitatively exploring the link between sensory processing difficulties and children's academic performance among children with Autism Spectrum Disorder and developmental disabilities.

Methodology

Correlational research design has been adopted for this research to study the correlation between difficulties in sensory processing and academic performance among students suffering from Autism Spectrum Disorder and Intellectual Developmental Disabilities. The rationale behind adopting this type of research is based on quantifying the data and studying the correlation between variables using this method. In this study, difficulties in sensory processing have been taken as independent variables, and academic performance is taken as dependent variables.

The data collection for this particular study has been conducted through the centers of special education and home-based educational programs in Gujrat. One of the centers of Special Education, and other centers are also being used for the purpose of providing facilities to the children with Intellectual developmental disabilities. Permission has been taken prior to the data collection process.

For the purpose of the study, the data was collected from Al-Mudassar Institute located in the district of Gujrat, which is a special institution for children with special needs. The total number of the population of the study was 200 children.

Procedure

Before commencing the actual research study, permission was sought and obtained from concerned universities as well as the selected institutions. The purpose of conducting this particular study was communicated to the school administration as well as teachers. The questionnaires were administered among teachers who were in regular contact with students and were well aware of their behavior as well as academic performance. The questionnaires were ready to be analysed as they were completed by 200.

Results

Reliability Test

A reliability test was performed to determine the level of internal consistency of the scales applied in this study.

Table 1

Reliability Test Results for Research Variables

Scale	No. of Items	Cronbach's Alpha
Sensory Processing (SP)	38	.74
Academic Performance (AP)	19	.75

The results from the reliability test revealed that the Sensory Processing scale had adequate internal consistency ($\alpha = 0.74$). Likewise, the Academic Performance scale exhibited good reliability ($\alpha = 0.75$).

Linear Regression Analysis

Table 2

Linear Regression Analysis to Predict Academic Achievement Based on Sensory Processing

R	R ²	F	β	B	t	p
.086	.007	1.507	.086	.095	1.228	.221

There is no statistical significance in the linear regression model used to predict academic achievement based on sensory processing problems in children with ASD. The R-squared value was only .7%, implying that other variables are essential in predicting academic achievement.

Table 3

Frequency Distribution of Sensory Processing Difficulties (SP level)

Category	Score	Frequency	Percentage
Low	38-88	72	35.6%
Moderate	89-139	67	33.2%
High	140-190	63	31.2%
Total		202	100%

The frequency distribution table for sensory processing difficulties states that 35.6% of participants have been classified under the low group, 33.2% have been classified under the moderate group, and 31.2% have been classified under the high group. The findings suggest that the sample is distributed nearly equally within all categories of sensory processing difficulties, but the distribution leans slightly toward the low group.

Table 4

Frequency Distribution of Academic Performance (AP level)

Category	Score	Frequency	Percentage
Low	19-44	69	34.2%
Moderate	45-70	81	40.1%
High	71-95	52	25.7%
Total		202	100%

The frequency distribution table for academic performance suggests that 40.1% of participants have been classified as moderate, 34.2% have been classified as low, and 25.7% have been classified as high. The findings show that the majority of participants belong to the moderate category of academic performance.

Discussion

The main aim of this study was to explore the relationship between children with Autism Spectrum Disorder (ASD) and academic performance in relation to sensory processing difficulties. Contrary to the initial study hypothesis, it was revealed that there was no significant relationship between children with ASD and academic performance in relation to sensory processing difficulties. It was revealed through regression analysis that children with ASD have academic performance outcomes, and it was indicated that sensory processing difficulties account for a very small percentage of variance in academic performance.

This study contradicts all previous literature, which has highlighted the importance of children with ASD and academic performance in relation to sensory processing difficulties. It was revealed in all previous literature that children with ASD face various difficulties in relation to sensory processing, especially in relation to hearing and touch. It was revealed that children who have hypersensitivity to sound have difficulties concentrating in a noisy classroom environment. Similarly, it was revealed that children who have tactile defensiveness have difficulties with writing. However, it was revealed in this study that this may not be the case.

One possible reason for this difference may be that academic performance is a complex construct with multiple determinants, and academic performance is affected by a number of factors other than sensory processing. Cognitive, teaching, and environmental factors all have a significant impact on academic performance. It is possible that children who have problems with sensory processing have developed coping mechanisms and have been supported by teachers and caregivers, thus reducing the impact on academic performance.

Another factor to be considered is the impact of contextual and cultural factors. In this study, participants were selected from Pakistan, where cultural and environmental conditions may be different from those in Western countries, where most of the previous research was conducted. It is possible that teachers in special education classrooms have adjusted their teaching techniques to address children with sensory issues, thus reducing the impact of such issues on academic performance.

The reliability analysis of both the Sensory Processing Scale and Academic Performance Scale results revealed that there was adequate internal consistency, thus indicating that the tools utilized in this study were adequate enough to be utilized in measuring the required parameters. Nevertheless, there was some level of subjectivity, considering that teacher-reported data might have been utilized, and teachers' perceptions might differ depending on their experience, expectations, and level of training.

Moreover, there was a general emphasis placed on overall sensory processing difficulties, rather than examining each sensory domain individually. Past research has indicated that some sensory domains, such as auditory processing, might be more linked with certain academic skills, such as reading and attention. By taking into account all sensory domains, there was a possibility of overlooking some minor relationships between sensory difficulties and academic outcomes.

Despite these limitations, the study is an important contribution to the existing literature on the subject. This is because it addresses an important gap in the research. Moreover, it questions the assumption that difficulties with sensory processing are the major factor that influences academic performance. Therefore, it is important to have a comprehensive understanding of the factors that influence learning in children with ASD.

In terms of implications, the study is important to educators and practitioners. Instead of focusing on sensory processing, it is important to have a holistic understanding of the factors that influence learning in

children with ASD. Therefore, when developing an individualized education plan, it is important to have an understanding of the different factors that influence learning in the child. These factors include attention, motivation, and social skills.

In conclusion, it is important to note that sensory processing difficulties are an important feature of ASD. However, the study indicates that they have little influence on academic performance. Therefore, it is important to have an understanding of the complex relationship that exists between sensory processing and other factors. Therefore, it is important to have a multidimensional understanding of the factors that influence learning in children with ASD. This will enable the development of more effective interventions to promote the academic performance of children with ASD.

Conclusion

Results from both sensory processing and academic performance questionnaires yielded adequate levels of reliability. Yet, the sensory processing problems were unable to account for variance in the academic performance scores, which is an indication that their correlation is negligible.

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