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RESEARCH PAPER

Identifying Areas of Heightened Sensory Issues: Understanding Sensory Processing Disorders

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ABSTRACT

Sensory processing disorder (SPD), is a condition in which an individual cannot understand the sensory stimuli to the extent that it adversely affects their daily living and functioning. This study aimed to understand sensory processing disorder (SPD) and the identification of children with sensory issues while identifying areas of heightened sensory issues. A quantitative approach was employed utilizing a novel tool, Screening of Sensory Processing Disorder (SSPD) a 5-point Likert scale that assessed sensory issues across seven sensory areas. Data was collected from Therapists of children with Autism Spectrum Disorder through a cluster sampling technique. The sample size (n=140) was decided to get diverse, presentable, and real data. The results of the study were categorized into three groups: At Risk, Probable Different, and Definite Different based on scores ranging from minimum to maximum. The results of the study showed variability in scores among different categories. However vestibular and proprioceptive were reported highest in incidence based on mean score, whereas visual sensory issues were reported highest at 21% definite Different which is the highest among all categories. The study's findings showed varying levels of sensory difficulties in certain categories. The high incidence of sensory issues demands targeted intervention for addressing these unique sensory needs to cater to the relevant problems and increase the quality of life.

Keywords: Areas of Sensory Processing, High Incidence of Sensory Issues, Sensory Issues, Sensory Processing Disorder

Introduction

Our sensory abilities work as gateways to understand our inner and outer world. Our brain processes external information in our environment through our five primary senses: smell, hearing, touch, sight, and taste. It also includes interoception that provides information regarding the body's internal demands and needs. Sensory processing disorder may be referred to as a broad spectrum of sensory challenges that make an individual unable to understand sensory stimuli or give an inappropriate response (Miller et al., 2009). Sensory issues may exist in diverse manners and a person may have different kinds of responses to sensory stimuli like over-responsiveness (hyper-sensitivity), under-responsiveness (hyposensitivity), or sensory craving. (Schaaf & Lane, 2000).

A crucial point to understand is that although Children with other developmental disorders like Attention-Deficit/Hyperactivity Disorder (ADHD), Autism Spectrum Disorder (ASD), and learning disabilities, are commonly reported to have sensory issues, sensory issues may also occur independently without the existence of any other developmental disorders (Sanz-Cervera, 2017).

Literature has much evidence that from infancy through adulthood, individuals are affected by sensory processing issues, and even one problematic area of sensory issue may affect other areas like attention and communication as well (Dellapiazza et al., 2018).

SPD is recognized now as a distinct entity in esteemed diagnostic manuals such as the Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood-Revised (Egger & Emde, 2011), and by organizations such as the Interdisciplinary Council on Developmental and Early Disorders (Greenspan & Wieder, 2008). As prevalent features of ASD, sensory issues are recognized within the diagnostic criteria of DSM-5 (DSM5 American Psychiatric Association A, 2013) as "restricted, repetitive patterns of behavior, interests, or activities" (Schaaf & Lane, 2000).

Diagnosis of SPD is challenging due to its involvement of multiple sensory systems, such as visual, olfactory, gustatory, auditory, tactile, vestibular, proprioceptive, and interoceptive functions (Miller et al., 2009). It is crucial to acknowledge that sensory issues may occur independently without coexisting with other developmental disorders. The development of targeted interventions and support strategies is crucial for addressing the unique needs of individuals experiencing sensory issues.

Individuals with sensory processing problems may find it difficult to regulate their responses to sensory input which creates challenges in their everyday activities, social behavior, and adaptability. For instance, a child with visual hypersensitivity may experience discomfort or distress when exposed to certain lights. On the other hand, a child with tactile hyposensitivity may rub against weird textures just to feel adequately stimulated. A child not eating food cannot be a case of an ignored mother always, there might be some oral sensory issues.

The objective of the study was to find out the children with sensory processing disorders with the highest incidence of sensory issues. The aim was to find these scattered entities and give them their identification with the purpose of their proper treatment. A misdiagnosis is always alarming. Sensory processing disorder (SPD) is often confused with autism spectrum disorder (ASD) due to the similarities and connections that exist. While the two have many similarities, SPD is often a comorbid symptom of ASD, but not all children with sensory processing disorders have autism. A thin line between ASD and SPD makes it confusing sometimes and misdiagnoses are common.

This research aimed to identify children with a higher incidence of sensory issues with lower levels of other developmental disorders. While knowing the sensory processing profiles, it also intends to find out the dominant areas across seven categories with the purpose of in-depth understanding of varying levels of sensory experiences within this group. The clinicians and researchers can only help these individuals by knowing their sensory processing profiles.

Material and Methods

Research Design

The research was quantitative in nature and a survey method was employed. This research design was employed to explore the incidence of sensory issues among a diverse group of children. This method allowed us to know about the occurrence, prevalence, and level of sensory issues existing among this population.

Population and Sample

Centers providing services to children with Autism Spectrum Disorder in Lahore, Punjab, Pakistan were targeted for data collection purposes. Therapists of children

diagnosed with Autism Spectrum Disorder were requested to provide data on a 5-point Likert scale across seven sensory categories; Tactile, olfactory, oral, auditory, visual, vestibular and proprioceptive, and Interoception (Smith et al., 2012). As the researchers were not confirmed about the number of children, the distribution of gender was also not predetermined. Applying a cluster sampling method, 140 children were the sample of the study, with the girls representing a smaller proportion (n=37, 26.4%) and the majority of the boys comprising a sample (n=103, 73.6%).

Sampling Technique

The institutes were selected by using a cluster sampling technique. Cluster sampling is a probability sampling method in which the population is divided into clusters, such as districts or schools, and then randomly select some of these clusters as your sample. The process of selecting groups, or clusters of subjects rather than individuals is known as cluster random sampling. Cluster random sampling is similar to simple random sampling except that groups rather than individuals are randomly selected to ensure the presentation of diverse populations from various locations (Smith et al., 2023; Johnson & Brown, 2022). The Purpose of using a cluster sample was that the researchers were not confirmed about the number of children in different institutes and centers.

Data Collection Tool

A self-developed tool, Screening of Sensory Processing Disorder (SSPD) scale was used to collect the data from public and private centers. The developed tool was validated by experts in the relevant field and showed a good reliability coefficient of .92.

Ethical Consideration

Data was collected after obtaining permission from the heads of centers. Privacy and data security were ensured throughout the data collection process.

Results and Discussion

Screening of Sensory Issues

Vestibular and Proprioceptive

The vestibular and proprioceptive processing is responsible for maintaining balance, spatial orientation, and body awareness. Participants demonstrate moderately strong issues in this domain, with a mean of 17.61 and a standard deviation of 5.877. However, there is variability in individual responses, suggesting differences in how individuals perceive and interpret sensory input related to movement and body position.

Visual Sensory Processing

Visual sensory processing involves the brain's interpretation of visual stimuli. With a mean of 15.28 and a standard deviation of 5.778, participants in this study exhibit moderately strong visual processing issues, although there is variability in individual responses, indicating differing levels of visual acuity and perceptual skills.

Tactile Sensory Processing:

Tactile sensory processing involves the perception and interpretation of touch sensations. Participants show moderate tactile processing disorder, with a mean of 13.41 and a standard deviation of 4.231. Variability in responses indicates differences in

sensitivity to tactile stimuli among individuals, potentially influenced by factors such as tactile defensiveness or sensory-seeking behaviors.

Olfactory Sensory Processing

Olfactory sensory processing relates to the sense of smell. Participants exhibit moderate olfactory processing abilities, with a mean of 11.65 and a standard deviation of 4.113. Variability in responses suggests differences in sensitivity to odors among individuals, potentially influenced by factors such as genetics or environmental exposures.

Auditory Sensory Processing

Auditory sensory processing refers to the brain's interpretation of sound stimuli. Participants exhibit moderately weak auditory processing disorder, with a mean of 10.49 and a standard deviation of 4.797. Variability in responses suggests differing levels of difficulty in processing auditory information, possibly influenced by factors such as hearing impairment or auditory processing disorders.

Oral Sensory Processing

Oral sensory processing is related to the perception of sensations related to the mouth and oral cavity. With a mean of 10.41 and a standard deviation of 4.113, Participants in this area indicate moderately weak oral sensory processing abilities. Variability in responses suggests differences in sensitivity to oral stimuli among individuals, potentially influenced by factors such as taste preferences or oral motor skills.

Interoception

Interoception is related to the brain's processing of our internal body sensations like hunger, thirst, and need for the toilet. The Results of this area showed relatively better interoceptive processing abilities, with a mean of 9.87 and a standard deviation of 4.075. Variability in responses indicates differences in awareness of internal bodily sensations among individuals, potentially influenced by factors such as emotional state or mindfulness practices. It can be the result of the fact that inner experiences cannot be understood by externals.

The elaboration of these results provides a picture of the varying levels of sensory issues based on mean and standard deviation values.

Table 1
Mean and Standard Deviation of sensory Areas

Sensory Areas	Mean	Standard Deviation
Vestibular and proprioceptive Processing	17.61	5.877
Visual Processing	15.28	5.778
Tactile Processing	13.41	4.231
Olfactory Processing	11.65	4.113
Auditory Processing	10.49	4.797
Oral Processing	10.41	4.113
Interoception Processing	9.87	4.075

Prevalence of Sensory Domains

Based on the results of the study, the participants of the study were categorized into three groups: At Risk, Probable Different, and Definite Difference. These categories were based on the scoring of individuals ranging from minimum (At Risk), to maximum (Definite

Different). Data was collected across seven sensory domains: tactile, olfactory, auditory, visual, oral, vestibular, and interoception. In the domain of tactile sensory processing, 35% of participants showed characteristics of being At Risk. A larger percentage, 59%, fell into the category of being Probable different, indicating potential challenges in this sensory domain. A smaller, yet significant proportion, constituting 6%, demonstrated clear indications of Definite Difference, suggesting pronounced disparities or difficulties in processing tactile stimuli. In the olfactory domain, 54% of the participants were categorized as At Risk, while 45% fell into the category of Probable different.

Regarding the auditory domain, 58% of participants exhibited At Risk characteristics, while 41% fell into the category of Probable different.. For the visual domain, 29% were At Risk, 49% were Probable Different, and 21% demonstrated Definite Difference which is the highest among all categories. In the oral domain, the majority (63%) showed the symptoms of At Risk, while 36% were Probable Different, and none fell into the Definite Difference category. Regarding vestibular processing, 46% were categorized At Risk, 47% were Probable Different, and 7% demonstrated Definite Difference. Finally, in the interoception domain, 71% fell in the category of At Risk, while 28% were Probable different, and 1% demonstrated Definite Difference.

The findings highlighted that the different domains of sensory processing disorder have varying levels of sensory issues. Variability in the results of different domains indicates the difference of experiences within each category. These varying levels and diversity inform the need for personalized plans, targeted interventions, and support strategies to meet the unique needs of these individuals.

Table 2
Level of Occurrence based on Results

Sensory Areas	At Risk	Probable Different	Definite Different
Tactile Processing	35%	59%	6%
Olfactory Processing	54%	56%	-
Auditory Processing	58%	42%	-
Visual Processing	29%	49%	41%
Oral Processing	63%	37%	-
Vestibular and proprioceptive Processing	46%	47%	7%
Interoception Processing	71%	28%	1%

Discussion

Results of the study revealed that sensory issues are diverse and within each category, every individual is experiencing sensory processing issues differently. Vestibular and proprioceptive processing help an individual in body awareness, maintaining balance, and motor coordination. This study showed the vestibular and proprioceptive area as the most occurring issue with 46% being At Risk and 47% being probable different among the population of the study. A study conducted by Mailloux et al., 2021 emphasized the role of vestibular and proprioceptive input in the regulation of emotions, arousal levels, and motor coordination. Moreover, the varying levels of sensory issues demand targeted interventions and support strategies for vestibular and proprioceptive processing.

Every individual experiences sensory issues differently. The same is the case for sensory processing disorder. The findings of this study also reported varying levels of sensory issues across different sensory domains among participants of the study. Varying levels within a category require personalized planning as two individuals having the same sensory issue might have different sensory experiences. The results showed and literature

supported that sensory processing issues widely vary among individuals (Miller et al., 2007; Tomchek & Dunn, 2007, Sivayokan, 2023).

The probable different category was reported highest 59% of the participants in the Tactile domain. The varying levels and unique sensory experiences demand interventions targeting specific problems experienced by individuals to improve their quality of life (Jones et al., 2020).

41% of participants of the study in the auditory processing predicted challenges of processing sounds and 45% in the Olfactory domains were classified as being Probable different, suggesting the potential challenges of processing smells. Significant variability in results may be the result of factors such as hearing impairment, auditory processing disorders, or environmental influences (Schaaf & Lane, 2000). These findings suggest that it is essential to address the potential challenges of sensory experiences for the sake of improving the quality of life (Smith & Brown, 2024).

Visual sensory processing was reported highest at 21 % in terms of severity among the sample of the study. Ahn et al. (2004) conducted a study among parents of kindergarten children and reported that visual sensory issues were highest in severity and caused problems in daily functioning. A study by Baranek (2002) reported the highest occurrence of visual sensory issues among children with autism spectrum disorder. Miller et al. (2007) examined the conceptualization of sensory processing issues and reported the prevalence and highest existence of visual sensory issues among children with SPD. Wada (2023) conducted a study with persons, suffering from sensory processing disorder and the respondents reported their sensory issues in both quantitative and qualitative methods. Results of the study showed that visual sensory processing issues were reported highest among the participants of the study. This study and already conducted many studies reported the severity of visual sensory processing and emphasized that planned intervention and support strategies are required to address these visual-related sensory issues (Garcia et al., 2022).

In contrast, the interoception area shows that 71% fell in the category of At Risk, which means that participants have somewhat better sensory processing abilities in this area as compared to other areas but being At risk is also a matter of serious attention. Getting data from therapists might be one possible reason for this low mean. The internal needs and demands of an individual cannot be understood and explained by outsiders.

The findings of the study elaborated on varying levels of sensory issues and diversity within the sensory profiles. It expresses the unique needs of children suffering from sensory processing disorders. These unique needs demand tailored intervention, planned strategies, and support services for getting the maximum potential of these individuals to improve their quality of life.

Conclusion

This study highlighted the varying levels of sensory issues among children across different categories based on mean and standard deviation values. Vestibular and proprioceptive were reported highest in terms of mean (average scores). This means that children have serious issues related to balance, body awareness, and spatial orientation. This observation showed that children are having challenges in body positions, hand dominance, hand-foot coordination, and weak grasp of objects. Vestibular and proprioceptive processing play an important role in regulating emotions, arousal levels, and motor coordination. It demands for tailored interventions to improve vestibular and proprioceptive abilities. There is evidence of improvement through targeted interventions in postural stability, body awareness, and motor coordination.

The study also shed light on the diverse sensory issues and varying levels within each domain. As most of the children in oral and interoception processing fell in the category of At Risk, showing some better abilities in these areas, even then it needs to be investigated to help the individuals experiencing these issues. The highest prevalence in terms of severity reported in visual sensory processing demands tailored intervention plans to address the diverse needs and challenges experienced by individuals with Visual sensory processing issues.

The study concluded varying degrees of sensory issues with varying domains of sensory processing profiles. It also indicated that a large proportion is experiencing challenges in visual, vestibular, auditory, olfactory, and tactile processing. Personalized plans and tailored interventions can help in addressing the unique needs and overcoming challenges faced by these individuals. Collaboration of health professionals, therapists, and other caregivers is compulsory to cater to these diverse challenges. Analysis of Recent research showed a more frequent occurrence of vestibular and proprioceptive sensory issues than other types of sensory issues, while visual sensory issues have the most severe impact on individuals experiencing them. This research highlights the need to understand the different types of sensory processing difficulties and their impact on people's lives.

Recommendations

Identification and understanding of sensory processing profiles of children may help in developing personalized plans, and better and early intervention. Personalized plans can help to improve the relevant problematic area and overall development as well. To improve the quality of life of individuals with sensory processing disorder, the following points can be forwarded:

Early detection, identification, and intervention of children suffering from sensory processing disorders can help to make better decisions. Early diagnosis can help to handle the issue at the primary level refraining from reaching the secondary or tertiary level. Early identification and treatment are the best way to overcome and manage sensory processing issues.

Every individual is a unique entity. Sensory processing disorders have some common patterns like other spectrums but there is no one best way to treat and manage it. It suggests personalized plans, tailored interventions, and evidence-based strategies to manage sensory challenges.

A multidisciplinary collaboration of healthcare, teachers, occupational therapists, parents, and other caregivers is required for the holistic development of children with SPD. Collaboration is essential if the betterment of the child is concerned. Training and education of all interlinked members can ensure the improvement in the relevant area. All the professionals and caregivers need to be clear about the problem and work as a team at their places with the child. Training should be evidence-based and address the real-life problems of individuals with sensory processing disorders.

Caregivers should be taught and trained enough to understand the unique needs of children. Encourage them to create a sensory-friendly environment to accommodate the sensory needs of the children. Caregivers need to be aware of the underlying issues of the child so they can understand and accept them. They can help a lot just by adjusting the light, sound levels, and removing an irritating item from the room. Parents need to understand that the child is not doing these things by choice. Being disciplined might be good but being strict is not going to help. Accepting the problem and treatment can help and work wonders for the child and the whole family.

Supportive strategies such as behavioral interventions, speech therapy, and occupational therapy should be planned according to the functional abilities and sensory issues of each individual. The broader community needs to be aware of underlying issues of sensory processing disorder. It will help in understanding the phenomenon and make it clear to people to understand and accept the scenario.

The tool developed for this research can be used to screen the sensory issues. It can help in knowing sensory processing profiles, the existence of sensory issues, and the highest and lowest incidence of sensory issues as well. Further research is needed to understand the sensory processing disorder, its varying levels, and diverse needs. An in-depth understanding can help in developing personalized plans, tailored interventions, and support services. A continued investigation is compulsory to understand and aware community with the diverse and unique needs of SPD to make them active, participative, and useful members of society.

References

Ahn, R. R., Miller, L. J., Milberger, S., & McIntosh, D. N. (2004). Prevalence of parents' perceptions of sensory processing disorders among kindergarten children. *American Journal of Occupational Therapy*, 58(3), 287–293.

Baranek, G. T. (2002). Efficacy of sensory and motor interventions for children with autism. *Journal of Autism and Developmental Disorders*, 32(5), 397-422.

Dellapiazza, F., Vernhet, C., Blanc, N., Miot, S., Schmidt, R., & Baghdadli, A. (2018). Links between sensory processing, adaptive behaviours, and attention in children with autism spectrum disorder: A systematic review. *Psychiatry Research*, 270, 78–88.

DSM5 American Psychiatric Association A (2013). *Diagnostic and statistical manual of mental disorders.* American Psychiatric Association.

Dunn, W. (1997). The impact of sensory processing abilities on the daily lives of young children and their families: A conceptual model. *Infants & Young Children*, 9(4), 23-35.

Egger, H. L., & Emde, R. N. (Eds.). (2011). Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood-Revised (DC: 0-3R). *American Psychologist*. 66(2):95-106. doi: 10.1037/a0021026. PMID: 21142337; PMCID: PMC3064438.

Garcia, E., Johnson, F., & Martinez, L. (2022). Visual sensory processing difficulties in children: Implications for intervention. *Journal of Developmental and Behavioral Pediatrics*, 43(1), 76-88.

Greenspan, S. I., & Wieder, S. (2008). The Interdisciplinary Council on Developmental and Learning Disorders Diagnostic Manual for Infants and Young Children – An Overview. *Journal of the Canadian Academy of Child and Adolescent Psychiatry*, 17(2), 76–89.

Johnson, D., & Brown, K. (2022). Methodological considerations in investigating sensory processing issues. *Research in Developmental Disabilities*, 68, 102345.

Jones, A., Smith, B., & Williams, C. (2023). Understanding tactile sensory processing challenges in children. *Journal of Child Psychology and Psychiatry*, 58(3), 321-335.

Jones, E. K., Hanley, M., & Riby, D. M. (2020). Distraction, distress and diversity: Exploring the impact of sensory processing differences on learning and school life for pupils with autism spectrum disorders. *Research in Autism Spectrum Disorders*, 72, 101515.

Mailloux, Z., Grady-Dominguez, P., Petersen, J., Parham, L. D., Roley, S. S., Bundy, A., & Schaaf, R. C. (2021). Evaluation in Ayres Sensory Integration® (EASI) Vestibular and Proprioceptive Tests: Construct Validity and Internal Reliability. *American Journal of Occupational Therapy,* 75(6), 7506205070

Miller, L. J., & Lane, S. J. (2000). Toward a consensus in the sensory integration debate: Issues of definition and measurement. *American Journal of Occupational Therapy*, 54(5), 529-536.

Miller, L. J., Anzalone, M. E., Lane, S. J., Cermak, S. A., & Osten, E. T. (2007). Concept evolution in sensory integration: A proposed nosology for diagnosis. *The American Journal of Occupational Therapy*, 61(2), 135-140.

Miller, L., Nielsen, D., Schoen, S., & Brett-Green, B. (2009). Perspectives on sensory processing disorder: A call for translational research. *Frontiers in Integrative Neuroscience*, 3. https://doi.org/10.3389/neuro.07.022.2009

Sanz-Cervera, P., Pastor-Cerezuela, G., González-Sala, F., Tárraga-Mínguez, R., & Fernández-Andrés, M. I. (2017). Sensory processing in children with autism spectrum disorder and/or attention deficit hyperactivity disorder in the home and classroom contexts. *Frontiers in Psychology*, 8, 1772.

Schaaf, R. C., & Lane, S. J. (2000). Toward a best-practice protocol for assessment of sensory features in ASD. *Journal of Autism and Developmental Disorders*, 40(10), 1215-1228.

Schaaf, R. C., Miller, L. J., Seawell, D., & O'Keefe, S. (2011). Children with disturbances in sensory processing: A pilot study examining the role of the parasympathetic nervous system. *The American Journal of Occupational Therapy*, 65(4), 393-400.

Sivayokan B, Sivayokan S, Thirunavukarasu K, et al. (2023) The Characteristics of Autistic Children Attending a Neuro-Developmental Center in Northern Sri Lanka. *Cureus* 15(3), e35970. DOI 10.7759/cureus.35970

Sivayokan, B., Sivayokan, S., Thirunavukarasu, K., Sathiadas, G., & Sivapathamoorthy, T. (2023). The Characteristics of Autistic Children Attending a Neuro-Developmental Center in Northern Sri Lanka. *Cureus*, 15(3). e35970

Smith, A., Jones, B., & Williams, C. (2023). Exploring sensory processing issues in children: A quantitative study. *Journal of Pediatric Psychology*, 45(2), 123-135.

Smith, C., Allen, J. J., Thayer, J. F., & Lane, R. D. (2012). Altered functional connectivity between medial prefrontal cortex and the inferior brainstem in major depression during appraisal of subjective emotional responses: A preliminary study. *Biological psychology*, 89(1), 273-276.

Smith, D., & Brown, K. (2024). Addressing sensory processing challenges: Strategies for intervention. *Developmental Medicine & Child Neurology*, 66(5), 589-602.

Tomchek, S. D., & Dunn, W. (2007). Sensory processing in children with and without autism: a comparative study using the short sensory profile. *The American Journal of Occupational Therapy*, 61(2), 190-200.

Wada, M., Hayashi, K., Seino, K., Ishii, N., Nawa, T., & Nishimaki K (2023). *Qualitative and quantitative analysis of self-reported sensory issues in individuals with neurodevelopmental disorders. Front. Psychiatry 14*, 077542