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RESEARCH PAPER

Impact of High-Sensory Issues on Attention: Understanding the Negative Effects

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ABSTRACT

This study aimed to investigate the relationship between sensory issues and Attention ability. It also determined the direction of the relationship between sensory domains and Attention. Attention is essential in understanding and comprehending any task. The existence of sensory issues may affect the child's attention negatively. The higher the sensory issues, the more it affects the child's ability to concentrate on relevant stimuli, making it difficult to learn and behave properly. The study was quantitative and a survey method was applied. Data from 86 children were collected through a purposive sampling technique. A self-developed Sensory Dysfunction Inventory (DSI) was applied to assess the children's sensory issues and an Attention checklist to measure their Attention abilities. Correlation and Linear Regression were applied to see the relationship between sensory dysfunction domains and Attention. Results of the study reported that sensory issues and attention are negatively correlated. The presence of sensory problems may negatively affect the child's ability to concentrate. The application of a multisensory approach can be useful in overcoming sensory issues and improving attention.

KEYWORDS Attention, Negative Effects, Sensory Issues

Introduction

Attention can be defined as one's ability to concentrate on a relevant task. Cognitive Psychology discusses Attention as a set of processes that enable and guide the selection of incoming perceptual information to limit the external stimuli processed by our bounded cognitive system and avoid overloading it (Posner 1982; Chun and Wolfe 2001; Driver 2001; Lavie 2005). Attention is defined as one's ability to choose among various sensory inputs and focus on relevant sensory stimuli for a course of action whereas other inputs may occur simultaneously (Talsma et al., 2010). Three distinct attention networks are discussed by Petersen and Posner (2012): selective, sustained, and attention control/shift. Ayres' sensory integration theory (SIT) focuses on selecting purposeful activities and the child's active participation for an adaptive response (Schaaf and Davies, 2010). Ayres' (1972) SIT discussed the importance of active attention for accurate processing of sensory receptors. Petersen and Posner (2012) discussed attention as brain complex subsets for active participation in daily tasks of life.

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 which provides information regarding the body's internal demands and needs and

vestibular and proprioceptive providing information about balance and stability. Sensory processing disorder may be a broad spectrum of sensory challenges that make an individual unable to understand sensory stimuli or give an inappropriate response (Miller et al., 2012). 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).

The purpose of the present study was to examine both sensory processing dysfunction and attention abilities. The sensory Dysfunction Inventory (SDI) consisted of Visual sensory Dysfunction, Tactile sensory Dysfunction, Olfactory sensory Dysfunction, Oral sensory Dysfunction, Auditory sensory Dysfunction, and Vestibular and proprioceptive Sensory Dysfunction domains. The study also aimed to understand the direction of the relationship between these Sensory domains and Attention. The Researchers assumed that Attention and Sensory issues are negatively correlated.

Literature Review

Sensory issues present diversity within each category, and every individual shared an individual experience of sensory processing (Mushtaq, 2024). Sensory modulation Disorder can be divided into three categories. Sensory over-responsivity (SOR), Sensory under responsivity (SUR), and Sensory Craving (SC) (Miller et al., 2007). Most of the available literature on sensory issues has reported sensory over-responsivity as the most occurring condition of sensory modulation disorder (Ismael, 2018). The reason might be that it can be understood and reported easily by caregivers.

Sensory receptors and attention are interlinked to perform a task successfully. A study conducted by Crasta et al. (2020), directly compared the attention abilities of children With ASD, Children with SPD and typically developed children and reported a difference in the attention abilities among these groups. Dunn et al. (2016) discussed that the child's participation and learning are affected by the presence of different sensory issues and experiences.

The focus of the current study was to understand the relationship between attention and successful sensory processing. When considering attention performance in children with SPD, there is a scarcity of research examining the specific types of attention deficits in children with SPD. Owen et al. (2013) found attention deficits, as measured by the inattention measure of the Sensory Profile, in 11 of the 16 children with SPD in their study, and Ahn et al. (2004) reported that around 40% of children with SPD show comorbid attention deficit symptoms. Children with SPD showed intermediate selective attention abilities on a visuomotor tracking task, with better performance than the ASD group but worse performance than typically developing (TD) (Brandes-Aitken et al., 2018).

Difficulties in sensory processing and attention in children contribute to challenges in meaningful participation in everyday activities such as play (Leipold and Bundy, 2000; Bundy et al., 2007) and academic performance (DuPaul et al., 2001). Understanding the profile of both sensory processing and attention abilities in children with SPD will provide critical information that may provide rich information for developing Individualized interventions.

Material and Methods

The research was quantitative in nature and a survey method was employed. This research design was used to explore the incidence of sensory issues and attention among a diverse group of children. Pearson correlation was applied to see the existence and Direction of the relationship between two variables (Esser & Vliegenthart, (2017).

Population and Sample

Centers providing services to children with developmental disabilities in Lahore, Punjab, Pakistan were targeted for data collection purposes. Therapists of children diagnosed with Sensory Processing disorder (who scored higher on the sensory scale and were in probable different or definite different categories of sensory issues) were requested to provide data on a 5-point Likert scale across six categories; Tactile, olfactory, oral, auditory, visual, and vestibular and proprioceptive (Smith et al., 2012).

86 children were the sample of the study, with the girls representing a smaller proportion (n=16, 18.6.%) and the majority of the boys comprising a sample (n=70, 81.4%).

Data Collection Tools

Assessment of Sensory Dysfunction

A self-developed tool, the Sensory Dysfunction Inventory (SDI) scale was used to collect the data. This scale was developed to measure the existence and level of a Child's Hypersensitivity, Hyposensitivity, poor perception, and discrimination of sensory areas. The developed tool was validated by three experts in the relevant field and collected data reserved a good reliability coefficient of .933.

Assessment of Attention Abilities

Attention abilities were assessed through the Attention Checklist (ACL) scale developed by Das. J. P. (1989). The standardized scale was validated by 3 experts in the face and construct validity in the context of the researcher's topic. The scale was employed on 86 children, who scored higher on the sensory scale and were in probable different or definite different categories of sensory issues. It showed a good Cronbach Alpha value of .888 for the scale. ACL was on an international scale, and its application and results provided its contextual reliability.

Ethical Consideration

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

Results and Discussion

The checklist measured children's attention responses. Children having short attention was reported as one of the main issues in children's attention-related issues with a mean value of 3.63 with a standard deviation of 1.532. Disregarding some or all directions was reported with a mean value of 2.95 with a standard deviation of 1.264. The children appeared detached from the class with a mean value of 2.94 and a standard deviation of 1.390. The children's problem of trouble with concentration in class was reported with a mean value of 2.52 with a standard deviation of 1.311. The children's

problem of daydreaming in class was reported with a mean value of 2.30 with a standard deviation of 1.354. The children's problem of Easily Distracted from an activity was reported with a mean value of 1.33 with a standard deviation of 1.325. The children's problem of getting engrossed in an activity was reported with a mean value of 1.85 with a standard deviation of 1.463. The children's problem of Listening Attentively during any assigned or relevant task was reported with a mean value of 1.00 with a standard deviation of 1.301. The children's problem of concentrating on tasks till the completion of a task was reported with a mean value of 1.50 with a standard deviation of 1.489.

Table 1
Mean and S.D. of Sensory Dysfunction

Domains	Mean	S.D.
Tactile	40.488	11.242
Auditory	22.542	8.382
Visual	22.104	7.742
Vestibular	39.290	10.428
Olfactory	38.593	11.361
ORAL	22.581	8.462

The table indicates the descriptive statistics of the data. The highest mean value reported is of the Tactile domain with a mean of 40.48 and an S.D. of 11.242. Vestibular and Proprioceptive are reported with a mean value of 39.290 and an S.D. of 10.428. Olfactory was reported as a mean value of 38.539 and an S.D. of 11.361. Oral was reported as a mean value of 22.581 and an S.D. of 8.462. Auditory was reported as a mean value of 22.542 and an S.D. of 8.382. Visual was reported as a mean value of 22.104 and an S.D. of 7.742.

The Sensory Dysfunction Inventory (SDI) measured sensory issues in the context of Hypersensitivity, Hyposensitivity, and some domains of poor tone and Muscle coordination. Poor tone and muscle coordination were reported highest as a mean value of 2.56. Hyposensitivity was reported as the second highest occurring condition with a mean value of 2.48. Hypersensitivity was reported third in the context of vestibular and proprioceptive occurrence with a mean value of 2.00.

The average mean values of Tactile dysfunction in the context of Hyposensitivity were reported highest with a mean value of 2.8. Poor Tactile Perception and Discrimination were reported as the second occurring condition with a mean value of 2.6 and hypersensitivity was reported as the third with a mean value of 2.5.

The average mean values of Oral dysfunction were reported in the context of Hypersensitivity, and Hyposensitivity. Oral hypersensitivity was reported highest with an average mean value of 2.69. Oral hyposensitivity was reported with a mean value of 2.14.

The average mean auditory hyposensitivity was reported as 2.65 and 2.4 in the context of hypersensitivity. Visual hypersensitivity was reported higher with a mean value of 2.95. Visual hyposensitivity was reported with a mean value of 2.6. Olfactory hypersensitivity was reported higher with a mean value of 2.60. olfactory hyposensitivity was reported with a mean value of 2.50.

Pearson Correlation

Pearson Correlation was applied to see the existence and direction of the relationship between sensory issues and attention.

Table 2
Sensory Domains and Attention Correlation

	Attention	Tactile	Auditory	Visual	vestibular	olfactory	Oral
Attention	1						
Tactile	-.611**	1					
Auditory	-.773**	.582**	1				
Visual	-.619**	.537**	.629**	1			
Vestibular	-.600**	.502**	.673**	-.567**	1		
Olfactory	-.501**	.777**	-.546**	.387**	.385**	1	
Oral	-.790**	.595**	.990**	.627**	.673**	.560**	1

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation Coefficient (r) value between Tactile processing dysfunction and Attention is reported as -.611 which shows a moderate negative association between these two variables. The P value is < 0.01 which means that the relationship is statistically significant. So, we can say that the increase in the tactile domain scores will cause a decrease in Attention scores. The correlation Coefficient (r) value between Auditory processing dysfunction and Attention is reported as -.773 which shows a high negative association between these two variables. The P value is < 0.01 which means that the relationship is statistically significant. So, we can say that the increase in the auditory domain scores will cause a decrease in Attention scores.

The correlation Coefficient (r) value between Visual processing dysfunction and Attention is reported as -.619 which shows a moderate negative association between these two variables. The P value is < 0.01 which means that the relationship is statistically significant. So, we can say that the increase in the Visual domain scores will cause a decrease in Attention scores. The correlation Coefficient (r) value between Vestibular and proprioceptive processing dysfunction and Attention is reported as -.600 which shows a moderate negative association between these two variables. The P value is < 0.01 which means that the relationship is statistically significant. So, we can say that the increase in the Vestibular and proprioceptive domain scores will cause a decrease in Attention scores.

The correlation Coefficient (r) value between Olfactory processing dysfunction and Attention is reported as -.501 which shows a moderate negative association between these two variables. The P value is < 0.01 which means that the relationship is statistically significant. So, we can say that the increase in the Olfactory domain scores will cause a decrease in Attention scores. The correlation Coefficient (r) value between Oral processing dysfunction and Attention is reported as -.790 which shows a very high negative association between these two variables. The P value is < 0.01 which means that the relationship is statistically significant. So, we can say that the increase in the Oral domain scores will cause a decrease in Attention scores.

Discussion

The purpose of this study was to explore the relationship between the existence of sensory issues and Attention. The finding of the study reported that sensory issues are negatively correlated with Attention (Mallory, 2021).

It's not surprising if a child with sensory issues seems lost. It's not unusual for a child with sensory issues to seem irritated all the time. The presence of Sensory issues may cause to happen all these situations and make the child's response inappropriate (Jorquera-Cabrera, et. al, 2017; Mimouni-Bloch et al., 2018). Planned intervention

strategies can applied to overcome this issue (Fazil, 2023). The linkage between Sensory processing and Attention is crucial to perform any task appropriately. Attention is essential in performing sensory tasks appropriately (Schaaf and Davies, 2010) and the existence of Sensory issues may adversely affect attention abilities (Miller, 2012).

The correlation Coefficient (r) value between Tactile processing dysfunction and Attention is reported as -.611 which shows a moderate negative association between these two variables. Piller, et al. (2018) also discussed the negative effects of tactile sensitivity on Attention. The correlation Coefficient (r) value between Auditory processing dysfunction and Attention is reported as -.773 which shows a high negative association between auditory issues and Attention. Sanz-Cervera, (2017) also discussed auditory distraction as one of the biggest hallmarks of attention. The correlation Coefficient (r) value between Visual processing dysfunction and Attention is reported as -.619 showing a moderate negative association between visual dysfunction and Attention. The results suggest an environment with fewer distractions, dim lights, and removed clutters (Hanley, 2017). The correlation Coefficient (r) value between Vestibular and proprioceptive processing dysfunction and Attention is reported as -.600 which shows a moderate negative association between these two variables. The correlation Coefficient (r) value between Oral processing dysfunction and Attention is reported as -.790 which shows a very high negative association between these two variables. Such situations demand targeted interventions for improved learning and active participation (Jacob, 2018).

Conclusion

The study results concluded that sensory issues and attention are negatively correlated. Different domains were reported to affect attention at different levels. Oral processing dysfunction was reported highest in the context of negative correlation with attention. Auditory distractors were reported as having the second-highest negative relationship with Attention. Visual, Tactile, vestibular, and Olfactory were also reported respectively negatively correlated with Attention. However, it can be concluded that the presence of one variable will always affect the other variable negatively. An increase in sensory scores will cause a decrease in attention scores.

Recommendations

Children's sensory issues need to be addressed to Increase the child's ability to learn. Individualized intervention strategies utilized with consistency can overcome sensory issues and increase the attention of the child in the presence of sensory stimuli. Children's increased attention is crucial for learning and adaptability.

Children's classrooms need to be modified as per sensory demands. A room with minimized sensory distractions reduced bright lights, and movement breaks can be useful for overcoming sensory overstimulation.

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