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Parental Perceptions of Sensory Avoidance and Sleep Disturbances among Autistic Children in Lahore: A Cross-sectional Study

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ABSTRACT

As literature shows, children with autism often experience sensory processing difficulties and sleep disturbances. **Objectives:** To determine parent-reported sensory avoidance behaviours and sleep habits in school-aged children with autism spectrum disorder in Lahore. **Methods:** This observational cross-sectional study was conducted on 249 autistic children. Outcome measures of this study were the prevalence of sensory avoidance behaviours and sleep habits. The standardized tools were the Short Sensory Profile (SSP) and the Children's Sleep Habits Questionnaire (CSHQ) to assess the sensory avoidance behaviours and sleep problems. Data were gathered by using SSP and CSHQ. Data were analyzed by using SPSS-27. **Results:** 38% were aged 3-7 years, and 61% were aged 8–12 years. Parent reports showed that 17% of children exhibited probable differences and 53% exhibited significant differences in tactile sensory avoidance behaviours. Movement sensitivity issues were definite in 54% and probable in 30% of children. Regarding auditory sensory avoidance, 55% showed significant changes, and 1% showed probable changes. For under-responsive behaviour. For visual and auditory sensory behaviours, only 44% showed typical performance. Overall, 74% of children demonstrated definite sensory avoidance behaviours across multiple domains, while 8% showed some level of sensory avoidance. Additionally, 20% did not display low energy behaviours. Regarding sleep habits, 16% had typical sleep patterns, 3% faced sleep issues at a minimum level, 22% faced sleep issues at an intermediate level, and the remaining 57% faced sleep issues at a severe level. A p-value was >0.05. Significant association between sensory avoidance behaviour and sleep habits. **Conclusion:** Sensory avoidance behaviour had a significant association with sleep habits.

INTRODUCTION

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition characterized by deficits in social interaction, communication, and repetitive behaviours [1]. Globally, its prevalence has risen significantly over the past two decades, although regional estimates vary. The global prevalence of autism spectrum disorder (ASD) remained uncertain, with studies reporting significant variations across different regions. In low-income countries, underdiagnosis was prevalent due to limited access to assessment tools. Autism, originally coined to describe the self-isolating tendencies in individuals with schizophrenia, was later redefined in the 1940s by psychiatrists Leo Kanner and Hans Asperger. They characterized it as a distinct syndrome in children, marked by atypical social interaction, communication challenges, and repetitive behaviours. In contemporary discourse, the term Autism encompasses a diverse variety of neurological issues, unified by shared clinical features such as speech impairments, social difficulties, and restricted or repetitive behavioural patterns [1, 2]. Autism, along with other neurodevelopmental disorders, had been recognized as possessing a substantial genetic foundation; however, it had also been posited that environmental influences contributed meaningfully to its aetiology. Gene expression

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in autism has varied due to copy number variations and exposure to environmental toxins [3-5]. Some cases of autism have been linked to spontaneous genetic mutations [6]. These mutations had affected neuron movement, axon direction, and the formation of synapses. Structural genetic changes were found more frequently in autistic children than in typically developing peers [7, 8]. A specific gene mutation, CHD8, had been associated with autism and was linked to physical traits such as an enlarged head and widely spaced eyes [3]. Autism Spectrum Disorder (ASD) usually develops in early life, where the issue is diagnosed as early as three years old. The initial symptoms included such signs as a poor reaction to the name and uneasiness with eye contact [9-11]. Though most social and cognitive challenges were carried down into adulthood, communication skills may prove to change with time, especially during adolescent years. Intelligence and IQ are known to be rather fixed. Nevertheless, the quality of life may improve greatly with the help of effective social support systems, interventions, and accommodations [12, 13]. Data from 2020 indicated that Hong Kong, South Korea, the United States, Japan, and Ireland had the highest recorded rates, with Hong Kong reporting 372 cases per 10,000 children [5]. The growing incidence of autism spectrum disorder (ASD) could have been explained by the fact that there are increasing environmental risk factors that are likely to increase during the prenatal period, including exposure to air pollution, advanced age of a father, and maternal use of psychotropic drugs. Though there has been a critical influence of genetic predisposition, which influences ASD, environmental factors are believed to be major contributors to the development of ASD. They may be causing the increase of ASD if the environmental factors emerged more and more strongly with the progress of time [6]. Difficulties in sensory processing are also common to a great proportion of children with ASD [14]. Sensory processing in the clinical practice was the increased sensitivity to external stimuli, sounds, lights or odors [15]. The idea of sensory integration was pioneered and explained how people perceived, processed and used rudiments of sense [16]. Researcher contribution is the basis of therapeutic approaches to working on sensory input/awareness, self-management, motor performance, and praxis. Winnie Dunn devised this model in 1997 and divided the responses into the model of sensory processing; this was dependent on the neurological threshold and behavioural response. There are neurological thresholds: lower (having a high degree of reactivity to low stimulation) and generally higher. Depending on the behavioural response, thresholds work against or with one another, resulting in four sensory processing patterns being low registration, sensory seeking, sensory sensitivity, and sensory avoiding [7]. Sensory integration dysfunction (SID) is a disorder of communication, social interaction that is built on incorrect behavioural patterns. It elevates due to poor neural transmission between the sensory receptors, afferent systems, and other subcortical components, causing inadequacies in the reception of those stimuli, processing, and modulation of the stimulus. SID occurred as hypersensitivity, with even low stimuli provoking the inappropriate responses or hyposensitivity, requiring high stimuli to arouse neural responses. The malfunction traverses in tactile, vestibular, proprioceptive, auditory, visual, gustatory and olfactory systems that affect motor coordination, emotional steadiness and mental development [8]. Sleep disturbance is yet another of the commonly co-morbid challenges in autistic children. Instead, it has been found that sleep problems, including bedtime resistance, delayed sleep onset, and night awakenings, are very common in ASD, with more than 50% [9].

This study aims to investigate parental perceptions of sensory avoidance and sleep habits among school-aged children with autism spectrum disorder (ASD) in Lahore. Disrupted sleep exacerbated the cognitive decline in these children, further hindering their developmental progress. The findings provided valuable insights for occupational physiotherapists in formulating targeted sensory integration strategies to mitigate sensory avoidance behaviours. Implementing such interventions not only enhanced the well-being of autistic children but also served as a crucial alleviating factor for parental distress.

METHODS

This study followed a cross-sectional, descriptive design with correlational analysis and was conducted over a period of four months (January 2025 to Apr 2025) in private autistic centers located in Lahore, Pakistan. When a prevalence (p) of 73% was assumed (based on the previous literature), with a confidence level (Z) of 95% (Z=1.96) and a margin of error (d) of 5% (d=0.05), the sample size approximately equaled 303. Based on practical limitations and scarcity of resources, a sample size of 249 participants was recruited, which was considered satisfactory to address the descriptive and correlational aims of the study [17]. In this study, a selected sample of 249 participants from the total population was used for the collection of data from private autistic centers of Lahore. The study followed the ethical guidelines and ethical approval was taken. Non-probability sampling technique was used for this purpose. The outcomes of this study were assessing sensory

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avoidance and sleep habits using standardized tools: The Short Sensory Profile (SSP) and the Children's Sleep Habits Questionnaire (CSHQ). Both are validated tools commonly used in neurodevelopmental research. To assess the internal consistency of the tools in the present sample, Cronbach's alpha was calculated. The SSP showed a Cronbach's alpha of 0.89, while the CSHQ yielded a Cronbach's alpha of 0.83, indicating good reliability in this population. Children aged 3–12 years with Autism Spectrum Disorder (ASD), diagnosed according to DSM-5 criteria by a licensed clinician, were included in the study. Primary caregivers were involved in the child's care and provided detailed reports of the child's sensory and sleep behaviours. Children were excluded if they had a primary diagnosis of another developmental disorder, such as intellectual disability or a genetic syndrome, which might affect sensory or sleep patterns. Children on sedative medications, with severe medical or neurological conditions, or with co-existing psychiatric disorders were excluded. Single parents with more than one disabled child, or parents not residing in the same household as the child, were also excluded. Data were analyzed using SPSS version 27.0. Categorical variables were described as absolute frequencies (n) and relative frequencies (%), while continuous variables were expressed as mean ± standard deviation for parametric distributions or as median and percentiles for non-parametric distributions. The Chi-square test was used to assess associations between categorical variables. Pearson's or Spearman's correlation coefficients were applied, as appropriate, to examine relationships between continuous variables. A p-value of less than 0.05 was considered statistically significant.

RESULTS

This study comprised 249 autistic children. Out of them, 96 autistic children (38.5%) were in the age range of 3-7 years old, and 153 autistic children (61.4%) belonged to the 8 years to 12 years' age group. The average coded age value was 1.61+/-0.49 (Table 1).

Table 1: Descriptive Statistics for Age and Gender Distribution of Autistic Children (n=249)

Variables	Descriptive Statistics
Mean	1.6145
Standard Deviation	0.48770
Minimum value	1.0
Maximum Value	2.0
Total	249

The gender ratio included 123 boys (49.40%), 126 girls (50.60%) (Figure 1).

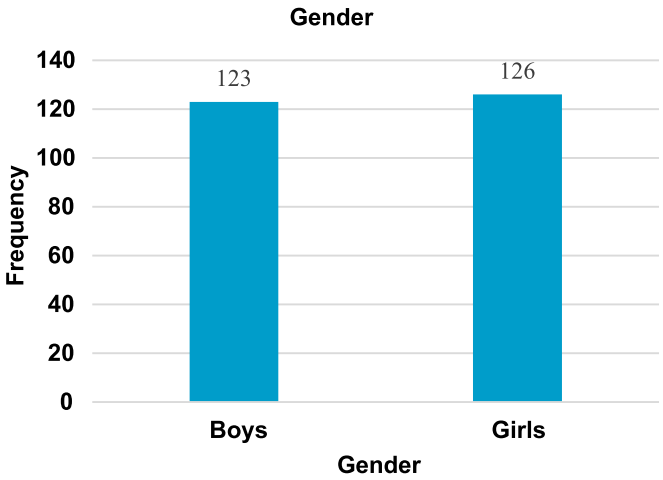

Figure 1: Gender Distribution of Autistic Children Showing 123 Were Boys and 126 Were Girls

Sensory avoidance behaviour was assessed using the Short Sensory Profile (SSP). 41 children showed typical performance, 22 subjects had shown some issues in sensory avoidance behaviours processing, and the remaining 1866 had shown significant differences in sensory avoidance behaviours processing (Table 2).

Table 2: Frequency of Sensory Avoidance Behaviours Assessed by Short Sensory Profile

Sensory Avoidance Behaviours	Frequency (%)
Typical Performance	41 (16.41%)
Probable Difference	22 (8.84%)
Significant Difference	186 (74.70%)
Total	249 (100%)

Sleep patterns were evaluated using the Children's Sleep Habits Questionnaire (CSHQ). Results showed that 42 children (16.9%) had typical sleep habits, 8 (3.2%) had mild sleep problems, 55 (22.1%) had moderate sleep problems, and 144 (57.8%) experienced severe sleep disturbances (Table 3).

Table 3: Distribution of Sleep Habits among Autistic Children

Sleep Habits	Frequency (%)
Typical Sleep Habits	42 (16.87%)
Mild Sleep Problems	8 (3.21%)
Moderate Sleep Problems	55 (22.09%)
Severe Sleep Problems	144 (57.83%)
Total	249 (100%)

A Chi-square test showed a significant association between age group and sensory avoidance behaviour (χ^2 = 9.22, df=2, p=0.010). However, no significant association was found between gender and sensory avoidance (χ^2 = 0.78, df=2, p=0.675). There was a statistically significant association between sensory avoidance behaviours and sleep disturbances (χ^2 = 15.62, df=6, p=0.016), indicating that children with greater sensory avoidance had more

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severe sleep issues (Table 4).

Table 4: Chi-Square Test Showing Association Between Sensory Avoidance, Age, Gender, And Sleep Habits

Variable Pair	χ^2 Value	df	p-Value	Interpretation
Age Group × Sensory Avoidance	9.22	2	0.010	Significant
Gender × Sensory Avoidance	0.78	2	0.675	Not Significant
Sensory Avoidance × Sleep Habits	15.62	6	0.016	Significant

DISCUSSION

Autism Spectrum Disorder (ASD) typically manifests during early childhood, with formal diagnoses frequently established by the age of three. Early indicators often comprised reduced responsiveness to auditory cues, such as one's name being called, and a pronounced aversion to maintaining eye contact [18, 19]. Although difficulties in social interaction and cognitive functioning generally persisted into adulthood, communicative abilities often showed improvement over time, particularly during adolescence [20, 21]. Cognitive aptitude, including intelligence quotient (IQ), tended to remain stable throughout the lifespan [22]. Nevertheless, the overall quality of life for individuals with ASD was markedly enhanced through the implementation of robust social support systems, tailored therapeutic interventions, and context-specific accommodations [23]. This observational study included children between the ages of 3 and 12 years who had autism spectrum disorder. Information was collected from their parents. According to parent reports, 17% of the children showed possible differences, and 53% showed clear differences in how they avoided touch. For taste and smell, 32% had clear differences and 12% had possible differences. Problems with movement sensitivity were definite in 54% of the children and possible in 30%. When it came to avoiding sounds, 55% showed clear signs and 1% showed possible signs. For under-responsiveness (less reaction to sensory input), 48% showed definite signs and 1% showed possible signs. Only 44% of the children showed normal behaviour in both seeing and hearing responses. Overall, 74% of the children had definite sensory avoidance in more than one area, and 8% had some level of sensory avoidance. Also, 20% of the children did not show signs of low energy behaviours. Olson, investigating the school-aged children with autism, found links between one-carbon metabolism (OCM) nutrients and sensory processing patterns, revealing significant associations between intake of vitamins B1, B12, and choline with specific sensory domains [24]. In contrast, the present study focused on parent-reported sensory avoidance behaviours and sleep habits without assessing nutritional factors. While the earlier research highlighted biological influences on sensory responses, our findings emphasized the behavioural manifestations of sensory avoidance across multiple domains, along with a notable association with sleep difficulties. Both studies underscore the complexity of sensory processing in autism, though from different perspectives biochemical versus behavioural. These differences suggest a need for integrative approaches in future research to better understand the interplay between diet, sensory behaviours, and overall well-being in autistic children. Aljaid examined sleep habits among autistic children under 15 years and found significant differences compared to typically developing peers, including shorter sleep duration, earlier bedtimes, and higher rates of sleep disturbances such as snoring and morning headaches [25]. Similarly, the present study revealed that a large proportion (57%) of autistic children experienced severe sleep problems, with only 16% displaying typical sleep patterns. Gulati reported that 77.5% of children with ASD were poor sleepers, supported by objective polysomnographic findings showing reduced sleep efficiency and altered sleep architecture [26].

CONCLUSIONS

It was concluded that sensory avoidance behaviour had a significant association with sleep habits. Early sensory integration therapies are recommended as they be employed in therapy programs in order to enhance sleep among the autistic children. Furthermore, education and training programs oriented to parents should be developed to control sensory challenges at home.

Authors Contribution

Conceptualization: EN
Methodology: ML, ST
Formal analysis: EN
Writing review and editing: EN, MJ, TA

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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