ISSN: 2663-2187

https://doi.org/10.48047/AFJBS.6.16.2024.1126-1147

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

Sleep Irregularities and Associated Factors in Children with Autism Spectrum Disorder at Special Education Departments of Lahore, Pakistan

Mehak Razzaq[1], Najm Al-Dain Al-Sameeai, Asra khan[3], Romana Altaf[4], Zafar Ahmad khan[5], Nazish Idrees Chaudhary[6*], Maria Amir[7]

[1] Student, Institute of Public Health, The university of Lahore. Pakistan.
[2] Student, I.M Sechenov University Moscow, Russia.
[3] Department of emerging allied health technologies, The University of Lahore, Pakistan.
[4] Assistant consultant, Paeds Medicine, Capital diagnostic Centre, Islamabad, Pakistan.
[5] Associate Professor Medicine, Bolan Medical College, Quetta, Pakistan.
[6] Assistant professor of clinical psychology, Lahore School of Behavioral Sciences, The University of Lahore. Pakistan. [7] Chief Executive Officer (CEO), OOTIEN (Private). Limited

Corresponding author
*** Nazish Idrees Chaudhary,** Assistant professor of clinical psychology, Lahore School of Behavioral Sciences, The University of Lahore. Pakistan
Email: nazish.idrees@lsbs.uol.edu.pk

Volume 6, Issue 16, Dec 2024

Received: 15 Oct 2024

Accepted: 25 Nov 2024

Published: 09 Dec 2024

doi: 10.48047/AFJBS.6.16.2024.1126-1147

ABSTRACT

Background: Sleep disturbances in children with autism spectrum disorder (ASD) are a significant concern, impacting their development and quality of life. Understanding these disturbances in diverse cultural contexts is essential for effective management and intervention. ***Objective:*** This study aimed to investigate the frequency and factors associated with sleep irregularities in children with ASD attending special education departments in Lahore, Pakistan. ***Methodology:*** A cross-sectional approach was employed, involving children diagnosed with ASD. Data on sleep disturbances, demographic details, family dynamics, parental education, and occupation were gathered through structured questionnaires. Statistical analyses, including Pearson Chi-Square was performed by using software package for social sciences 26.0 to identify significant associations. ***Results:*** In a study of 110 ASD children, 68.2% were male, with 66.3% diagnosed at 3-4 years. Treatment breakdown: 47.3% under-treatment, 33.6% not treated. Fathers were primary caretakers in 42.7% of cases. Socioeconomic status: 82.7% middle class. Sleep disturbances showed 33.7% severe sleep disorders in females and 66.3% severe issues in males. No significant gender difference in sleep disturbances was noted. Treatment type was significantly linked to sleep disturbance severity (p 0.015). A comorbidity, ADHD, was strongly associated with sleep disorders ($p < 0.05$). No significant associations were observed between electronic devices, gadget use duration, co-sleeping arrangements, and sleep disorders ($p < 0.05$). The SDSC revealed significant differences in sleep disturbances, particularly in sleep-wake transition and excessive somnolence disorders, across autism severities ($p < 0.05$). ***Conclusion:*** The study highlights the multifaceted nature of sleep disturbances in children with ASD, influenced by gender, autism severity, treatment type, and parental factors. These findings emphasize the need for comprehensive, context-specific approaches in managing and understanding sleep disorders in ASD.

Keywords: Autism Spectrum Disorder, Sleep Disturbances, Children, Lahore, Pakistan, Special Education, Parental Influence.

INTRODUCTION

Approximately four out of every five children with autism spectrum disorder (ASD) face chronic sleep disturbances, significantly impacting their overall well-being and daily functioning. ASD is a neurodevelopmental condition characterized by genetic and cognitive impairments, with hallmark behavioral features including reduced social interaction, impaired communication, and repetitive, stereotyped behavior patterns [1]. These challenges underscore the importance of understanding and addressing the unique needs of individuals with ASD.

Historical Perspective

Awareness of autism, a rapidly expanding pediatric condition, has increased globally in recent decades [2]. Sleep disorders are notably prevalent among individuals with ASD, with an estimated 1 in 54 children in the United States affected by this condition as of 2020 [3]. Similarly, in China, the prevalence of autism rose from 0.35% in 2018 to 0.7% in 2020 [4]. The Centers for Disease Control and Prevention (CDC) reports that autism prevalence varies globally, with rates ranging from 0.14% to 2.9% in Arab countries and averaging 3.9% across Asia. In North America, prevalence rates range between 0.87% and 1.14%, compared to 0.11% to 1.5% in the Middle East and 0.42% to 3.13% in Europe [5]. In Pakistan, the Autism Association estimates that approximately 350,000 children are diagnosed with ASD. Increased awareness has led to earlier diagnoses, with rates climbing from 2.4% to 5.3%, indicating a significant rise in the disorder's impact on children [6].

Sleep disturbances are among the most prevalent challenges faced by children with ASD, affecting their behavior, cognitive function, and overall health. These disruptions include difficulties falling asleep, frequent nocturnal awakenings, and early morning awakenings, leading to sleep deprivation and exacerbation of core ASD symptoms such as impaired social and communication skills [7]. Parents often report persistent sleep difficulties throughout the developmental stages of their children with ASD. These include hyperactivity, self-harming behaviors, and delays in adaptive skill development. Such challenges not only affect the child’s quality of life but also diminish the effectiveness of therapeutic interventions [8]. Research indicates that the prevalence of sleep issues in children with ASD ranges from 40% to 83%, compared to 9% to 50% in neurotypical children [9]. Males are diagnosed with ASD at a significantly higher rate than females (4:1), with common issues including nighttime awakenings, daytime fatigue, reduced sleep duration, and resistance to bedtime routines [10].

Study Gap between of previous studies

- Heterogeneity of ASD Population: The wide variability in symptoms and severity among individuals with ASD complicates efforts to draw universal conclusions [11].

- Measurement Challenges: Reliance on subjective parent or caregiver reports introduces potential biases, despite the availability of objective methods such as actigraphy and polysomnography [12].
- Comorbid Conditions: The frequent presence of comorbidities like ADHD or anxiety makes it challenging to isolate the effects of ASD on sleep patterns [13].
- Confounding Variables: Factors such as medication use, sensory sensitivities, and co-sleeping arrangements complicate the analysis of sleep disturbances [14].

Rationale

Addressing sleep disturbances in children with ASD is critical for improving their quality of life and reducing caregiver stress. However, limited research, particularly in settings such as the Special Education Department of Lahore, hampers the development of effective interventions. Understanding the underlying factors contributing to sleep disturbances can guide the formulation of targeted strategies to enhance sleep and overall functioning in children with ASD. By prioritizing this area of study, it is possible to alleviate the burden on families and promote better outcomes for affected individuals [15].

OBJECTIVES

- To find out frequency of sleep irregularities in children with autism spectrum disorder at Special Education Departments in Lahore, Pakistan.
- To determine the correlation between sleep irregularities and socio-economic determinants among individuals diagnosed with autism spectrum disorder (ASD) enrolled in Special Education Departments in Lahore, Pakistan.

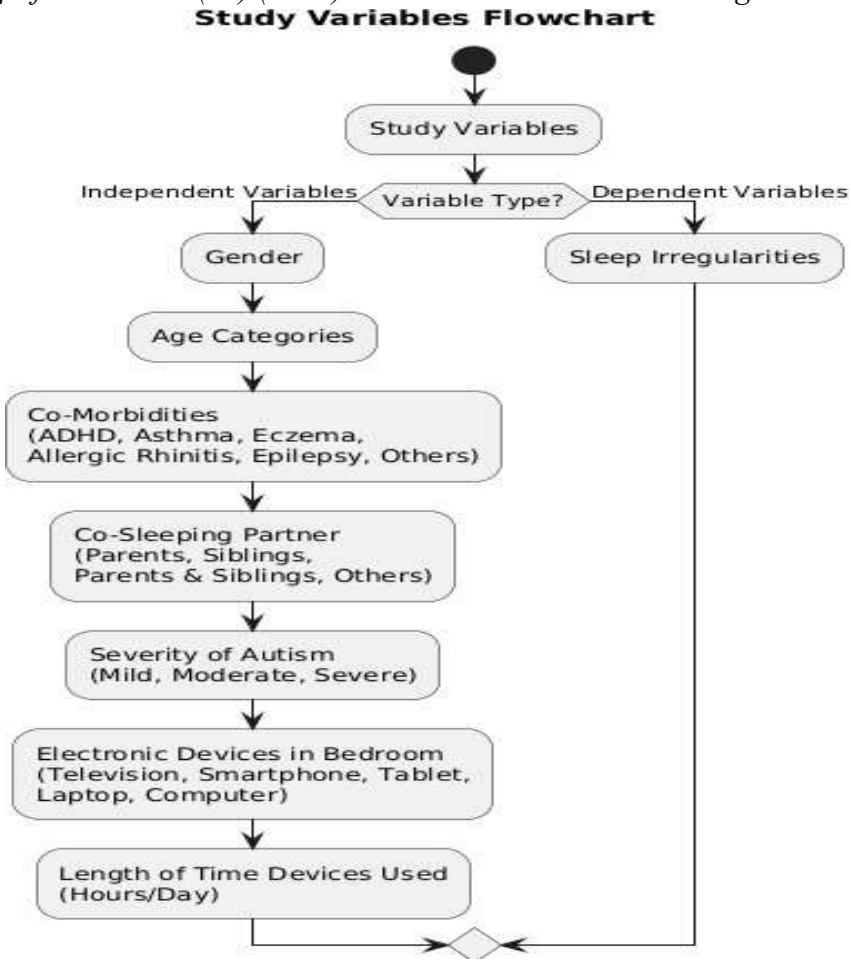

Fig: 1 Frame work Study variables (independent and dependent variable)

METHODOLOGY

This study was conducted across various Special Education Departments in Lahore, Pakistan, including the Govt. Shadab Training Institute of Special Education, Govt. Special Education Center at Nishtar Town Campus, Fukuoka School for Special Children, Love & Care Autism Center, and the Pakistan Institute of Autism. The research adopted an analytical cross-sectional design to investigate the prevalence and associated factors of sleep disturbances in children diagnosed with autism spectrum disorder (ASD). The study was carried out over nine months, following the approval of the research synopsis.

A non-probability purposive sampling technique was used to recruit participants, ensuring that the selected sample was aligned with the study's objectives. The sample size, determined using prior research as a reference, (Koo, H. W., S. Z. 2021) was calculated to include 110 participants to achieve a statistical power of 99% at a significance level of 0.05.

Participants were selected based on specific inclusion and exclusion criteria. The inclusion criteria required children aged 3–12 years who had been diagnosed with ASD by qualified healthcare professionals, were enrolled in Special Education Departments in Lahore, and whose guardians or parents provided informed consent. Children with other developmental or neurological conditions, those outside the age range, or those whose guardians declined to provide consent were excluded from the study.

To collect data, the Sleep Disturbance Scale for Children (SDSC) was used, a validated tool designed to assess various sleep-related problems in children. The five part Likert questionnaire was administered to the parents or caregivers of the children to ensure accurate reporting of the participants' sleep patterns and challenges.

Ethical approval for the study was obtained from the Institutional Review Board (IRB) of the University of Lahore, and permission was granted by the respective educational institutions. Participants were fully briefed on the study objectives, and written informed consent was secured from all guardians. The privacy and confidentiality of participants were strictly maintained, with data securely stored and accessible only to authorized personnel.

The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 26.0. Frequency tables were generated for categorical variables, while means and standard deviations were calculated for continuous data. The Pearson Chi-Square test was used to identify associations between sleep irregularities and various factors, with a p-value of less than 0.05 considered statistically significant.

FINDINGS:

The study investigating sleep disturbances among children with autism spectrum disorder (ASD) in Lahore, Pakistan, provided critical insights into the prevalence and associated factors influencing these disturbances.

Gender and Age Distribution

Sleep disturbances were observed more frequently in males (75 cases, 68.2%) than females (35 cases, 31.8%). However, statistical analysis indicated no significant gender-based differences in the severity of sleep disturbances ($p > 0.5$). The prevalence of sleep disturbances varied across different age groups, with the highest occurrence in children diagnosed at 3–4 years (73 cases, 66.4%), followed by 5–6 years (29 cases, 26.4%) and 7–8 years (8 cases, 7.3%). Despite these variations, no significant association was found between the age of diagnosis and sleep disturbance severity ($p > 0.6$).

Treatment Type and Sleep Disturbances

The distribution of sleep disturbances based on treatment type revealed a significant association with severity ($p < 0.05$). Among the participants, 52 cases (47.3%) were categorized as "Under-Treatment," 21 cases (19.1%) as "Treated," and 37 cases (33.6%) as "Not Treated." This finding underscores the influence of treatment on the severity of sleep problems in children with ASD.

Representation and Marital Background

A significant correlation was observed between the primary caregiver (representor) and sleep disturbance severity ($p < 0.05$). Representors were distributed as Father (47 cases, 42.7%), Mother (22 cases, 20.0%), and Both Parents (41 cases, 37.3%). Regarding marital background, 45 cases (40.9%) involved blood-related marriages and 65 cases (59.1%) involved non-blood-related marriages. However, no significant differences in sleep disturbances were found based on marital background ($p > 0.2$).

Socioeconomic and Family Structure

The study examined socioeconomic status, revealing that most participants belonged to the middle class (91 cases, 82.7%), followed by the upper class (10 cases, 9.1%) and lower class (9 cases, 8.2%). No significant association was found between socioeconomic status and sleep disturbance severity ($p > 0.5$). Similarly, family structure, whether nuclear (58 cases, 52.7%) or joint (52 cases, 47.3%), showed no significant relationship with sleep disturbances ($p > 0.5$).

Parental Factors and Sleep Disturbances

Parental education demonstrated a significant association with sleep disturbance severity ($p < 0.01$). Additionally, parents' occupations were significantly correlated with the severity of sleep disturbances ($p < 0.05$), with varying distributions among employed, unemployed, and self-employed parents.

Autism Severity and Comorbidities

Sleep disturbances were distributed according to autism severity: mild (65 cases, 59.1%), moderate (37 cases, 33.6%), and severe (8 cases, 7.3%). Statistical analysis suggested a potential correlation between autism severity and sleep disturbance severity, with p-values approaching significance (close to 0.05). Comorbid conditions, including ADHD, asthma, eczema, allergic rhinitis, and epilepsy, exhibited a strong association with sleep disturbance severity ($p < 0.01$).

Electronic Devices and Co-Sleeping Arrangements

The presence of electronic devices such as televisions, computers, laptops, smartphones, and tablets in children's bedrooms was analyzed, but no significant correlation with sleep disturbance severity was observed ($p > 0.3$). Similarly, the length of gadget use did not show a significant association ($p > 0.7$). Co-sleeping arrangements, whether with parents, siblings, grandparents, or caregivers, also demonstrated no significant relationship with sleep disturbance severity ($p > 0.2$).

Significance of Findings

Statistical significance values emphasized critical relationships in the study. For instance, the association between treatment type and sleep disturbance severity ($p = 0.015$) highlighted that treatment status significantly influenced sleep problems. Additionally, comorbid conditions like ADHD ($p < 0.05$) were strongly linked to increased sleep disturbances, indicating that ASD children with ADHD were more prone to sleep issues. Conversely, factors such as electronic devices, gadget usage duration, and co-sleeping arrangements did not significantly impact sleep

disturbances ($p > 0.05$). The study findings underscore the complex interplay of factors influencing sleep disturbances in children with ASD. Key variables such as treatment type, autism severity, comorbidities, parental education, and occupation significantly contributed to sleep problems. In contrast, other factors like socioeconomic status, family structure, electronic device use, and co-sleeping arrangements showed no statistically significant associations. These results provide valuable insights for targeted interventions and support strategies to improve the quality of life for children with ASD and their families.

Table 1: Socio-demographic representation

Socio-demographic Characteristics			
Category	**Frequency**	**Percent%**	**P Value**
Gender			
Male	75	68.2	0.728
Female	35	31.8	
Diagnosis Age of Autism			
3-4 Years	73	66.4	
5-6 Years	29	26.4	0.529
7-8 Years	8	7.3	
Treatment			
Under-Treatment	52	47.3	
Treated	21	19.1	0.589
Not treated	37	33.6	
Representor			
Father	47	42.7	
Mother	22	20.0	0.825
Both	41	37.3	
Marriage			
Blood Relation	45	40.9	0.426
Non-Blood Relation	65	59.1	
Marital Status			
Single Parent	3	2.7	
Divorced	1	0.9	0.266
Married	106	96.4	
Socioeconomic Status			
Lower Class	9	8.2	
Middle Class	91	82.7	0.416
Upper Class	10	9.1	
Family Type			
Nuclear	58	52.7	0.746
Joint Family	52	47.3	

Qualification			
Primary	21	19.1	
Secondary	30 35	27.3	0.396
Graduation		31.8	
Post-Graduation	24	21.8	
Occupation			
Employed	78	70.9	
Unemployed	16	14.5	0.408
Businessman	16	14.5	
Income			
20-30K	13	11.8	0.703
40-50K	16	14.5	
>60K	30	27.3	
Others	51	46.4	
Severity of Autism			
Mild	65	59.1	
Moderate	37	33.6	~
Severe	8	7.3	

The table 1 shows the socio-demographic characteristics as Gender-wise, 68.2% of cases are male (75 individuals), and 31.8% are female (35 individuals). In terms of age at diagnosis, 66.4% were diagnosed between 3-4 years (73 individuals), 26.4% at 5-6 years (29 individuals), and 7.3% at 7-8 years (8 individuals). Regarding treatment, 47.3% were under-treatment (52 individuals), 19.1% treated (21 individuals), and 33.6% received no treatment (37 individuals). Parental representation shows 42.7% by fathers (47 individuals), 20.0% by mothers (22 individuals), and 37.3% by both (41 individuals). In terms of marriage, 40.9% had blood relation (45 individuals), and 59.1% had non-blood relation (65 individuals). For marital status, 96.4% were from married families (106 individuals). Socioeconomic status is divided into lower (8.2%, 9 individuals), middle (82.7%, 91 individuals), and upper classes (9.1%, 10 individuals). Family types are nuclear (52.7%, 58 individuals) and joint (47.3%, 52 individuals). Qualification levels range from primary (19.1%, 21 individuals) to post-graduation (21.8%, 24 individuals). Occupation-wise, 70.9% are employed (78 individuals). Income levels and severity of autism are also detailed, with a notable finding that comorbidities have a significant odds ratio of 0.269 (P-value 0.006).

Table 02: Sleep disturbance Classification by Gender of child

Gender	Normal [%]	Sleep Disorder frequency	Total	P Value
Male	20 (74.1%)	55 (66.3%)	75 (68.2%)	
Female	7 (25.9%)	28 (33.7%)	35 (31.8%)	0.449
Total	**27 (100.0%)**	**83 (100.0%)**	**110 (100.0%)**	

In the study, males constituted a larger proportion of the ASD children with sleep disorders, with 75 (68.2%) males, of which 20 (74.1%) had normal sleep patterns and 55 (66.3%) experienced sleep disorders. In contrast, of the 35 (31.8%) females, 7 (25.9%) were normal and 28 (33.7%) had sleep disorders. However, the statistical analysis yielded a P Value of 0.449, indicating no significant gender-based differences in sleep disorders.

Table 03: Sleep disturbance classification with diagnosis age of autism

Diagnosis Age of Autism	Normal [%]	Sleep Disorder frequency	Total	P Value
3-4 Years	20 (74.1%)	53 (63.9%)	73 (66.4%)	
5-6 Years	6 (22.2%) 1	23 (27.7%) 7	29 (26.4%)	0.554
7-8 Years	(3.7%)	(8.4%)	8 (7.3%)	
Total	**27 (100.0%)**	**83 (100.0%)**	**110 (100.0%)**	

Among the different age groups at diagnosis, the 3-4 years group had 73 (66.4%) children, with 20 (74.1%) normal and 53 (63.9%) having sleep disorders. The 5-6 years group included 29 (26.4%) children, 6 (22.2%) normal and 23 (27.7%) with sleep disorders. The 7-8 years group had 8 (7.3%) children, with 1 (3.7%) normal and 7 (8.4%) with sleep disorders. The P Value of 0.554 suggests no significant association between age at diagnosis and sleep disorders.

Table 04: Sleep Disturbance Classification by Treatment Type

Treatment	Normal (Count [%])	Sleep Disorder frequency	Total	P Value
Under-Treatment	10 (37.0%)	42 (50.6%)	52 (47.3%)	
Treated Not	2 (7.4%)	19 (22.9%)	21 (19.1%)	0.015
Treated	15 (55.6%)	22 (26.5%)	37 (33.6%)	
Total	**27 (100.0%)**	**83 (100.0%)**	**110 (100.0%)**	

In terms of treatment, 52 (47.3%) children were under treatment, with 10 (37.0%) normal and 42 (50.6%) having sleep disorders. 21 (19.1%) were treated, with 2 (7.4%) normal and 19 (22.9%) having sleep disorders. For those under intervention, there were 37 (33.6%) children, with 15 (55.6%) normal and 22 (26.5%) having sleep disorders. The P Value of 0.015 indicates a significant association between treatment type and sleep disorders.

Table 05: Sleep Disturbance Classification by Marriage Type

Marriage	Normal (Count [%])	Sleep Disorder frequency	Total	P Value
Blood Relation	8 (29.6%)	37 (44.6%)	45 (40.9%)	
Non-Blood Relation	19 (70.4%)	46 (55.4%)	65 (59.1%)	0.170
Total	**27 (100.0%)**	**83 (100.0%)**	**110 (100.0%)**	

In terms of parents' marital status, 45 (40.9%) children were from blood-related marriages, with 8 (29.6%) normal and 37 (44.6%) having sleep disorders. Non-blood-related marriages accounted for 65 (59.1%) children, with 19 (70.4%) normal and 46 (55.4%) having sleep disorders. The P Value of 0.170 indicates no significant difference based on marriage type.

Table 06: Sleep Disturbance Classification by Parents Qualification

Qualification	Normal (Count [%])	Sleep Disorder frequency	Total	P Value
Primary Secondary	8 (29.6%) 2 (7.4%)	13 (15.7%) 28 (33.7%)	21 (19.1%) 30 (27.3%)	0.010
Graduation	7 (25.9%)	28 (33.7%)	35 (31.8%)	
Post-Graduation	10 (37.0%)	14 (16.9%)	24 (21.8%)	
Total	**27 (100.0%)**	**83 (100.0%)**	**110 (100.0%)**	

Regarding parental qualification, primary education parents had 21 (19.1%) children with Sleep Disorder Classification by Occupation 8 (29.6%) normal and 13 (15.7%) with sleep disorders.
Secondary education parents had 30 (27.3%) children, with 2 (7.4%) normal and 28 (33.7%) experiencing sleep disorders. For parents with graduation, there were 35 (31.8%) children, with 7 (25.9%) normal and 28 (33.7%) with sleep disorders. Postgraduates had 24 (21.8%) children, with 10 (37.0%) normal and 14 (16.9%) having sleep disorders. The P Value of 0.010 indicates a significant association between parental qualification and sleep disorders.

Table 07: Sleep Disturbance Classification by Parents Occupation

Occupation	Normal (Count [%])	Sleep Disorder frequency	Total	P Value
Employed	15 (55.6%)	63 (75.9%)	78 (70.9%)	
Unemployed	4 (14.8%)	12 (14.5%)	16 (14.5%)	0.034
Businessman	8 (29.6%)	8 (9.6%)	16 (14.5%)	
Total	**27 (100.0%)**	**83 (100.0%)**	**110 (100.0%)**	

Looking at parents' occupation, among the employed, there were 78 (70.9%) children, with 15 (55.6%) normal and 63 (75.9%) with sleep disorders. Unemployed parents had 16 (14.5%) children, with 4 (14.8%) normal and 12 (14.5%) experiencing sleep disorders. Businessmen parents accounted for 16 (14.5%) children, with 8 (29.6%) normal and 8 (9.6%) with sleep disorders. The P Value of 0.034 suggests a significant relationship between parents' occupation and sleep disorders.

Table 08: Sleep Disturbance Classification by Severity of Autism

Severity of Autism	Normal (Count, %)	Sleep Disorder frequency	Total	P-Value
Mild	19 (70.4%)	46 (55.4%)	65 (59.1%)	
Moderate	8 (29.6%)	29 (34.9%)	37 (33.6%) 8	0.170
Severe	0 (0.0%)	8 (9.6%)	(7.3%)	
Total	**27 (100.0%)**	**83 (100.0%)**	**110 (100.0%)**	

This table categorizes the severity of autism and its correlation with sleep disorders. Mild autism cases account for 59.1% (65 individuals), with 70.4% (19 individuals) having normal sleep and 55.4% (46 individuals) experiencing sleep disorders. Moderate cases constitute 33.6% (37 individuals), with 29.6% (8 individuals) normal and 34.9% (29 individuals) with sleep disorders. Severe cases are 7.3% (8 individuals), all of whom have sleep disorders. The Chi-Square P-value is 0.170, suggesting a lack of significant association between autism severity and sleep disorders.

Table 9: Sleep Disturbance Classification by Comorbidities

Comorbidities	Normal (Count, %)	Sleep Disorder frequency	Total	P-Value
ADHD	2 (7.4%)	28 (33.7%)	30 (27.3%)	
Asthma	0 (0.0%)	6 (7.2%)	6 (5.5%)	
Eczema	5 (18.5%)	5 (6.0%)	10 (9.1%)	
Allergic Rhinitis	2 (7.4%)	6 (7.2%)	8 (7.3%)	0.004
Epilepsy	0 (0.0%)	8 (9.6%)	8 (7.3%)	
Others	18 (66.7%)	30 (36.1%)	48 (43.6%)	
Total	**27 (100.0%)**	**83 (100.0%)**	**110 (100.0%)**	

This table examines the relationship between various comorbidities and sleep disorders. ADHD is present in 27.3% of cases (30 individuals) with a significant Chi-Square P-value of 0.004, indicating a strong association with sleep disorders. Other comorbidities include asthma (5.5%), eczema (9.1%), allergic rhinitis (7.3%), epilepsy (7.3%), and others (43.6%). The distribution of these conditions between normal sleep and sleep disorder groups is detailed.

Table10: Sleep Disturbance Classification by Electronic Devices in Child's Bedroom

Electronic Devices	Normal (Count, %)	Sleep Disorder frequency	Total	P-Value
TV	5 (18.5%)	32 (38.6%)	37 (33.6%)	
Computer	1 (3.7%)	3 (3.6%)	4 (3.6%)	
Laptop	1 (3.7%)	1 (1.2%)	2 (1.8%)	
Smart Phone	17 (63.0%)	39 (47.0%)	56 (50.9%)	
Tablet	0 (0.0%)	2 (2.4%)	2 (1.8%)	
Nil	0 (0.0%)	2 (2.4%)	2 (1.8%)	0.347
Combine (TV+ Smart Phone+ Tablet)	3 (11.1%)	4 (4.8%)	7 (6.4%)	
Total	**27 (100.0%)**	**83 (100.0%)**	**110 (100.0%)**	

The presence of electronic devices in a child's bedroom is analyzed in relation to sleep disorders. Devices include TV (33.6% cases, 37 individuals), computer (3.6%, 4 individuals), laptop (1.8%, 2 individuals), smartphone (50.9%, 56 individuals), and tablet (1.8%, 2 individuals). The combination of TV, smartphone, and tablet is seen in 6.4% of cases (7 individuals). The Chi-Square P-value is 0.347, indicating a non-significant association between the presence of these devices and sleep disorders.

Table 11: Sleep Disturbance Classification by Length of Gadget Use

Length of Gadgets Use	Normal (Count, %)	Sleep Disorder frequency	Total	P-Value
15-30 min	1 (3.7%)	4 (4.8%)	5 (4.5%)	
1-2 hours	11 (40.7%)	25 (30.1%)	36 (32.7%)	
3-4 hours	5 (18.5%)	27 (32.5%)	32 (29.1%)	
5-6 hours 7-8 hours	4 (14.8%) 3 (11.1%)	16 (19.3%) 5 (6.0%)	20 (18.2%) 8 (7.3%)	0.659
Nil	0 (0.0%)	1 (1.2%)	1 (0.9%)	
>8 hours	3 (11.1%)	5 (6.0%)	8 (7.3%)	
Total	**27 (100.0%)**	**83 (100.0%)**	**110 (100.0%)**	

This table focuses on the duration of gadget use and its correlation with sleep disorders. Usage durations are categorized as 15-30 minutes (4.5% cases, 5 individuals), 1-2 hours (32.7%, 36 individuals), 3-4 hours (29.1%, 32 individuals), 5-6 hours (18.2%, 20 individuals), 7-8 hours (7.3%, 8 individuals), and more than 8 hours (7.3%, 8 individuals). The Chi-Square P-value is 0.659, suggesting no significant link between gadget usage length and sleep disorders.

Table 12: Sleep Disturbance Classification by Co-Sleeping Arrangement

Co-Sleeping	Normal (Count, %)	Sleep Disorder frequency	Total	P-Value
Separate	0 (0.0%)	1 (1.2%)	1 (0.9%)	
Parents	21 (77.8%)	50 (60.2%)	71 (64.5%)	
Siblings	4 (14.8%)	19 (22.9%)	23 (20.9%)	
Grand Parents, Caretaker	2 (7.4%)	13 (15.7%)	15 (13.6%)	0.399
Total	**27 (100.0%)**	**83 (100.0%)**	**110 (100.0%)**	

The table investigates the impact of co-sleeping arrangements on sleep disorders. Arrangements include sleeping separately (0.9% cases, 1 individual), with parents (64.5%, 71 individuals), with siblings (20.9%, 23 individuals), and with grandparents or caretakers (13.6%, 15 individuals). The Chi-Square P-value of 0.399 indicates a non-significant association between co-sleeping and sleep disorders.

Table 13: Sleep Disturbance Scale for Children (SDSC) and autism type

SDSC and Domains	Autism Spectrum Disorder						P Value
	Mild	(59.1%)	Moderate	(33.6%)	Severe	(7.3%)	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	
Disorder of initiating and maintaining of sleep	16.29	5.69	18.35	5.18	21.75	7.01	.018
Sleep breathing disorder	4.88	2.52	6.30	3.13	7.63	2.20	.004

Disorder of arousal	4.89	2.64	6.05	3.35	7.13	3.83	.047
Sleep-wake transition disorder	11.92	5.06	14.57	5.66	20.00	5.01	.000
Disorder of excessive somnolence	9.66	4.55	13.19	5.80	15.50	5.45	.000
Sleep hyperhidrosis	3.66	2.01	3.73	1.68	5.13	1.81	.120
Sleep Disturbance Scale for Children (SDSC)	51.31	18.82	62.19	21.04	77.13	20.14	.000

This table uses the Sleep Disturbance Scale for Children (SDSC) to evaluate sleep disorders across different autism severities. It details the mean and standard deviation for disorders like initiating and maintaining sleep, sleep breathing disorder, disorder of arousal, sleep-wake transition disorder, disorder of excessive somnolence, and sleep hyperhidrosis. Significant differences are noted across severity levels, especially in sleep-wake transition disorder and disorder of excessive somnolence (P-values .000).

Table 14: Frequency of Sleep Disturbance Scale for Children (SDSC)

Sleep Disturbance Scale					
Variables	Never %	Rarely 1-2 times/ month%	Sometimes (1-2 times/week) %	Often 3-5 times/week %	Daily (Always) %
SDSC3	23.6	24.5	32.7	13.6	5.5
SDSC4	25.5	15.5	26.4	21.8	10.9
SDSC5	42.7	22.7	12.7	17.3	4.5
SDSC6	36.4	24.5	13.6	14.5	10.9
SDSC7	43.6	10.9	16.4	13.6	15.5
SDSC8	56.4	21.8	5.5	11.8	4.5
SDSC9	49.1	22.7	15.5	10.9	1.8
SDSC10	31.8	29.1	13.6	17.3	8.2
SDSC11	29.1	30.9	22.7	9.1	8.2
SDSC12	32.7	25.5	17.3	12.7	11.8
SDSC13	61.8	16.4	10.9	7.3	3.6
SDSC14	62.7	15.5	11.8	7.3	2.7
SDSC15	45.5	20.0	18.2	12.7	3.6
SDSC16	52.7	21.8	16.4	5.5	3.6
SDSC17	60.9	17.3	10.9	9.1	1.8
SDSC18	50.0	21.8	14.5	10.9	2.7
SDSC19	36.4	26.4	18.2	10.9	8.2
SDSC20	57.3	10.9	13.6	11.8	6.4
SDSC21	65.5	15.5	4.5	10.9	3.6
SDSC22	34.5	22.7	19.1	18.2	5.5
SDSC23	34.5	25.5	17.3	13.6	9.1
SDSC24	49.1	24.5	9.1	9.1	8.2

SDSC25	44.5	18.2	17.3	11.8	8.2
SDSC26	44.5	20.0	10.0	12.7	12.7

This table presents the percentage distribution of responses across various frequencies ('Never' to 'Daily') for multiple Sleep Disturbance Scale (SDSC) variables. Each variable (SDSC3 to SDSC26) shows varying percentages across the frequency categories. For example, SDSC3 has 23.6% never experiencing the issue, 24.5% rarely, 32.7% sometimes, 13.6% often, and 5.5% daily. The table provides a detailed view of how frequently different sleep disturbances occur in the sample.

DISCUSSION

The present study on children with Autism Spectrum Disorder (ASD) in Lahore highlights significant findings regarding sleep disorders. It was observed that gender, age at diagnosis, and socioeconomic status of the family did not notably influence sleep disturbances. However, the type of treatment, parental education levels, and comorbid conditions such as ADHD were found to have substantial effects. Notably, factors like co-sleeping or the presence of electronic devices had no significant impact on sleep quality in these children. This indicates that treatment approaches, parental influences, and co-occurring conditions are critical in addressing sleep disorders in children with ASD.

López-Zamora et al. (2023) delved into the neurocognitive aspects of sleep disturbances in children with both ASD and epilepsy, revealing significant impacts on daily functioning, memory, attention, and activity levels due to serotonin imbalances. This aligns with our study's findings linking ADHD and other health conditions to sleep issues in ASD, despite differences in research focuses. [17] Comparing the current study with Galli et al. (2022), we found that

68.2% of boys with ASD faced sleep issues, a figure higher than Galli's 43%. Our study revealed the importance of treatments and parental education, while Galli's focused more on developmental delays and bedtime routines. Both studies emphasize the need for individualized approaches to sleep management in ASD. [18]

Sampath et al. (2022) found similar sleep challenges in children aged 4-6 in India, with factors such as hospital stays and breathing difficulties contributing to sleep deprivation. Our study, covering a wider age range, identified treatment and parental involvement as significant factors influencing sleep, aligning with Sampath's findings on stress, while offering a broader

perspective on environmental and medical influences. [19] Further comparisons with Chen et al. (2021) show that both studies report a high prevalence of sleep disturbances in children with ASD. However, while gender and age played a role in Chen's study, our research highlighted that socioeconomic status had minimal influence on sleep issues, suggesting different dynamics in various contexts. [20] Sosso et al. (2021) explored the role of socioeconomic status (SES) on sleep quality, showing that lower SES often leads to sleep disturbances. Contrary to this, our study found that SES had a minimal impact on sleep issues in children with ASD, prompting further investigation into how these factors uniquely affect children with ASD. [21] Paulich et al. (2021) reported the effects of screen time on sleep in children, linking excessive screen exposure to sleep disruptions. Our study, focusing more on treatment types, found similar patterns of sleep disturbances in children with ASD, highlighting the need for comprehensive management strategies. [22] In relation to Cheng et al. (2021), who discussed the psychiatric impacts of sleep deprivation, our study emphasized the role of parental factors and treatments in sleep disturbances. While both studies recognize the importance of sleep in child development, Cheng et al. focused more on the neurological effects of insufficient sleep. [23] The review by Johnson and Zarrinnegar (2021) agrees with our findings regarding the high prevalence of sleep disorders in children with ASD. However, they noted more severe sleep disturbances in males, whereas our study found no significant gender differences. Both studies underline the importance of timely and personalized treatment for sleep issues in this population. [24] Seo (2021) further contributes by identifying neurobiological abnormalities in ASD children as key contributors to sleep problems. Our study concurs that treatments and parental factors play vital roles, echoing Seo's call for individualized therapeutic approaches to managing sleep disorders in children with ASD. [25] Waddington et al. (2020) and our study both acknowledge the complexity of sleep disturbances in children with ASD, highlighting the roles of treatment, family dynamics, and socioeconomic status. While our study focused more on treatment modalities, Waddington et al. stressed the importance of family and financial aspects in managing these disturbances. [26] Finally, studies by Martin et al. (2019 and others emphasize the significant impact of family dynamics and parental mental health on children's sleep. Our research adds to this by highlighting the clinical and environmental factors contributing to sleep disorders in children with ASD. [27]

CONCLUSION

The study titled "Sleep Irregularities and Associated Factors in Children with Autism Spectrum Disorder at Special Education Departments of Lahore, Pakistan" provides valuable insights into the complex nature of sleep disturbances in children with autism. The research demonstrates that sleep issues are influenced by multiple interrelated factors, including gender, autism severity, family dynamics, and parental characteristics. It highlights the multifaceted nature of these disturbances, emphasizing the need for individualized and context-sensitive approaches in both assessment and intervention. This study underscores the importance of considering not only the medical or psychological aspects of sleep disturbances in children with autism, but also the broader familial and sociocultural context. The findings stress that clinicians, educators, and families must be cognizant of the various factors, such as parental education, family structure, and the severity of the child's autism, which contribute to sleep irregularities. The implications of these results suggest that a comprehensive approach, tailored to the specific needs of the child and family, is crucial for effective management of sleep-related issues.

Additionally, the study advocates for a more holistic view of sleep disorders, encouraging clinicians and caregivers to factor in the familial environment when devising interventions. It also calls for greater awareness and education regarding the impact of these factors on sleep, empowering families and caregivers to implement more effective sleep management strategies.

FUTURE RECOMMENDATIONS

Develop and implement individualized intervention plans that take into account the severity of autism, as well as specific family dynamics and contextual factors. Tailored approaches should focus on both the child's medical needs and the family environment. Increase awareness among parents, educators, and caregivers about the negative effects of electronic devices and gadget usage on sleep. Encourage strategies to limit screen time, especially before bedtime, to improve sleep quality. Implement interventions that involve family factors, including parental education levels, occupation, and family structure, which can significantly influence the child's sleep patterns. Family-focused strategies should be integrated into therapy and educational programs. Conduct longitudinal studies to further explore the causal relationships between identified factors—such as parental education, family dynamics, and autism severity—and sleep disturbances in children with autism. This would provide a deeper understanding of how these variables interact over time. Future research should incorporate objective measures of sleep

disturbances, such as polysomnography or actigraphy, to provide a more comprehensive and accurate assessment of sleep patterns in children with autism. These methods could complement subjective reports and enhance the reliability of sleep disorder evaluations. By above these recommendations, future interventions can be better aligned with the unique needs of children with autism, helping to mitigate the impact of sleep disturbances on their overall well-being and development.

LIMITATIONS OF STUDY

Limited generalizability due to the study being specific to Lahore, Pakistan. Potential bias from parent-reported data, which may not always accurately reflect sleep disturbances. The cross-sectional nature of the study limits the ability to establish causality. Lack of objective sleep measures, relying on questionnaires and self-reports. The study did not explore the impact of dietary and lifestyle factors on sleep disturbances

REFERENCES

1. Aathira, R., Gulati, S., Tripathi, M., Shukla, G., Chakrabarty, B., Sapra, S., ... & Pandey, R. M. (2017). Prevalence of sleep abnormalities in Indian children with autism spectrum disorder: a cross-sectional study. Pediatric Neurology, 74, 62-67. https://doi.org/10.1016/j.pediatrneurol.2017.05.019
2. American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.). https://doi.org/10.1177/0306624X13511040
3. Andersen, I. M., Kaczmarska, J., McGrew, S. G., & Malow, B. A. (2008). Melatonin for insomnia in children with autism spectrum disorders. Journal of child neurology, 23(5), 482-485. https://doi.org/10.1177/0883073807309783
4. Baig, U., Mehdi, S. M., & HM, I. A. (2021). Sleep disturbances in children with autism spectrum disorder in Lahore, Pakistan; a cross-sectional study. JPMA. The Journal of the Pakistan Medical Association, 71(1 (B)), 783-785. https://doi.org/10.47391/jpma.1352
5. Baio, J., Wiggins, L., Christensen, D. L., Maenner, M. J., Daniels, J., Warren, Z., & Dowling, N. F. (2018). Prevalence of autism spectrum disorder among children aged 8 years—autism and developmental disabilities monitoring network, 11 sites, United

States, 2014. MMWR Surveillance Summaries, 67(6), 1-23. Doi: https://doi.org10.15585/mmwr. ss6706a1

6. Bellini, S., & Peters, J. K. (2008). Social skills training for youth with autism spectrum disorders. Child and adolescent psychiatric clinics of North America, 17(4), 857-873. https://doi.org/10.1016/j.chc.2008.06.008
7. Baker, E., Richdale, A., Short, M., & Gradisar, M. (2013). An investigation of sleep patterns in adolescents with high-functioning autism spectrum disorder compared with typically developing adolescents. Developmental Neurorehabilitation, 16(3), 155-165. https://doi.org/10.3109/17518423.2013.765518
8. Bruni, O., Ottaviano, S., Guidetti, V., Romoli, M., Innocenzi, M., Cortesi, F., & Giannotti, F. (1996). The Sleep Disturbance Scale for Children (SDSC) Construct ion and validation of an instrument to evaluate sleep disturbances in childhood and adolescence. Journal of sleep research, 5(4), 251-261. https://doi.org/10.1111/j.1365-2869.1996.00251.x
9. Chen, H., Yang, T., Chen, J., Chen, L., Dai, Y., Zhang, J., & Li, T. (2021). Sleep problems in children with autism spectrum disorder: a multicenter survey. BMC psychiatry, 21, 1-13.
10. Cheng, W., Rolls, E., Gong, W., Du, J., Zhang, J., Zhang, X. Y., ... & Feng, J. (2021). Sleep duration, brain structure, and psychiatric and cognitive problems in children. Molecular psychiatry, 26(8), 3992-4003.
11. Chiarotti, F., & Venerosi, A. (2020). Epidemiology of autism spectrum disorders: a review of worldwide prevalence estimates since 2014. Brain sciences, 10(5), 274. https://doi.org/10.3390/brainsci10050274
12. Couturier, J. L., Speechley, K. N., Steele, M., & Norman, R. (2020). Sleep problems in children with autism spectrum disorder: Examining the contributions of sensory sensitivities and anxiety. Research in Autism Spectrum Disorders, 70, 101470. https://doi.org/10.1016/j.sleep.2014.11.006
13. Council on Children with Disabilities, Section on Developmental Behavioral Pediatrics, Bright Futures Steering Committee, & Medical Home Initiatives for Children with Special Needs Project Advisory Committee. (2006). Identifying infants and young children with developmental disorders in the medical home: An algorithm for

developmental surveillance and screening. Pediatrics, 118(1), 405-420. https://doi.org/10.1542/peds.2006-1231

14. Cohen, S., Conduit, R., Lockley, S. W., Rajaratnam, S. M., & Cornish, K. M. (2014). The relationship between sleep and behavior in autism spectrum disorder (ASD): a review. Journal of neurodevelopmental disorders, 6(1), 1-10.
15. Chokroverty, S. (2010). Overview of sleep & sleep disorders. Indian Journal of Medical Research, 131(2), 126-140.
16. Cortesi, F., Giannotti, F., Ivanenko, A., & Johnson, K. (2010). Sleep in children with autistic spectrum disorder. Sleep medicine, 11(7), 659-664. https://doi.org/10.1016/j.sleep.2010.01.010
17. Sosso, F. A. E., Holmes, S. D., & Weinstein, A. A. (2021). Influence of socioeconomic status on objective sleep measurement: A systematic review and meta-analysis of actigraphy studies. Sleep Health, 7(4), 417-428. https://doi.org/10.1016/j.sleh.2021.05.005
18. Sosso, F. E., & Khoury, T. (2021). Socioeconomic status and sleep disturbances among pediatric population: a continental systematic review of empirical research. Sleep Science, 14(3), 245. doi: https://doi.org/10.5935/1984-0063.20200082
19. Sampath, R., Nayak, R., Gladston, S., Ebenezer, K., Mudd, S. S., Peck, J., ... & Pandian, V. (2022). Sleep disturbance and psychological distress among hospitalized children in India: Parental perceptions on pediatric inpatient experiences. Journal for Specialists in Pediatric Nursing, 27(1), e12361. https://doi.org/10.1111/jspn.12361
20. Shui, A. M., Katz, T., Malow, B. A., & Mazurek, M. O. (2018). Predicting sleep problems in children with autism spectrum disorders. Research in developmental disabilities, 83, 270-279. https://doi.org/10.1016/j.ridd.2018.10.002
21. Schreck, K. A., Mulick, J. A., & Smith, A. F. (2004). Sleep problems as possible predictors of intensified symptoms of autism. Research in developmental disabilities, 25(1), 57-66. https://doi.org/10.1016/j.ridd.2003.04.007
22. Souders, M. C., Mason, T. B., Valladares, O., Bucan, M., Levy, S. E., Mandell, D. S., ... & Pinto-Martin, J. (2009). Sleep behaviors and sleep quality in children with autism spectrum disorders. Sleep, 32(12),1566-1578. https://doi.org/10.1093/sleep/32.12.1566

23. Tager-Flusberg, H. (2016). Risk factors associated with language in autism spectrum disorder: Clues to underlying mechanisms. Journal of Speech, Language, and Hearing Research, 59(1), 143-154. https://doi.org/10.1044/2015_JSLHR-L-15-0146
24. Vahia, V. N. (2013). Diagnostic and statistical manual of mental disorders 5: A quick glance. Indian journal of psychiatry, 55(3), 220-223. Doi: https://doi.org/10.4103/0019-5545.117131
25. Whelan, S., Mannion, A., Madden, A., Berger, F., Costello, R., Ghadiri, S., & Leader, G. (2022). Examining the Relationship Between Sleep Quality, Social Functioning, and Behavior Problems in Children with Autism Spectrum Disorder: A Systematic Review. Nature and science of sleep, 14, 675.
26. Wiggs, L., & Stores, G. (2004). Sleep patterns and sleep disorders in children with autistic spectrum disorders: Insights using parent report and actigraphy. Developmental Medicine and Child Neurology, 46(6), 372-380.
DOI: https://doi.org/10.1017/s0012162204000611
27. Zhu, Z. W., Jin, Y., Wu, L. L., & Liu, X. L. (2018). Current status and challenge in clinical work of autism spectrum disorders in China. World Journal of Pediatrics, 14, 209-211.