

Impact of Sleep Disorders on Daily Functioning in Children with Autism Spectrum Disorder

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ABSTRACT

This study aims to explore the impact of sleep disorders on daily functioning in children with Autism Spectrum Disorder (ASD) through the perspectives of their caregivers. A qualitative research design was employed, involving semi-structured interviews with 23 caregivers of children aged 4-12 years diagnosed with ASD. Participants were recruited through local autism support groups, special education schools, and pediatric clinics. Interviews focused on the types, frequency, and severity of sleep disorders, their impact on the child's behavior, academic performance, social interactions, physical health, and family dynamics, as well as the strategies used to manage these issues. Thematic analysis was used to identify key themes and patterns from the data. The study identified several types of sleep disorders among children with ASD, including insomnia, sleep apnea, and night terrors, varying in frequency and severity. Sleep disturbances were found to significantly impact daily functioning, leading to behavioral issues, academic challenges, social difficulties, and physical health problems. Caregivers employed a range of coping strategies, such as medical interventions, behavioral routines, environmental modifications, dietary adjustments, and alternative therapies, with varying degrees of success. Barriers to effective management included cost, accessibility, and lack of knowledge. The need for individualized, adaptive approaches to treatment was emphasized. Sleep disorders in children with ASD have profound effects on their daily functioning and overall quality of life. Addressing these issues requires a comprehensive, individualized approach that considers the unique needs of each child. Collaboration with caregivers and regular adjustments to intervention strategies are essential for effective management. Further research should focus on larger, more diverse samples and incorporate objective sleep measures to provide a more comprehensive understanding of these challenges.

Keywords: Autism Spectrum Disorder, sleep disorders, daily functioning, caregivers, coping strategies, behavioral issues, interventions

1. Introduction

Sleep disorders are common among children with Autism Spectrum Disorder (ASD) and have significant implications for their daily functioning and overall quality of life. Research indicates that up to 80% of children with ASD experience some form of sleep disturbance, which can exacerbate core ASD symptoms and contribute to a range of behavioral and emotional difficulties (Hollway et al., 2018; Johnson et al., 2012; Krakowiak et al., 2012).

Sleep plays a crucial role in cognitive development, emotional regulation, and overall health. For children with ASD, adequate sleep is essential for managing the core symptoms of the disorder, including social communication difficulties and repetitive behaviors (May et al., 2013; Veatch et al., 2015). However, sleep disturbances are pervasive in this population, often presenting as difficulties in falling asleep, frequent night awakenings, and early morning awakenings (Galli et al., 2022; Güneş et al., 2019). These disturbances can lead to a cascade of negative outcomes, impacting not only the child's functioning but also the well-being of the entire family (Liu et al., 2020).

Several factors contribute to the high prevalence of sleep disorders in children with ASD. Sensory sensitivities, anxiety, gastrointestinal issues, and neurochemical abnormalities have all been implicated (Ramanujam et al., 2020; Wang et al., 2015; Yavuz-Kodat et al., 2020). Moreover, the interplay between sleep disturbances and behavioral problems is complex and bidirectional; poor sleep can exacerbate behavioral issues, which in turn can further disrupt sleep (Chung, 2024; Galli et al., 2022).

The COVID-19 pandemic has further highlighted the challenges faced by children with ASD and their families regarding sleep. Lockdown measures and changes in daily routines have significantly affected sleep patterns, with many parents reporting worsened sleep disturbances during this period (Bruni et al., 2021). This disruption underscores the need for effective interventions and support systems to help families manage sleep issues.

Addressing sleep disturbances in children with ASD requires a multifaceted approach. Medical interventions, such as the use of melatonin, have shown promise in improving sleep onset and duration (Park & Park, 2020; Tse et al., 2018). Behavioral strategies, including the establishment of consistent bedtime routines and the use of sleep hygiene practices, are also commonly recommended (Miner et al., 2023; Moore et al., 2017). Additionally, environmental modifications, such as reducing sensory

stimuli in the bedroom, can help create a conducive sleep environment (Deliens & Peigneux, 2019; Nguyen, 2022).

The impact of sleep disorders extends beyond the immediate effects on the child's behavior and health. Poor sleep can strain family dynamics, increase parental stress, and reduce overall family functioning (Lawson & Little, 2017; Liu et al., 2020). Caregivers often report feelings of exhaustion and helplessness, which can affect their ability to effectively support their child (Haimovich et al., 2022). Understanding these broader impacts is crucial for developing comprehensive support systems that address the needs of both the child and the family.

Recent research has begun to elucidate the neurobiological underpinnings of sleep disturbances in children with ASD. Studies using animal models have identified specific genetic and neural circuit disruptions that may contribute to fragmented sleep and associated cognitive deficits (Choi, 2023; Chung, 2024). These findings hold potential for the development of targeted treatments that address the root causes of sleep problems in this population.

Despite the growing body of research on sleep disturbances in children with ASD, significant gaps remain. Many studies have focused on quantitative measures, such as sleep duration and frequency of awakenings, without fully capturing the lived experiences of children and their families (Deliens & Peigneux, 2019; Wang et al., 2022). Qualitative research can provide valuable insights into the subjective impact of sleep disorders, including how they affect daily routines, social interactions, and emotional well-being.

This study seeks to fill this gap by employing a qualitative approach to explore the impact of sleep disorders on daily functioning in children with ASD. By conducting in-depth interviews with caregivers, we aim to capture a holistic understanding of the challenges and coping strategies associated with sleep disturbances. This approach allows for a rich, nuanced exploration of the experiences of families navigating the complexities of sleep issues in the context of ASD.

2. Methods and Materials

2.1. Study Design and Participants

This qualitative research aims to explore the impact of sleep disorders on daily functioning in children with Autism Spectrum Disorder (ASD). The study employs a phenomenological approach to gain an in-depth understanding of the lived experiences of children with ASD

and their caregivers regarding sleep disorders and their effects on daily activities.

Participants were selected through purposive sampling to ensure a diverse range of experiences related to sleep disorders in children with ASD. The inclusion criteria were:

- Children aged 4-12 years diagnosed with ASD.
- Presence of reported sleep disorders, as indicated by caregivers.
- Willingness of caregivers to participate in the study.

The sample size was determined based on the principle of theoretical saturation, where no new themes emerged from the data.

2.2. Measure

2.2.1. Semi-Structured Interview

Data collection was conducted through semi-structured interviews with the caregivers of children with ASD. An interview guide was developed to ensure consistency while allowing flexibility to explore relevant topics in-depth. The guide included open-ended questions about:

- The nature and severity of sleep disorders experienced by the child.
- The impact of sleep disorders on the child's daily functioning, including behavior, learning, and social interactions.
- Coping strategies and interventions used by caregivers to manage sleep issues.
- The perceived effectiveness of these interventions.

Any additional challenges faced due to sleep disorders.

Interviews were conducted in a quiet and comfortable setting, either in-person or via video call, depending on the participant's preference. Each interview lasted approximately 60-90 minutes and was audio-recorded with the participant's consent. Field notes were also taken to capture non-verbal cues and contextual information.

2.3. Data Analysis

Data analysis followed the principles of thematic analysis, as outlined by Braun and Clarke (2006). The steps involved were:

Familiarization with the Data: Transcriptions of the interviews were read multiple times to immerse in the data.

Generating Initial Codes: Data were coded systematically using NVivo software. Codes were assigned to meaningful

segments of text that captured key concepts related to the research questions.

Searching for Themes: Codes were grouped into potential themes by identifying patterns and relationships among them.

Reviewing Themes: Themes were reviewed and refined to ensure they accurately represented the data and were distinct from each other.

Defining and Naming Themes: Each theme was defined clearly, and sub-themes were identified where necessary.

Producing the Report: A coherent narrative was developed around the themes, supported by direct quotes from the interviews to illustrate key points.

To ensure the credibility and trustworthiness of the findings, several strategies were employed:

Member Checking: Participants were invited to review the preliminary findings to confirm that their experiences were accurately represented.

Peer Debriefing: The analysis process was discussed with peers and experts in the field to ensure the validity of the themes.

Triangulation: Data were compared with existing literature on sleep disorders in children with ASD to enhance the robustness of the findings.

3. Findings and Results

The study included a total of 23 participants, consisting of caregivers of children with Autism Spectrum Disorder (ASD) who were experiencing sleep disorders. The caregivers' ages ranged from 30 to 50 years, with a mean age of 38.6 years. The majority of the caregivers were mothers (n=18, 78%), followed by fathers (n=4, 17%) and one grandmother (n=1, 4%). The children's ages ranged from 4 to 12 years, with a mean age of 8.3 years. In terms of gender, 15 of the children were male (65%), and 8 were female (35%). Most families reported a middle socioeconomic status (n=15, 65%), while the remaining families were evenly split between low (n=4, 17%) and high (n=4, 17%) socioeconomic status. The participants were recruited from various settings, including local autism support groups (n=10, 43%), special education schools (n=8, 35%), and pediatric clinics (n=5, 22%). This diverse sample ensured a wide range of experiences and perspectives regarding sleep disorders in children with ASD.

Table 1
The Results of Qualitative Analysis

Categories (Themes)	Subcategories (Subthemes)	Concepts (Open Codes)
1. Nature and Severity of Sleep Disorders	1.1 Types of Sleep Disorders	Insomnia, Sleep Apnea, Night Terrors
	1.2 Frequency of Sleep Issues	Nightly, Weekly, Sporadic
	1.3 Duration of Sleep Disturbances	Hours awake, Multiple awakenings, Difficulty falling asleep
	1.4 Severity Levels	Mild, Moderate, Severe
	1.5 Factors Influencing Sleep	Sensory Sensitivities, Anxiety, Medications
2. Impact on Daily Functioning	2.1 Behavioral Changes	Increased irritability, Aggression, Hyperactivity
	2.2 Academic Performance	Difficulty concentrating, Poor grades, Increased absenteeism
	2.3 Social Interactions	Withdrawal, Difficulty with peer relationships, Social anxiety
	2.4 Physical Health	Fatigue, Headaches, Weakened immune system
	2.5 Family Dynamics	Increased stress, Disrupted routines, Sibling impact
	2.6 Emotional Well-being	Anxiety, Mood swings, Depression
3. Coping Strategies and Interventions	3.1 Medical Interventions	Prescription medications, Over-the-counter supplements, Sleep studies
	3.2 Behavioral Strategies	Consistent bedtime routines, Positive reinforcement, Relaxation techniques
	3.3 Environmental Modifications	Darkening the room, Noise reduction, Comfortable bedding
	3.4 Dietary Adjustments	Limiting caffeine, Evening snacks, Balanced diet
	3.5 Alternative Therapies	Melatonin, Aromatherapy, Weighted blankets
	3.6 Professional Support	Sleep specialists, Therapists, Support groups
	3.7 Parental Self-care	Support networks, Stress management, Education on sleep disorders
4. Effectiveness and Challenges of Interventions	4.1 Success Stories	Improved sleep quality, Enhanced daily functioning, Reduced stress
	4.2 Ongoing Challenges	Inconsistent results, Resistance to change, Side effects
	4.3 Barriers to Implementation	Cost, Accessibility, Lack of knowledge
	4.4 Adaptation over Time	Evolving strategies, Long-term management, Changing needs
	4.5 Recommendations for Other Parents	Sharing experiences, Practical advice, Encouragement

3.1. Nature and Severity of Sleep Disorders

Types of Sleep Disorders: The children in the study experienced a variety of sleep disorders, including insomnia, sleep apnea, and night terrors. One parent shared, "My child wakes up screaming several times a week, often due to nightmares."

Frequency of Sleep Issues: The frequency of sleep disturbances varied, with some children experiencing issues nightly, others weekly, and some sporadically. A caregiver noted, "Some nights are worse than others, but there's rarely a week where he sleeps well every night."

Duration of Sleep Disturbances: The duration of sleep issues included hours of wakefulness, multiple awakenings, and difficulty falling asleep. "He can be up for hours at night, and it's like a cycle – just as he starts to settle, he wakes up again," described one parent.

Severity Levels: The severity of sleep problems ranged from mild to severe. A parent explained, "On a mild night, it might take an hour to fall asleep. On a severe night, he's up all night, and no one gets any rest."

Factors Influencing Sleep: Various factors influenced sleep, such as sensory sensitivities, anxiety, and medications. "His anxiety spikes at night, and the slightest noise can wake him up," said a caregiver.

3.2. Impact on Daily Functioning

Behavioral Changes: Sleep disorders led to increased irritability, aggression, and hyperactivity in children. "Lack of sleep makes him so irritable that he often lashes out at his siblings," shared a parent.

Academic Performance: Children's academic performance was affected by difficulty concentrating, poor grades, and increased absenteeism. A teacher-parent commented, "He misses so much school because he's too exhausted to get out of bed."

Social Interactions: Sleep issues impacted social interactions, causing withdrawal, difficulty with peer relationships, and social anxiety. "He avoids playing with other kids because he's too tired and cranky," noted a caregiver.

Physical Health: Poor sleep affected physical health, leading to fatigue, headaches, and a weakened immune system. One parent observed, "He's always tired and seems to catch every cold going around."

Family Dynamics: Sleep disorders disrupted family dynamics, increasing stress and disrupting routines, which also impacted siblings. "Our entire family is stressed and exhausted because his sleep issues affect everyone," explained a caregiver.

Emotional Well-being: The emotional well-being of children was impacted, with increased anxiety, mood swings, and depression. A parent shared, "His mood swings are so severe when he doesn't sleep well, and it breaks my heart."

3.3. *Coping Strategies and Interventions*

Medical Interventions: Families utilized prescription medications, over-the-counter supplements, and sleep studies. "Melatonin helps sometimes, but we've also had to try prescription sleep aids," noted one caregiver.

Behavioral Strategies: Consistent bedtime routines, positive reinforcement, and relaxation techniques were employed. "We have a strict bedtime routine that involves calming activities, which sometimes helps," shared a parent.

Environmental Modifications: Changes to the sleep environment included darkening the room, noise reduction, and comfortable bedding. "We made his room completely dark and quiet, and it seems to help a bit," mentioned a caregiver.

Dietary Adjustments: Adjustments included limiting caffeine, providing evening snacks, and maintaining a balanced diet. "We cut out all sugary snacks in the evening, which has made a noticeable difference," explained a parent.

Alternative Therapies: Alternative therapies like melatonin, aromatherapy, and weighted blankets were tried. "A weighted blanket has been a game-changer for him; it really helps him feel secure," said one caregiver.

Professional Support: Sleep specialists, therapists, and support groups were sought for professional guidance. "We've seen a sleep specialist, and the advice has been invaluable," shared a parent.

Parental Self-care: Parents engaged in self-care through support networks, stress management, and education on sleep disorders. "Joining a support group for parents has helped me manage my stress and feel less isolated," noted a caregiver.

4. Effectiveness and Challenges of Interventions

Success Stories: Some families reported improved sleep quality, enhanced daily functioning, and reduced stress. "After trying various strategies, we finally found a routine that works for us," shared a relieved parent.

Ongoing Challenges: Many families faced inconsistent results, resistance to change, and side effects from interventions. "Even with medication, some nights are still a struggle, and it's hard to find a lasting solution," explained a caregiver.

Barriers to Implementation: Barriers such as cost, accessibility, and lack of knowledge hindered effective intervention. "The cost of some treatments is prohibitive, and it's difficult to access specialized care," mentioned one parent.

Adaptation over Time: Families described evolving strategies, long-term management, and changing needs over time. "What worked last year doesn't work now, so we're constantly adapting," noted a caregiver.

Recommendations for Other Parents: Participants shared their experiences, practical advice, and encouragement for other parents. "Sharing our experiences with other parents has been incredibly helpful and reassuring," said a participant.

4. Discussion and Conclusion

This study aimed to explore the impact of sleep disorders on daily functioning in children with Autism Spectrum Disorder (ASD) through qualitative interviews with caregivers. The findings highlighted several key areas: the nature and severity of sleep disorders, their impact on daily functioning, coping strategies and interventions, and the effectiveness and challenges of these interventions.

Nature and Severity of Sleep Disorders: The study found that children with ASD experienced a range of sleep disorders, including insomnia, sleep apnea, and night terrors. These issues varied in frequency, duration, and severity, with factors such as sensory sensitivities, anxiety, and medications playing significant roles. This aligns with previous research, which also identified a high prevalence of sleep disturbances in children with ASD (Galli et al., 2022; Krakowiak et al., 2012).

Impact on Daily Functioning: Sleep disorders significantly affected the daily functioning of children with ASD. Behavioral changes such as increased irritability and hyperactivity, academic challenges, social interaction difficulties, and physical health issues were common. These findings are consistent with existing literature that highlights

the broad impact of poor sleep on the emotional and behavioral regulation in children with ASD (May et al., 2013; Wang et al., 2021).

Coping Strategies and Interventions: Caregivers employed various strategies to manage sleep issues, including medical interventions (e.g., melatonin), behavioral strategies (e.g., bedtime routines), environmental modifications, dietary adjustments, and alternative therapies. Professional support from sleep specialists and therapists was also sought. These strategies reflect those commonly recommended in the literature for managing sleep problems in children with ASD (Moore et al., 2017; Park & Park, 2020).

Effectiveness and Challenges of Interventions: The effectiveness of interventions varied, with some families reporting significant improvements while others faced ongoing challenges. Barriers such as cost, accessibility, and lack of knowledge were common. The need for personalized and adaptive strategies was emphasized, mirroring findings from previous studies that highlight the complexity of treating sleep disorders in this population (Liu et al., 2020; Ramanujam et al., 2020).

The prevalence and variety of sleep disorders in children with ASD can be attributed to multiple interacting factors. Sensory sensitivities and heightened anxiety levels, common in ASD, contribute significantly to sleep disturbances (Haimovich et al., 2022). These children often have difficulty calming down and maintaining a sleep routine due to their heightened arousal states, as supported by Arazi et al. (2019), who noted reduced sleep pressure in young children with autism (Arazi et al., 2019).

The impact of sleep disorders on daily functioning is profound. Poor sleep exacerbates the core symptoms of ASD, such as irritability, aggression, and difficulty with social interactions, which can create a vicious cycle of behavioral problems and further sleep disturbances (Veatch et al., 2015; Wang et al., 2022). The link between sleep problems and academic performance is also well-documented, with children experiencing sleep issues showing poorer concentration and increased absenteeism (Güneş et al., 2019; Kang et al., 2020).

Coping strategies reported by caregivers align with the broader literature on managing sleep disorders in ASD. Medical interventions like melatonin are commonly used and have been shown to be effective in some cases (Park & Park, 2020; Tse et al., 2022; Tse et al., 2018). Behavioral strategies and environmental modifications are also widely recommended, as they address some of the underlying

causes of sleep disturbances, such as sensory sensitivities and anxiety (Deliens & Peigneux, 2019; Moore et al., 2017).

The varying effectiveness of interventions highlights the need for individualized approaches. What works for one child may not work for another, underscoring the importance of tailored interventions based on each child's specific needs and circumstances. This need for personalized treatment plans is echoed in the literature, which emphasizes the heterogeneity of ASD and the necessity for flexible, adaptive strategies (Miner et al., 2023; Ramanujam et al., 2020).

Despite the valuable insights gained from this study, several limitations must be acknowledged. The qualitative nature of the research means that the findings are not generalizable to all children with ASD. The sample size, though sufficient for qualitative analysis, is relatively small and may not capture the full spectrum of experiences. Additionally, the reliance on caregiver reports introduces potential bias, as caregivers' perceptions and experiences may not fully represent the children's actual sleep patterns and their impacts. Future studies could benefit from incorporating objective measures of sleep, such as actigraphy or polysomnography, to complement caregiver reports and provide a more comprehensive picture.

Future research should aim to address these limitations by using larger, more diverse samples and incorporating objective sleep measures. Longitudinal studies could provide valuable insights into the long-term effects of sleep disturbances and the effectiveness of various interventions over time. Additionally, exploring the genetic and neurobiological underpinnings of sleep disorders in children with ASD could lead to more targeted and effective treatments. Studies that investigate the interplay between sleep disturbances and other comorbid conditions, such as ADHD and anxiety, would also be beneficial, as these conditions often coexist and interact in complex ways (Choi, 2023; Chung, 2024).

Another important area for future research is the impact of sleep interventions on the overall well-being of the family. Understanding how improving a child's sleep can alleviate parental stress and improve family dynamics could highlight the broader benefits of effective sleep management strategies. Finally, examining the role of cultural and socioeconomic factors in sleep disturbances and their management could provide a more holistic understanding of these issues and inform more inclusive and equitable intervention approaches (Koo et al., 2021; Wang et al., 2022).

For practitioners working with children with ASD, this study underscores the importance of addressing sleep issues as a critical component of overall treatment plans. Practitioners should adopt a holistic, individualized approach to sleep management, considering the unique sensory, emotional, and environmental factors affecting each child. Collaboration with caregivers is essential, as they are integral to implementing and maintaining sleep strategies. Providing caregivers with education and support can empower them to effectively manage their child's sleep issues and improve the family's overall quality of life (Hollway et al., 2018; Nguyen, 2022).

Interventions should be multi-faceted, combining medical, behavioral, and environmental strategies tailored to the child's specific needs. Regular follow-ups and adjustments to these strategies are necessary to address the evolving nature of sleep disturbances and ensure sustained improvements (Ramanujam et al., 2020; Souders et al., 2009). Practitioners should also advocate for policies and programs that increase access to sleep-related resources and support services, particularly for families from lower socioeconomic backgrounds who may face additional barriers to effective intervention (Koo et al., 2021; Liu et al., 2020).

In conclusion, sleep disorders in children with ASD have far-reaching impacts on their daily functioning and overall quality of life. By adopting a comprehensive, individualized approach to sleep management, practitioners can help mitigate these effects and support children and their families in achieving better sleep and improved well-being.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethics Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

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