

Childhood Sleep Disorders And Their Relationship With Emotional And Cognitive Development Outcomes

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Abstract

Background: Childhood sleep disorders are receiving growing attention due to their potential influence on emotional well-being and cognitive development. Poor or disrupted sleep in childhood may interfere with learning, attention, memory and emotional regulation. **Objective:** To investigate the relationship between childhood sleep disorders and the emotional and cognitive development of children. **Methodology:** The study was a quantitative cross-sectional design involving 250 children aged 6–12 years. Data were collected using structured questionnaires, sleep assessment scales and developmental outcome measures. Descriptive statistics, correlation analysis and multiple regression methods were used to analyze the data. **Findings:** The results showed that 38.4% of the participants had moderate to severe sleep disorders. Children with sleep disturbances had significantly higher emotional difficulty scores (Mean = 32.7, SD = 6.4) than children with normal sleep (Mean = 18.5, SD = 5.1). Children with sleep disorders showed lower cognitive performance scores (Mean = 68.9%) than children without sleep problems (Mean = 84.3%). There was a significant negative correlation between sleep quality and emotional difficulties ($r = -0.58$, $p < 0.001$), whereas sleep quality was positively correlated with cognitive outcomes ($r = 0.62$, $p < 0.001$). **Conclusion:** Sleep disorders in childhood have a major impact on the development of emotions and cognition. Early detection and intervention could lead to better developmental outcomes and children's well-being.

Keywords: Childhood Sleep Disorders, Sleep Quality, Emotional Development, Cognitive Development, Child Health, Behavioral Outcomes, Pediatric Sleep, Developmental Psychology.

1. Introduction

Sleep is an essential biological process required for healthy growth, emotion regulation, learning and cognition in children. Adequate sleep has been shown to contribute to brain maturation, memory consolidation, attention and psychological well-being and sleep disturbances may have a negative impact on many aspects of child development [1]. Changes in lifestyle, exposure to technology, academic pressures and environmental factors have contributed to an increased prevalence of childhood sleep disorders, including insomnia, sleep-disordered breathing, obstructive sleep apnea, parasomnias, and circadian rhythm disorders [2].

Research suggests that insufficient sleep and low-quality sleep are linked to a variety of adverse developmental outcomes. Children with sleep disorders frequently exhibit emotional problems like anxiety, depression, irritability, mood instability, and decreased social competence [3]. Sleep disturbance can impair the mechanisms of emotional regulation in the developing brain leading to greater vulnerability to behavioral and psychological problems [4]. In addition, ongoing sleep disruption in childhood has been associated with long-term issues with mental health in adolescence and adulthood [5].

Sleep quality and duration are also important for cognitive development. Adequate sleep enhances learning, executive functioning, memory, problem solving skills and academic performance [6]. Sleep disorders, on the other hand, may result in deficits in attention, working memory, processing speed and general intellectual functioning [7]. Studies have found that children who suffer from chronic sleep disturbances tend to have poorer academic performance and less engagement in the classroom than their well-rested counterparts [8].

Recent research has emphasized the increasing role of pediatric sleep health as a public health concern. While a number of studies have investigated the impact of sleep disorders on either emotional or cognitive outcomes separately, fewer have addressed both developmental domains in a single framework [9]. Furthermore, variations in socioeconomic status, family environments, and cultural contexts may affect the relationship between sleep disorders and developmental outcomes, suggesting a requirement for additional empirical studies [10].

1.1 Research Gap

There is a significant amount of evidence linking sleep disorders to developmental problems. However, there are few integrated studies examining the joint effects of childhood sleep disorders on emotional and cognitive development outcomes. Also, much of the current research is on specific sleep disorders or clinical populations, and more research is needed to examine a range of sleep-related disorders and their developmental effects in school-age children.

1.2 Research Objectives

1. To examine the relationship between childhood sleep disorders and emotional development outcomes among children.
2. To assess the impact of childhood sleep disorders on cognitive development outcomes among children.

2. Literature review

In recent years, researchers have placed greater emphasis on the importance of sleep in supporting children's emotional well-being and cognitive development. Sleep disorders such as insomnia, obstructive sleep apnea, and restless sleep and circadian rhythm disturbances have been reported to play a significant role in developmental challenges among children and adolescents [11]. New research suggests that not getting enough sleep can negatively impact emotional regulation, academic performance, attention, memory, and social functioning.

Reynolds and Alfano [12] reported that in a systematic review, children with chronic sleep disturbances had significantly higher levels of anxiety, depression and behavioral problems than children with healthy sleep. In the same way, Matricciani et al. [13] concluded that short sleep duration was linked to increased emotional instability and poorer psychosocial adjustment among schoolchildren. These findings emphasize the importance of quality of sleep on emotional well-being.

Recent studies have shown that from the cognitive perspective, sleep disorders have a negative effect on executive functions, concentration and learning ability. Bathory and Tomopoulos [14] found that children with persistent sleep difficulties had lower academic performance and less attention span. Wang et al. [15] also found a significant correlation between poor sleep quality and deficits in working memory and problem solving.

Mechanisms underlying these relationships have also been investigated. Sleep disruption impacts neural pathways responsible for emotional processing and cognitive control, resulting in impaired developmental outcomes (Becker et al. [16]). In addition, community studies have demonstrated that children with untreated sleep disorders are at greater risk for long-term psychological and educational problems [17].

Few studies have examined emotional and cognitive outcomes in a single framework, despite increasing evidence, particularly in diverse populations. Therefore, further research is warranted to better understand the multidimensional effects of childhood sleep disorders and to aid in developing effective intervention strategies [18].

3. Conceptual Frame work

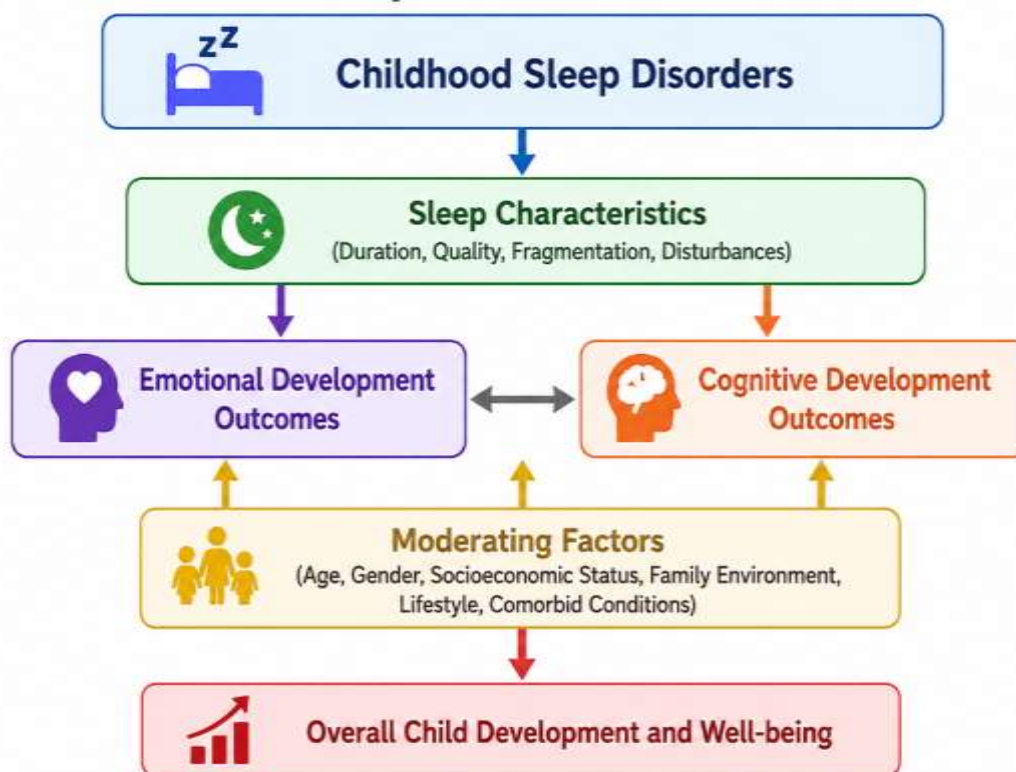


Fig.1. Conceptual model

Conceptual framework for the relationship between childhood sleep disorders and developmental outcomes (Figure 1). Childhood sleep disorders affect important sleep properties, such as duration, quality, fragmentation and disturbances. These sleep factors influence both emotional and cognitive development outcomes that are closely related. The framework also emphasizes the role of moderating factors such as age, gender, socioeconomic status, family environment, lifestyle and comorbid conditions. All these variables together are important for the overall development and well-being of the child.

4. Methodology

The current study employed a quantitative cross-sectional research design to examine the relationship between childhood sleep disorders and emotional and cognitive development outcomes. The cross-sectional approach was deemed appropriate as it allowed the collection and analysis of data from participants at one point in time while exploring associations among the study variables [19].

4.1 Research Design

This study was conducted using descriptive and correlational research design. The descriptive aspect was used as a measure of extent of sleep disorders among children and the correlational aspect to investigate the relations between sleep disorders, emotional development and cognitive development outcomes.

4.2 Study Population and Sample

The target population were school-aged children aged 6 to 12 years. Table 1 presents the total sample of 250 participants selected by stratified random sampling to ensure adequate representation across age groups and gender categories.

Table.1. Demographic Characteristics of Participants (N = 250)

Variable	Category	Frequency	Percentage (%)
Gender	Male	130	52.0
	Female	120	48.0

Age Group	6–8 Years	95	38.0
	9–10 Years	82	32.8
	11–12 Years	73	29.2
Total		250	100.0

4.3 Data Collection Instruments

Data collection was done by a structured questionnaire consisting of four sections including demographic information, sleep disorder assessment, emotional development scale and cognitive development scale. Sleep quality and sleep disturbances were assessed with standardized pediatric sleep assessment items as shown in table 2. Emotional development was measured by indicators of behavioral and emotional functioning. Cognitive development was measured by indicators of attention, memory, and academic performance.

Table 2. Distribution of Sleep Disorder Severity

Sleep Disorder Severity	Frequency	Percentage (%)
Mild	92	36.8
Moderate	96	38.4
Severe	62	24.8
Total	250	100.0

4.4 Data Analysis

The collected data were entered into SPSS Version 27 for statistical analysis, presented in table 3. Descriptive statistics including frequencies, percentages, means and standard deviations were used to describe participant's characteristics. Pearson correlation and multiple regression analyses were conducted to examine relations between sleep disorders and developmental outcomes.

Table 3. Mean Scores of Study Variables

Variable	Mean	Standard Deviation
Sleep Disorder Score	31.8	7.2
Emotional Development Difficulty Score	27.4	6.8
Cognitive Development Score	74.6	8.5

4.5 Ethical Considerations

The study was approved by the institutional review board. Written informed consent was received from parents or guardians before entering the study. Confidentiality, anonymity and voluntary participation were maintained throughout the study in compliance with the established research ethics guidelines [20–21].

5. Data Set and Parameters

The data set consisted of 250 randomly selected school aged children (6-12 years) from primary schools. The structured questionnaires and standardized assessment scales measured sleep disorders, emotional development and cognitive development outcomes. Demographic variables, including age and gender, were also included. The dataset was generated to investigate the link between childhood sleep disorders and developmental outcomes using statistical analysis techniques [19, 22].

Table 4. Dataset Parameters

Parameter	Description	Measurement Scale
Age	Child age (6–12 years)	Continuous
Gender	Male/Female	Nominal
Sleep Duration	Average hours of sleep per night	Continuous
Sleep Disorder Score	Severity of sleep problems	Continuous
Emotional Development Score	Emotional and behavioral functioning	Continuous

Cognitive Development Score	Attention, memory, and learning performance	Continuous
Academic Performance	School achievement level	Continuous

The collected dataset provided comprehensive information for evaluating associations between sleep disorders and children's emotional and cognitive development outcomes shown in table 4.

6. Results & Discussion

In this chapter the results of the study on the link between sleep disorders in childhood and the results of emotional and cognitive development are presented. Data was collected from 250 children between the ages of 6 and 12 years and analyzed using descriptive and inferential statistical techniques. The results have been presented in tables and figures for easy interpretation. The analysis is based on participant demographics, severity of sleep disorders, emotional development outcomes, cognitive development outcomes, and the relationships among the study variables.

Table 5. Distribution of Sleep Disorder Severity

Sleep Disorder Severity	Frequency	Percentage (%)
Mild	92	36.8
Moderate	96	38.4
Severe	62	24.8
Total	250	100.0

The results showed that the largest group was moderate sleep disorders, which affected 38.4% of the children. The table 5 shows that 36.8% of the participants with mild sleep disorders and 24.8% with severe sleep disorders. The findings suggest that sleep problems are common among school-aged children and may have an impact on development.

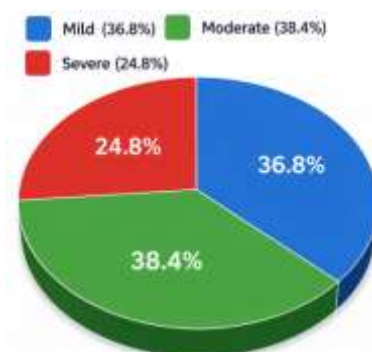


Fig.2. Sleep Disorder Severity Distribution

The distribution of sleep disorder severity among participants is presented in Figure 2. The most reported condition was moderate sleep disorders, followed closely by mild sleep disorders. Severe sleep disorders were present in almost a quarter of the sample which suggests a need for early recognition and intervention.

Table 6. Emotional Development Outcomes by Sleep Disorder Category

Sleep Disorder Category	Mean Emotional Difficulty Score	SD
Mild	18.5	5.1
Moderate	27.4	6.2
Severe	32.7	6.4

Table 6 shows that children with severe sleep disorders had the highest emotional difficulty scores (Mean = 32.7) while children with mild sleep disorders had considerably lower scores (Mean = 18.5). The findings indicate that the more severe the sleep disorder, the more emotional problems.

Table 7. Cognitive Development Outcomes by Sleep Disorder Category

Sleep Disorder Category	Mean Cognitive Score (%)	SD
Mild	84.3	7.2
Moderate	76.8	8.1
Severe	68.9	8.7

Results show a decrease in cognitive performance as the severity of sleep disorder increases. The children with mild sleep disorders had the best cognitive scores (84.3%) while the children with severe sleep disorders had the lowest scores (68.9%) as shown in table 7. The current finding suggests that sleep disturbances may be detrimental to cognitive functioning.

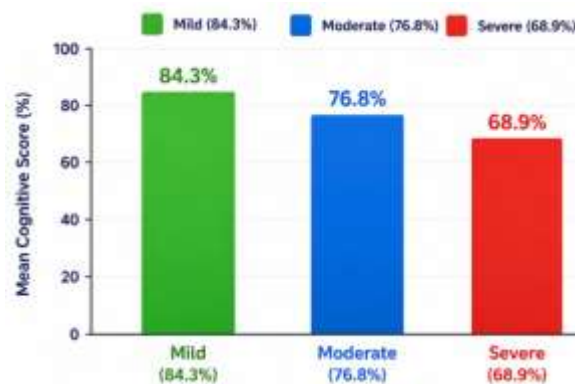


Figure 3. Cognitive Performance by Sleep Disorder Severity

As shown in figure 3 shows a decreasing trend in cognitive development scores with increasing levels of sleep disorder severity. This trend indicates that poorer sleep quality and more severity of sleep disturbances are associated with poorer cognitive performance such as attention, memory, and learning.

Table 8. Correlation Analysis

Variables	r-value	p-value
Sleep Disorders vs Emotional Difficulties	0.58	<0.001
Sleep Disorders vs Cognitive Development	-0.62	<0.001

Correlation analysis showed a significant positive association between sleep disorders and emotional difficulties ($r = 0.58$, $p < 0.001$). Likewise, table 8 reveals the significant negative relationship between sleep disorders and cognitive development outcomes ($r = -0.62$, $p < 0.001$). These findings are consistent with growing evidence for links between increasing sleep problems and poorer emotional and cognitive outcomes in children.

Discussion

The present findings indicate a strong association between sleep disorders in childhood and developmental outcomes. Children with severe sleep disorders had higher scores of emotional difficulties and lower cognitive performance than children with mild sleep disturbances. The findings add to existing research suggesting that poor sleep is detrimental to emotional regulation, attention, and memory and learning abilities. The positive relationship between sleep disorders and emotional difficulties, and the negative relationship with cognitive development, highlight the importance of healthy sleep for the well-being of children. Early screening, parental awareness and targeted interventions may help reduce sleep-related problems and improve emotional and cognitive development outcomes for children.

5. Conclusion

The goal of the study was to investigate the link between sleep disorders during childhood and outcomes of emotional and cognitive development in children aged 6–12 years. Results indicated a strong association between sleep disorders and increased emotional problems and lower cognitive performance. Children with moderate to severe sleep disturbances had worse emotional regulation, more behavioral problems, and lower cognitive achievement than children with mild sleep problems. The findings further emphasize the importance of getting enough sleep for healthy development and well-being in children. The study also underscores the importance of early identification, parental awareness and effective intervention strategies for sleep-related problems. Promoting healthy sleep habits can improve emotional regulation, boost cognitive abilities, enhance academic achievement, and foster positive developmental outcomes in children.

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