



Research Paper

Assessment of Sleep Quality in Children and Adolescents with ADHD

Maria Julia Todero¹, André Curiolleti Pereira², Marcela Soares², Caroline de Paula Cassânego³, Marta Regina Clivati⁴, Marcos Antonio da Silva Cristovam⁵.

¹Undergraduate Medical Student, School of Medicine, Western Paraná State University, Cascavel, Paraná, Brazil.

²Pediatrics Residency Program, Department of Pediatrics, Western Paraná University Hospital, Cascavel, Paraná, Brazil.

³M.D., Assistant Professor of Pediatrics, School of Medicine, Western Paraná State University, Cascavel, Paraná, Brazil.

⁴M.D., M.Sc., Pediatric Neurologist; Volunteer Physician in the Pediatrics Residency Program, Department of Pediatrics, Western Paraná University Hospital, Cascavel, Paraná, Brazil.

⁵M.D., M.Sc., Assistant Professor of Pediatrics, School of Medicine, Western Paraná State University, Cascavel, Paraná, Brazil.

Institution: Western Paraná State University, Cascavel, Paraná, Brazil.

Corresponding author: Marcos Antonio da Silva Cristovam

ABSTRACT

Background: Sleep disorders are common among children and adolescents with attention deficit disorder with hyperactivity (ADHD) who are treated with psychostimulants. Adequate sleep quality is essential for consolidating learning and maintaining physical and psychological well-being.

Objective: To assess sleep quality in children and adolescents with ADHD who are treated with psychostimulants.

Methods: The Adolescent Sleep Hygiene Scale (ASHS) was applied to children and adolescents receiving regular care at an outpatient clinic specializing in academic underachievement from a university hospital between August 2025 and April 2026. The study assessed sleep quality in participants diagnosed with ADHD who were using central nervous system stimulants. The variables analyzed were age, sex, body mass index (BMI), and ASHS score.

Results: A total of 60 questionnaires were completed; five were excluded because of missing data. The final analysis included 55 questionnaires, completed by 37 male (67.2%) and 18 female (32.8%). No statistically significant associations were observed between sleep quality and age ($p = 0.390$), sex ($p = 0.563$), or BMI ($p = 0.565$). However, the descriptive analysis showed a higher proportion of "poor" sleep quality among children younger than 12 years (40.8% vs. 16.7%), female participants (44.4% vs. 35.1%), and participants with excess weight (45.0% vs. 34.3%).

Conclusion: Poor sleep quality was more frequent among children younger than 12 years, female participants, and participants with excess weight. These findings underscore the importance of individualized clinical approaches to sleep hygiene in pediatric patients with ADHD who are treated with psychostimulants.

Key-words: children; questionnaires; sleep quality; attention deficit disorder with hyperactivity; central nervous system stimulants.

Received 07 Oct., 2026; Revised 16 Oct., 2026; Accepted 18 Oct., 2026 © The author(s) 2026.

Published with open access at www.questjournals.org

I. INTRODUCTION

Sleep plays a fundamental role in maintaining physiological homeostasis and supporting proper cognitive and emotional functioning. This role is particularly important during childhood, a period marked by intensive neurological and behavioral development¹. In children with attention deficit disorder with hyperactivity (ADHD), the importance of sleep is even more evident because changes in sleep patterns are highly prevalent and may significantly impair academic performance, social interactions, and family dynamics². Recent studies

indicate that sleep disorders occur more frequently in children with ADHD^{3,4}. In addition, pharmacological treatment with psychostimulants may adversely affect sleep quality⁵.

Both subjective and objective methods are available for assessing sleep quality. In this context, subjective instruments such as the Adolescent Sleep Hygiene Scale (ASHS) provide a practical and cost-effective alternative, particularly when compared with objective methods such as polysomnography and actigraphy, which can be costly and less feasible in clinical practice and population-based studies^{6,7}.

Accordingly, this study aimed to apply the ASHS to assess sleep quality in children and adolescents diagnosed with ADHD who were using stimulant medication.

II. METHOD

This epidemiological, observational, descriptive, cross-sectional study was conducted at an outpatient clinic specializing in academic underachievement at a teaching hospital in Cascavel, Paraná, Brazil, between August 2025 and April 2026. After written informed consent was obtained from the participants' parents or legal guardians and written informed assent was obtained from adolescents older than 12 years, the participants or their parents or guardians completed the Adolescent Sleep Hygiene Scale (ASHS). This study did not, however, constitute a formal translation or validation of the instrument.

The inclusion criteria were a diagnosis of ADHD based on the Diagnostic and Statistical Manual-5 (DSM-5) diagnostic criteria, current use of psychostimulant medication (atomoxetine or methylphenidate), and voluntary participation in the study.

The variables analyzed were age, sex, body mass index (BMI), and ASHS score. Participants or their parents or guardians were instructed to answer each item according to how often the participant had engaged in specific sleep-related behaviors during the previous month. Responses were recorded on a six-point Likert scale with the following options: always, frequently, almost always, sometimes, rarely, and never. Scores were assigned as follows: 6 points for "never," 5 for "rarely," 4 for "sometimes," 3 for "almost always," 2 for "frequently," and 1 point for "always." Item 27 was reverse scored, with 6 points assigned to "always" and 1 point to "never." Based on the total score, sleep quality was categorized as excellent (165-198 points), very good (132-164 points), good (99-131 points), or poor (98 points or fewer). The questionnaire was administered individually so that each respondent could read and complete it independently according to their own perceptions. One of the researchers was present throughout administration to provide assistance when needed.

Body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared (kg/m^2), and classified according to the World Health Organization sex-specific BMI-for-age Z-score reference for individuals aged 5-18 years (WHO, 2007). The categories were defined as follows: thinness (Z score ≥ -3 and < -2), normal weight (Z score ≥ -2 and $\leq +1$), and excess weight, including overweight, obesity, and severe obesity (Z score $> +1$, including values $> +3$). Body weight was measured using an electronic scale (*Lider®*, model P-300C, serial number 31403, 2014, Brazil), with participants wearing light clothing. Height was measured using a wall-mounted stadiometer (*Tonelli Equipamentos Médicos Ltda.*, model E150A, 2014, Brazil), with participants barefoot.

Study variables were described using absolute frequencies (n) and percentages (%). Because of the small number of participants, sleep quality was grouped into only two categories for this analysis: 1) excellent, very good, or good and 2) poor. Fisher's exact test was used to assess the associations of the ASHS sleep quality classification with the demographic variables (age and sex) and the clinical variable (BMI), and p -value < 0.05 was considered significant.

This study was approved by the Research Ethics Committee of Western Paraná State University (approval n° 7,208,593/2024).

III. RESULTS

A total of 60 questionnaires were completed, five of which were excluded because of missing data, yielding 55 participants for analysis. Of these, 37 (67.2%) were male and 18 (32.8%) were female. No statistically significant associations were observed between sleep quality and age ($p = 0.390$), sex ($p = 0.563$), or body mass index (BMI) ($p = 0.565$). Nevertheless, the descriptive analysis showed a higher proportion of sleep quality classified as poor among children younger than 12 years (40.8% vs. 16.7%), female participants (44.4% vs. 35.1%), and participants with excess weight (45.0% vs. 34.3%).

Table 1 presents the associations between age, sex, BMI, and the sleep quality classification based on ASHS scores.

ASHS*	Age				p-value
	Under 12 years		12 years or older		
	n	%	n	%	
Excellent, Very Good, or Good	29	59.2%	5	83.3%	0.390
Poor	20	40.8%	1	16.7%	
Total	49	100.0%	6	100.0%	
ASHS*	Sex				p-value
	Female		Male		
	n	%	n	%	
Excellent, Very Good, or Good	10	55.6%	24	64.9%	0.563
Poor	8	44.4%	13	35.1%	
Total	18	100.0%	37	100.0%	
ASHS*	BMI**				p-value
	Underweight or Normal Weight		Overweight or Obesity		
	n	%	n	%	
Excellent, Very Good, or Good	23	65.7%	11	55.0%	0.565
Poor	12	34.3%	9	45.0%	
Total	35	100.0%	20	100.0%	

*ASHS: Adolescent Sleep Hygiene Scale; **BMI: body mass index.

IV. DISCUSSION

Children and adolescents diagnosed with ADHD are more susceptible to sleep disorders⁸. Investigating the factors that influence sleep in ADHD presents a complex methodological challenge, particularly when examining the interaction between psychostimulant use and environmental and behavioral factors⁹.

In this study, a high proportion of participants younger than 12 years had inadequate sleep quality. Although no association between sleep quality and age was identified, the current literature indicates that younger children with ADHD experience greater difficulty maintaining good sleep hygiene^{10,11}.

Regarding sex, the descriptive data indicated poorer sleep quality among female children and adolescents. Studies indicate that girls tend to experience poor sleep quality, primarily because they are more likely to experience symptoms of anxiety and nighttime restlessness^{12,13}.

When sleep quality was examined in relation to BMI, a marked descriptive association was observed between excess weight and poorer sleep quality. The literature supports this association, indicating that metabolic disorders, weight gain, and sleep fragmentation are intrinsically interrelated¹⁴. In addition, children with ADHD who use psychostimulants frequently experience irregular eating patterns and disruptions to the circadian cycle as adverse effects of treatment. These changes contribute to the risk of excess weight and may impair sleep efficiency¹⁵.

This study had several limitations, including the small number of participants, its cross-sectional design, which precludes the establishment of causal relationships, and the use of a convenience sample, which may limit the generalizability of the findings. In addition, the questionnaire may be subject to response bias. Nevertheless, the study also had important strengths, including the use of a widely employed screening instrument, the analysis of multiple variables (sex, age, and body mass index), the performance of a correlational analysis, an adequate sample size for the study's scope, and the originality of the study in Brazil. Together, these features contribute to the robustness and relevance of the findings.

V. CONCLUSION

Although no statistically significant association was found between sleep quality and age, sex, or BMI, a higher proportion of poor sleep quality was observed among participants younger than 12 years, female participants, and participants with excess weight.

These trends highlight the importance of an individualized clinical approach that considers demographic and metabolic factors when assessing sleep quality in children diagnosed with ADHD.

Disclosure Statement: the authors declare no conflicts of interest.

Funding: the authors declare no funding source to this research.

REFERENCES

- [1]. Lisboa AAS, Nunes ML. Sleep disorders in adolescents: a critical assessment of the influence of electronic devices - a literature review. *Resid Pediatr*. 2025;15(1):1-9. doi:10.25060/residpediatr-2025.v15n1-1220.
- [2]. Martins R, Scalco JC, Ferrari Junior GJ, Gerente JGDS, Costa MDL, Beltrame TS. Sleep disturbance in children with attention-deficit hyperactivity disorder: A systematic review. *SleepSci*. 2019 Oct-Dec;12(4):295-301. doi: 10.5935/1984-0063.20190088. PMID: 32318251; PMCID: PMC7159075.
- [3]. Almeida MES, Freitas FL, Oliveira FAC, Pires ME, Fernandes JAS, Chagas BR, et al. Sleep and ADHD in children: the impact of changes in the circadian cycle on cognitive development. *J Med Biosci Res*. 2025;2(2):273-80. doi:10.5281/jmbr.2025.27380.
- [4]. Oliveira ACG, Lamana IV, Nogueira NBA, Bertazzo LT, Santos JCC, Stangherlin L. Attention-deficit/hyperactivity disorder (ADHD) and sleep disorders: what do we know now, and where are we headed? *Braz J Clin Med Rev*. 2024;2(1):e25. doi:10.52600/2763 583X.bjcmr.2025.3.1.bjcmr25.
- [5]. Wiggs KK, Breaux R, Langberg JM, Peugh JL, Becker SP. Examining daily stimulant medication use and sleep in adolescents with ADHD. *Eur Child Adolesc Psychiatry*. 2024 Mar;33(3):821-832. doi: 10.1007/s00787-023-02204-w. Epub 2023 Apr 12. PMID: 37043095; PMCID: PMC12376402.
- [6]. Markovich AN, Gendron MA, Corkum PV. Validating the Children's Sleep Habits Questionnaire Against Polysomnography and Actigraphy in School-Aged Children. *Front Psychiatry*. 2015 Jan 6;5:188. doi: 10.3389/fpsyt.2014.00188. PMID: 25610402; PMCID: PMC4285019.
- [7]. Van de Water AT, Holmes A, Hurley DA. Objective measurements of sleep for non-laboratory settings as alternatives to polysomnography - a systematic review. *J Sleep Res*. 2011 Mar;20(1 Pt 2):183-200. doi: 10.1111/j.1365-2869.2009.00814.x. PMID: 20374444.
- [8]. Corkum P, Tannock R, Moldofsky H. Sleep disturbances in children with attention-deficit/hyperactivity disorder. *J Am Acad Child Adolesc Psychiatry*. 1998 Jun;37(6):637-46. doi: 10.1097/00004583-199806000-00014. PMID: 9628084.
- [9]. Cortese S, Konofal E, Yateman N, Mouren MC, Lecendreux M. Sleep and alertness in children with attention-deficit/hyperactivity disorder: a systematic review of the literature. *Sleep*. 2006 Apr;29(4):504-11. PMID: 16676784.
- [10]. Lycett K, Mensah FK, Hiscock H, Sciberras E. Comparing subjective measures of behavioral sleep problems in children with ADHD: a cross-sectional study. *Sleep Med*. 2015 Nov;16(11):1377-1380. doi: 10.1016/j.sleep.2015.08.015. Epub 2015 Aug 29. PMID: 26498239.
- [11]. Cortese S, Faraone SV, Konofal E, Lecendreux M. Sleep in children with attention-deficit/hyperactivity disorder: meta-analysis of subjective and objective studies. *J Am Acad Child Adolesc Psychiatry*. 2009 Sep;48(9):894-908. doi: 10.1097/CHI.0b013e3181ac09c9. PMID: 19625983.
- [12]. Mowlem F, Agnew-Blais J, Taylor E, Asherson P. Do different factors influence whether girls versus boys meet ADHD diagnostic criteria? Sex differences among children with high ADHD symptoms. *Psychiatry Res*. 2019 Feb;272:765-773. doi: 10.1016/j.psychres.2018.12.128. Epub 2018 Dec 27. PMID: 30832197; PMCID: PMC6401208.
- [13]. Becker SP, Cusick CN, Sidol CA, Epstein JN, Tamm L. The impact of comorbid mental health symptoms and sex on sleep functioning in children with ADHD. *Eur Child Adolesc Psychiatry*. 2018 Mar;27(3):353-365. doi: 10.1007/s00787-017-1055-2. Epub 2017 Oct 5. PMID: 28983772; PMCID: PMC5854508.
- [14]. Cohen-Zion M, Ancoli-Israel S. Sleep in children with attention-deficit hyperactivity disorder (ADHD): a review of naturalistic and stimulant intervention studies. *Sleep Med Rev*. 2004 Oct;8(5):379-402. doi: 10.1016/j.smrv.2004.06.002. PMID: 15336238.
- [15]. Kidwell KM, Van Dyk TR, Lundahl A, Nelson TD. Stimulant Medications and Sleep for Youth With ADHD: A Meta-analysis. *Pediatrics*. 2015 Dec;136(6):1144-53. doi: 10.1542/peds.2015-1708. PMID: 26598454.