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CLINICAL REVIEW

Sleep problems in autism spectrum disorders: Prevalence, nature, & possible biopsychosocial aetiologies

Amanda L. Richdale [a,*], Kimberly A. Schreck [b,c]

[a] Olga Tennison Autism Research Centre, School of Psychological Science, La trobe University, Bundoora, VIC 3086, Australia
[b] Penn State University, 777 W. Harrisburg Pike, W311 Olmsted Building, Middletown, PA 17057-4898, USA

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SUMMARY

As considerably more people are diagnosed with an autism spectrum disorder (ASD), interest in the associated behaviours, including sleep problems has increased. This has resulted in a subsequent increase in the research related to the sleep problems occurring in people with an ASD. This article summarizes and evaluates the current literature related to a) the higher prevalence of a sleep problem compared to typically developing children, b) the specific types of sleep problems for people with an ASD, and c) the possible aetiology of sleep problems in the ASDs within a biopsychosocial framework. It is concluded that recent studies confirm that the majority of this population are likely to experience sleep difficulties, with settling issues in children with an ASD the most commonly reported. However, exploration of the types of sleep difficulties and associated aetiological factors in the ASDs is still in its infancy.

It is generally agreed that the incidence of autism spectrum disorders (ASDs) has been increasing and the estimated population prevalence is now 0.6%.[1] These disorders (autism, Asperger syndrome (AS) and pervasive developmental disorder not otherwise specified) affect all areas of a child's development, including communication, socialisation, and behaviour.[2] Patterns of other commonly occurring behaviours include sleep difficulties.[2] Through a variety of measurement procedures, including sleep EEG or polysomnography (PSG), actigraphy, sleep diary, and sleep questionnaire studies, as we will show, research predominantly has supported the observation that people with an ASD experience more sleep problems than the general population. As sleep issues are increasingly observed and supported over the last 10 years, more professionals are routinely asked to identify and treat these sleep problems and possibly related behaviours. This review will discuss and evaluate sleep problems in ASDs with reference to a) prevalence, b) nature, and c) potential aetiology.

Prevalence of sleep problems in autism spectrum disorders

The prevalence of sleep problems in any population is affected by several variables, including criteria used to define and measure the sleep problem, age, IQ (Intelligence Quotient), informant, sampling, and sample size. The criteria and definitions of sleep problems are particularly affected in paediatric research because no clear consensus on sleep disorder definitions exist. Generally researchers do not use classificatory systems such as the DSM-IV-TR (Diagnostic and Statistical Manual of Mental Disorders (4th ed.)–Text Revision),[2] ICD-10 (International Classification of Diseases (10th ed.)),[3] or ICSD-2 (International Classification of Sleep Disorders)[4] or its predecessors. Researchers typically construct their own criteria or definitions of sleep problems, such as cut-off or frequency scores on sleep questionnaires or diaries, or based on parent-report that a sleep problem is present.

The issue of sleep problem measurement is further complicated when measuring children's sleep. Adults with sleep difficulties can report directly to health care providers. However, measurement and description of childhood sleep problems, especially for children with developmental disabilities (DDs) such as ASD, differ as a parent or another responsible adult (e.g., teacher) generally reports and describes the problem. Information may be sought directly from older typically developing (TD) children and adolescents, but where children have an intellectual disability (ID), DD, or ASD parents or carers are likely to be the major source of information about sleep through to adulthood. It can be argued that if the parent believes that there is a sleep problem then some investigation is warranted, even if only to eliminate the child's sleep as the primary issue of concern.

Despite this variability in research definitions and measurement, sleep problems are commonly reported in TD children. For children in the age range 0–6 years as many as 50% may have a sleep problem and on average 25% of all children will experience

* Corresponding author. Tel.: +61 (0) 3 9479 2497; fax: +61 (0) 3 9479 1956.
E-mail addresses: a.richdale@latrobe.edu.au (A.L. Richdale), kas24@psu.edu (K.A. Schreck).
[c] Tel.: +1 717 948 6048; fax: +1 717 948 6519.

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Abbreviations

ADHD	Attention Deficit Hyperactivity Disorder
AS	Asperger syndrome
ASD	autism spectrum disorder. Includes autism, pervasive developmental disorder, and Asperger's syndrome
CAP	cyclic alternating pattern
CBCL	child behavior checklist
CSHQ	Children's Sleep Habits Questionnaire
DD	developmental disability
DS	Down syndrome
DSM-IV-TR	Diagnostic and Statistical Manual of Mental Disorders (4th ed.) – Text Revision.
GARS	Gilliam Autism Rating Scale
ICD-10	International Classification of Diseases (10th ed.)
ICSD-2	International Classification of Sleep Disorders
ID	intellectual disability
IQ	Intelligence Quotient
NREM	non-rapid eye movement sleep
OSA	Obstructive Sleep Apnoea
PDDNOS	pervasive developmental disorder not otherwise specified
PLMS	Periodic Limb Movements in Sleep
PSG	polysomnography
PWS	Prader–Willi syndrome
REM	rapid eye movement sleep
SW sleep	slow wave sleep
TD	typically developing

sleep difficulties at some time.[5] When an ID (IQ < 70) or DD is present sleep problems may be found in up to 80% of children.[5]

Children and adolescents with an ASD are particularly vulnerable to sleep difficulties, regardless of their age or IQ with around two-thirds having a sleep problem at some point in childhood.[6] Sleep problems are persistent in ASDs, for example 63% of children with a parent-reported past sleep problem also had a current sleep problem.[7] Studies continue to find parent-reported sleep problem rates ranging from around 50% to 80% for children with an ASD compared with 9% to 50% for comparison groups.[8–11] The prevalence of parent-reported sleep problems is potentially affected by sample size and sample composition. Nevertheless, there are now sleep studies that include around 200–300 children[12–14] with an ASD. Children and young adults with AS also self-report a higher rate of sleep problems than TD peers.[15–17] Overall the high rate of parent-reported sleep problems in the ASDs found in earlier studies[6] continues to be supported by more recent research.

While some report that there may be an increased proportion of more developmentally delayed children with an ASD and sleep problems[18] many recent studies with high rates of parent-reported sleep problems have predominantly examined high-functioning children (IQ > 70). The frequency of sleep problems in low-functioning adults with autism may be similar to that of adults with an ID,[19] which may reflect the generally higher rate of sleep difficulties in individuals with an ID compared with TD individuals. However, the lack of association of sleep problems with IQ in children was again supported in a recent population-based study of 2–5 year-olds with an ASD.[13] This study is also consistent with previous sleep disorder prevalence estimates with 52.5% of young children with an ASD having a parent-reported sleep problem compared with 46% of children with a DD and 31.9% of TD children.[13] Nevertheless in early childhood, those who have a DD or are TD may have comparably high rates of sleep problems to young children with an ASD.[20]

A further difficulty in determining prevalence of sleep problems in children with an ASD is that comparison groups are often composed of mixed disabilities[20] that can present with differing types of sleep problems. For example parent-reported sleep problems in TD children and children with autism, Prader–Willi syndrome (PWS) or Down syndrome (DS) showed that settling difficulties significantly differentiated the children with autism from the other groups, while excessive daytime sleepiness differentiated children with PWS.[21] Thus individual disabilities can be differentiated by type of sleep problem reported. Consequently, in mixed comparison groups, sample composition may affect our understanding of prevalence data and reported susceptibility to certain types of sleep problems if the individual DDs comprising the group are ignored. Despite the issues involved in determining prevalence rates of sleep problems, it is clear that high rates of sleep problems are common in ASDs.

Practice points

1. Increased prevalence of sleep problems is commonly reported for children with an ASD.
2. The influence of IQ or intellectual functioning on sleep problems for children with an ASD is sometimes contradictory.

Research agenda

In future studies it will be important to:

1. Avoid or control for mixed DD comparison groups when assessing sleep in ASD.
2. Assess potential differences across specific DDs and ASD when examining the frequency of sleep problems.
3. Control for IQ and other measures of functioning levels in determining the influence of these factors on sleep problems in ASDs.
4. Use standardized sleep disorder definitions when assessing sleep in ASD.

Types of sleep problems in ASDs

Within the scope of this article, it is impossible to define and describe all sleep disorders commonly occurring for children. Consequently, readers are directed to Sheldon et al.'s[5] comprehensive book on paediatric sleep for a description of insomnia, parasomnia, circadian rhythm sleep disturbances, and other sleep disturbances in TD children. Among the sleep problems most commonly found in children, sleep onset and maintenance problems, and sleep duration are consistently the most predominant concerns expressed by parents of children with an ASD that is, symptoms of insomnia.[11] In Table 1 we have arranged the reported sleep problems against the eight ICSD-2[4] broad criteria for classifying sleep disorders to give a sense of the range and scope of sleep difficulties that are reported for children with an ASD. The most commonly reported sleep problems are those consistent with disorders classified within the ICSD's "Behavioral Insomnia of