

# Sleep Problems Predict and Are Predicted by Generalized Anxiety/Depression and Oppositional Defiant Disorder

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**Objective:** We tested whether sleep problems co-occur with, precede, and/or follow common psychiatric disorders during childhood and adolescence. We also clarified the role of comorbidity and tested for specificity of associations among sleep problems and psychiatric disorders. **Method:** Data came from the Great Smoky Mountains Study, a representative population sample of 1,420 children, assessed 4 to 7 times per person between ages 9 and 16 years for major *Diagnostic and Statistical Manual-Fourth Edition (DSM-IV)* disorders and sleep problems. Sleep-related symptoms were removed from diagnostic criteria when applicable. **Results:** Sleep problems during childhood and adolescence were common, with restless sleep and difficulty falling asleep being the most common symptoms. Cross-sectional analyses showed that sleep problems co-occurred with many psychiatric disorders. Longitudinal analyses revealed that sleep problems predicted increases in the prevalence of later generalized anxiety disorder (GAD) and high GAD/depression symptoms, and oppositional defiant disorder (ODD). In turn, GAD and/or depression and ODD predicted increases in sleep problems over time. **Conclusions:** Sleep problems both predict and are predicted by a diagnostic cluster that includes ODD, GAD, and depression. Screening children for sleep problems could offer promising opportunities for reducing the burden of mental illness during the early life course. *J. Am. Acad. Child Adolesc. Psychiatry*, 2014;53(5):550–558. **Key Words:** sleep problems, GAD, depression, ODD, adolescence

The relationship between psychiatric disorders and sleep problems is complex. The *DSM-IV* describes 4 groups of sleep-related disorders: primary sleep disorders “presumed to arise from endogenous abnormalities in sleep-wake generating or timing mechanisms” (p. 551); sleep disturbance that results from a diagnosable mental disorder; sleep disorder due to a general medical condition; and substance-induced sleep disorder.<sup>1</sup> Here, we use a prospective, longitudinal sample of children and adolescents from the community to test the validity of the *DSM* assumption that the causal arrow runs from psychiatric disorders to sleep problems.<sup>2</sup> We also test 2 additional possibilities: that sleep problems have only concurrent but no longitudinal associations with mental disorders; and that sleep disturbances predict later psychiatric illness.

Depressive disorders, generalized anxiety disorder (GAD), and separation anxiety disorder

(SAD) all list sleep problems among their core symptoms; panic disorder includes sleep problems as concomitants but not core criteria. Consequently, research on sleep problems and psychopathology in the early life course has primarily focused on internalizing disorders, with a special emphasis on depression.<sup>3</sup> Sleep problems are not currently part of the diagnostic criteria of externalizing disorders but have been linked to aggression, attention problems, and substance use in youth (reviewed by Gregory and Sadeh<sup>4</sup>). Little is currently known about associations among sleep problems and oppositional defiant disorder (ODD), although this disorder is at the intersection of internalizing and externalizing disorders and also tends to precede depression and GAD.<sup>5,6</sup>

For testing the assumption of directionality from psychiatric disorders to sleep problems during adolescence, prospective-longitudinal data are needed. Findings of depression<sup>7,8</sup> and anxiety<sup>8,9</sup>

predicting later insomnia have been reported. However, generally, the evidence for the *DSM's* assumed direction of effect during the adolescent period is limited<sup>4</sup>— in part, because studies were unable to test this prediction,<sup>10</sup> but also because they did not find significant predictions.<sup>3,11</sup> More support has been reported for the reverse direction of prediction. In observational community samples, childhood sleep problems predicted later depression/anxiety,<sup>3,7,8,10,12</sup> and also externalizing problems and substance use.<sup>13-15</sup> In clinical samples, sleep abnormalities predicted later depression recurrence.<sup>16</sup>

Thus, few studies have tested predictions from psychiatric disorder to sleep problems during adolescence, and additional challenges limit the conclusions that can be drawn. First, longitudinal studies on sleep problems that include diagnostic measures of both different internalizing and externalizing disorders are rare. Indeed, comorbidity among disorders is often not controlled, thus limiting possible conclusions about specificity of associations. Linkages between sleep problems and a disorder (e.g., depression) could partially or fully be accounted for by their joint association with another comorbid disorder (e.g., ODD). Second, associations between sleep problems and select disorders (e.g., depression, GAD) could be an artifact of dual measurement of the same sleep problem in both predictor and outcome. Therefore, sleep symptoms must be excluded from the diagnostic criteria for the disorder.<sup>17</sup> Third, studies identifying predictions from childhood/adolescence to sleep problems decades later have documented the long-term importance of sleep for mental health, but more work is needed to understand whether sleep problems already manifest themselves in a range of psychiatric disorders and vice versa over shorter time frames during the early life course. The present study uses parent- and child-reports of 11 *DSM-IV* sleep problems and common psychiatric disorders of childhood and adolescence to address these challenges.

## METHOD

### Participants

The Great Smoky Mountains Study is a longitudinal study of the development of psychiatric disorders in rural and urban youth.<sup>18,19</sup> A representative sample of 3 cohorts of children, aged 9, 11, and 13 at intake, was recruited from 11 counties in western North Carolina. Potential participants were selected from the population of some 12,000 children using a household equal probability, accelerated cohort design. All children

scoring above a predetermined cutoff point (the top 25% of the total score) on the externalizing scale of the Child Behavior Checklist (CBCL),<sup>20</sup> plus a 1-in-10 random sample of the remaining 75% of the total scores, were recruited for detailed interviews. All subjects were assigned a weight inversely proportional to their probability of selection, and all results presented here are weighted for the sampling procedure; thus results are representative of the population from which the sample was drawn, and not biased by the oversampling procedure. Approximately 8% of the area residents and the sample are African American, less than 1% are Hispanic, and 3% are American Indian. Of all subjects selected, 80% ( $N = 1,420$ ) agreed to participate. Here, we analyzed all assessments from participants aged 9 to 16 years ( $n = 7$ ,  $n = 6$ , and  $n = 4$  assessments for cohorts 1, 2, and 3, respectively).<sup>19</sup> Across annual assessments, participation rates ranged between 74% and 94%.

### Procedures

A parent (biological mother for 83% of interviews) and the subject were interviewed by trained interviewers separately. Before the interviews began, parent and child signed informed consent forms approved by the Duke University Medical Center Institutional Review Board. Each parent and child received an honorarium for his or her participation.

### Measures

Psychiatric and substance use disorders were assessed using the Child and Adolescent Psychiatric Assessment.<sup>21-23</sup> This structured interview enables interviewers to determine whether symptoms, defined in an extensive glossary, are clinically significant, and to code their frequency, duration, severity, and onset. Scoring algorithms generate either symptom scales or diagnoses made using the *DSM-IV*.<sup>1</sup> The time frame of the Child and Adolescent Psychiatric Assessment for assessing psychiatric disorders and also sleep problems is the 3 months preceding each interview. Symptoms were coded as present if parent, child, or both reported it, as is standard practice for clinical symptoms. Major depressive disorder (MDD), dysthymia, minor depression, GAD, and SAD have sleep problems listed among the *DSM-IV* diagnostic criteria. Thus, new algorithms were written to exclude these sleep problems from these disorders (depressive disorders: insomnia or hypersomnia, fatigue; GAD: easy fatigability, trouble falling or staying asleep; SAD: difficulty falling asleep, nightmares). Disorders with a prevalence of less than 1% (i.e., post-traumatic stress disorder, panic disorder, agoraphobia, specific phobia, bipolar disorder) were not analyzed separately but are included in the "any diagnosis" category.

### Depression and GAD

Some have recommended combining depression and generalized anxiety into 1 "distress disorders"

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