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# **Sleep Problems in Childhood: A Longitudinal Study of Developmental Change and Association With Behavioral Problems**

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Sleep problems commonly co-occur with psychiatric problems. In children, sleep problems have been associated with a range of emotional/behavioral disorders, including externalizing disorders (Aronen et al., 2000; Dahl, 1996), attention problems (Dahl et al., 1991; Gruber et al., 2000; Guilleminault et al., 1982; Yuen and Pelayo, 1999), anxiety/depression (Johnson et al., 2000; Ryan et al., 1987), autism (Lainhart, 1999), and Tourette's syndrome (Glaze et al., 1983).

These findings complement and extend the better known connection between sleep and a range of disorders in adults, including depression (Breslau et al., 1996), schizophrenia (Ganguli et al., 1987), eating disorders (Nobili et al., 1999; Walsh and Goetz, 1990), alcohol and substance abuse (Breslau et al., 1996; Ford and Kamerow, 1989; Gillin, 1994), obsessive compulsive disorder (Insel et al., 1982), and borderline personality disorder (Benson et al., 1990).

Much has been learned about the nature and prevalence of sleep disorders in children and adolescents (e.g., Ohayon et al., 2000). The present study is concerned not per se, but instead with the developmental and clinical significance of more commonly reported and general problems in sleep. The present study investigates parental reports of sleep problems and behavioral/emotional problems over an 11-year period, from ages 4 to 15 years, in a sample of 490 children. Specifically, we examine (1) developmental changes in levels of sleep problems, (2) concurrent and predictive associations with behavioral/emotional problems, and (3) developmental changes in the correlation between sleep and behavioral/emotional problems.

## **Developmental Change and Stability of Sleep Problems**

Results from several studies indicate that sleep problems decrease with age during childhood. This conclusion is qualified, however, by the variation among studies in the length of follow-up. In particular, research on young children tends to use short time frames, typically just a few years (Kataria et al., 1987; Zuckerman et al., 1987). Those studies that investigate changes in sleep problems over longer time periods tend to begin in middle or late childhood (Clarkson et al., 1986). The present study extends prior research by examining the extent to which there is a decrease in the mean level of sleep problems from preschool through mid-adolescence, an age range not bridged in previous studies.

A separate question for longitudinal research concerns the stability of individual differences over time. Findings from previous studies suggest that sleep problems are relatively stable. However, as with mean level changes, most studies that have addressed this question have been comparatively short-term. For example, Zuckerman et al. (1987) reported that 41% of 8-month-old infants with sleep problems continued to show problems at 3 years, compared with 26% of infants without earlier problems. Similarly, Kataria et al. (1987) found that 84% of infants who showed sleep problems at 26 months experienced sleep problems 3 years later (see also Richman, 1981). Stability of individual differences in sleep problems is also found in adolescents (Bixler et al., 1979; Lozoff et al., 1985; Madansky and Edelbrock, 1990; Morrison et al., 1992) and adults (Breslau et al., 1996). This study assesses the stability of individual differences in sleep problems over an 11-year period, a larger time scale than has previously been reported.

### **Concurrent and Predictive Associations Between Sleep Problems and Behavioral/Emotional Problems**

Studies of adults suggest that sleep problems can cause depression. For example, Ford and Kamerow (1989) found that adults who reported insomnia at two consecutive interviews were significantly more likely to develop a new case of major depression over the course of the next year than were those without insomnia. Furthermore, the risk of developing major depression was reduced for those whose insomnia had resolved by the second assessment. Similar findings have been reported by other investigators (Breslau et al., 1996; Dryman and Eaton, 1991; Livingston et al., 1993; Weissman et al., 1997). Whether or not sleep problems forecast depression in children is less clear and is in need of further investigation (see Stoleru et al., 1997).

We examine the degree to which early sleep problems predict depression/anxiety in mid-adolescence. In addition, we expand on this issue in two ways. First, we explore the links between early sleep problems and other forms of behavioral/emotional problems, namely attention problems and aggression. Depression/anxiety is the behavioral/emotional outcome most commonly assessed in relation to sleep problems, but sleep problems overlap with a wide range of psychiatric disorders, as reviewed above. The present study examines the extent to which sleep problems are specific to depression/anxiety or, alternatively, are a nonspecific correlate of a range of behavioral/emotional problems in children.

Second, we also examine whether the association between sleep and behavioral/emotional problems is bidirectional, that is, the extent to which sleep problems in mid-adolescence are predicted from early behavioral/emotional problems. A bidirectional connection between sleep and behavioral/emotional problems has been suggested in previous research on adolescents (Patten et al., 2000; see also Dahl, 1996; Sadeh and Gruber, 1998) and adults (Rodin et al., 1988).

## **Relationship Between Sleep and Other Problems: Developmental Changes**

Given the strong association between sleep problems and depression in adults (American Psychiatric Association, 1994), a similar overlap might be expected in adolescents and children. However, the link between sleep problems and depression/anxiety, and how this overlap may change with development, is not yet clear. What evidence there is suggests that sleep problems and depression co-occur in adolescence (Dahl, 1996; Patten et al., 2000), but findings with younger children are inconclusive (Ryan et al., 1987; Stoleru et al., 1997). This pattern of findings suggests that the overlap between sleep problems and depression may strengthen over time, an impression supported by several cross-sectional studies (Benca et al., 1992; Johnson et al., 2000; Knowles and MacLean, 1990). In the present prospective longitudinal study, we examine the covariation between sleep and depression/anxiety over time, from preschool to mid-adolescence, in order to test the hypothesis of an increasing association over this age span.

In summary, three hypotheses are tested in the current study. First, we hypothesize a mean decrease in general sleep problems from preschool to adolescence; despite the mean change, however, we expect stability of individual differences. Second, we hypothesize that sleep problems in early childhood will predict subsequent depression/ anxiety; exploratory analyses will examine whether sleep problems equally predict other behavioral/emotional problems and whether sleep problems in mid-adolescence are predicted from earlier behavioral/emotional problems. Third, we hypothesize that there will be an increase in the co-occurrence of sleep problems and depression/ anxiety from preschool to mid-adolescence.

## **METHOD**

### **Participants**

The sample consists of participants in the Colorado Adoption Project (CAP), a large, prospective longitudinal study of children in adoptive ( $n = 245$ ) and nonadoptive (biological,  $n = 245$ ) families ( $n = 490$ , 53.7% male) (DeFries et al., 1994; Plomin et al., 1988). Parents were recruited by two large adoption agencies in Denver, the Lutheran Social Services of Colorado and Catholic Community Services. Adopted children were separated from their biological mothers at an average of 4 days after birth and were placed in their adopted homes at an average of 28 days after birth. Families agreeing to participate in the study were matched to nonadoptive control families in terms of child sex, number of children in the family, and father's age, occupation, and education. The nonadoptive families were recruited through Denver area hospitals. Ninety percent of the families were white, and the families were slightly above national average in terms of occupational status (see DeFries et al., 1994; Plomin and DeFries, 1985; Plomin et al., 1988).

Children in CAP have been assessed at regular (usually yearly) intervals since infancy. The present study includes data from age 4 years, the point at which standardized data on sleep problems were first assessed, through age 15 years, the latest period for which there are complete data. In analyses below, we combine parent reports from age 13, 14, and 15 years because of attrition (see attrition analyses below) and to maximize the number of children available for the longitudinal analyses. Combining across these ages is generally consistent with developmental research, which typically differentiates early and mid-adolescence from middle and late childhood. We refer to the age 13-to-15 year composite as “mid-adolescence.” Analyses (not shown) indicated that the findings were substantively identical when we used the mid-adolescent composite or only the data for those adolescents with data at age 15, so we report the more inclusive composite measure in mid-adolescence.

### **Procedure and Instruments**

Parent reports on the Child Behavior Checklist (CBCL) (Achenbach and Edelbrock, 1983), a widely used questionnaire composed of 118 items, were used to assess children’s behavior/emotional problems at ages 4, 7, 9, 10, 11, 12, 13, 14, and 15. The reliability and validity of this measure is well documented (e.g., Achenbach, 1991).

The CBCL consists of eight first-order factors and two second-order factors (Externalizing and Internalizing). To maximize comparability with previous research, we examined the first-order factors most often examined in research on sleep problems, Anxious/Depressed, Attention, and Aggression. The Anxious/Depressed scale consists of 14 items (e.g., “unhappy, sad, depressed,” “cries a lot” and “lonely”), the Attention scale consists of 11 items (e.g., “day dreams,” “acts young,” and “can’t sit still”), and the aggression scale consists of 19 items (e.g., “fights,” “screams,” and “argues”). A “sleep problem scale” was defined by six items from the CBCL (“experiences nightmares,” “sleeps less than most children,” “sleeps more than most children,” “talks or walks in sleep,” “trouble sleeping,” and “overtired”). This general sleep problem scale has been used in previous research (e.g., Stoleru et al., 1997), although it is not a standard CBCL scale. Each item on the CBCL was scored using a 3-point scale (0 = not true; 1 = sometimes true; 2 = very true/often true). A score for each of the four scales was computed by taking the mean value of the individual items in each scale.

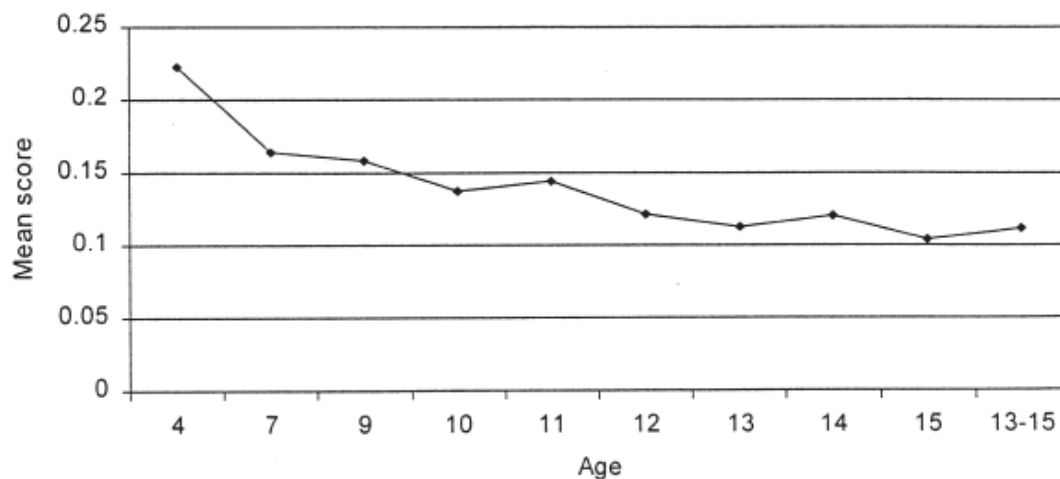
The internal consistencies of the three CBCL behavioral/emotional problem scales (Anxiety/Depression, Aggression, Attention Problems) were acceptable (e.g., Anxiety/Depression: 4 years  $\alpha = .69$ , 13–15 years  $\alpha = .82$ ). The internal consistency was lower for the sleep problem scale (4 years  $\alpha = 0.50$ , 13–15 years  $\alpha = 0.59$ ), most likely because the scale consists of different kinds of sleep difficulties, and there is no expectation that these particular sleep problems would co-occur. Consistent with previous studies (e.g., Stoleru et al., 1997), we decided to use a single sleep problem scale because our

interest was in assessing general disturbances in sleep problems rather than several specific kinds of problems.

As would be expected in a symptom count measure of psychopathology, the CBCL scales used in the analyses below are skewed. Accordingly, we transformed the data using a log transform. Although all analyses are performed on log transformed data, descriptive findings are reported as raw (untransformed) data (Fig. 1).

### Statistical Analysis

Developmental changes in sleep problems from age 4 to mid-adolescence were assessed with repeated measures analyses; stability of individual differences in sleep problems across this time period was assessed with bivariate correlations. Hierarchical regression analyses were used to examine the change in behavioral/emotional problem in mid-adolescence from sleep problems at age 4 years, and vice versa.



**Figure 1:** Children's sleep problems from age 4 years to mid-adolescence as rated by parents.

Finally, evidence for a developmental change in the strength of the associations between sleep problems and depression/anxiety is based on the Fisher  $r$  to  $z$  transformation.

## RESULTS

### Preliminary Analyses

Data for at least one time point were available on 490 children. Of this sample, data at both age 4 years and mid-adolescence were available on 360 children (74%). To assess whether there was selective attrition for any of the key variables, we conducted a series of  $t$  tests that compared the mean scores for participants on whom there were data at 4 years and mid-adolescence, and those for whom data were available at 4 years but not at the later time point. The differences between these two groups were not significant for Anxiety/Depression, Attention Problems, or Aggressive



Behavior. However, those children who were no longer in the study exhibited lower levels of sleep problems at age 4 years (mean = 0.05, SD = 0.07) compared with children who remained in the study through mid-adolescence (mean = 0.08, SD = 0.08;  $t_{419} = 3.14$ ,  $p < .05$ ).

### **Sleep Problems: Developmental Changes**

Mean levels of sleep problems from age 4 to mid-adolescence are displayed in Figure 1. Repeated measures analyses were performed, with time as the within-subject factor and adoptive status and child sex as between-subjects factors. Not surprisingly, the number of children available for this analysis depended on whether or not we included all nine assessments or just the two extreme time points at 4 years and mid-adolescence. Nevertheless, regardless of the number of assessments included, the findings indicated a significant decrease over time. For example, using only age 4 and mid-adolescent data resulted in a time effect of  $F_{1,354} = 75.66$ ,  $p < .001$ . More stringent inclusion criteria that required subjects to have complete data on multiple assessments resulted in a decreased sample size but a similarly high significant effect of age (for example, using somewhat arbitrarily chosen assessments of 4, 7, 11, and 15 years resulted in a time effect of  $F_{3,960} = 28.61$ ,  $p < .001$ ). There was no robust evidence in repeated measures analyses for a significant effect of child sex, adoptive status, or two- or three-way interactions between age, child sex, and adoptive status.

Although the means at ages 4 and mid-adolescence (Fig. 1) show a 50% drop in the level of problems, it is important note that this scale is heavily skewed toward no problems or minimal problems at each age. Despite these developmental changes in the mean level of sleep problems, individual differences were moderate and were less stable as the time interval between assessments increased. Stability of individual differences between the two extreme time points, at 4 years and mid-adolescence, was  $r_{360} = 0.29$ ,  $p < .001$ .

### **Early Sleep Problems Predict Subsequent Behavioral/Emotional Problems**

The prediction of behavioral/emotional problems in mid-adolescence from age 4 year sleep problems was assessed with hierarchical linear regression analyses. For each analysis, we included adoptive status (higher score indicates nonadoptive status), child sex (0 = male, 1 = female), and the age 4 stability measure for the behavioral/ emotional problem being predicted at step 1 (e.g., depression/anxiety at age 4 if we were predicting depression/anxiety at mid-adolescence); on step 2 we included the age 4 sleep problem measure. Thus, in the case of predicting depression/anxiety in mid-adolescence, a significant regression coefficient for sleep problems at age 4 years would mean that sleep problems in early childhood were associated with depression/anxiety in mid-adolescence, even after accounting for the stability of depression/ anxiety, as well as adoptive status and child sex.

Table 1 indicates that sleep problems at 4 years significantly predicted depression/anxiety in mid-adolescence ( $\beta = .16$ ,  $p < .01$ ,  $R^2 = 0.12$ ). Early sleep problems also predicted attention problems ( $\beta = .11$ ,  $p < .05$ ,  $R^2 = 0.25$ ; Table 2) and aggression ( $\beta = .11$ ,  $p < .05$ ,  $R^2 = 0.31$ ; Table 3) 11 years later. In each case, early sleep problems were associated with later behavioral/emotional problems after accounting for child sex, adoptive status, and stability of behavioral/emotional problems. In addition Tables 1–3 also show the expected connections between child sex and adoptive status and behavioral/emotional problems.

**Table 1:** Prediction of Anxiety/Depression in Mid-Adolescence From Sleep Problems at Age 4 Years

Variable	<i>B</i> (SE)	$\beta$	<i>T</i>
Step 1			
Anxiety/depression at age 4	.25 (.06)	.22	3.95***
Step 2			
Adoptive status	-.01 (.003)	-.14	-2.76**
Sex	.01 (.01)	.09	1.85†
Sleep problems at age 4	.13 (.04)	.16	2.95**

Note: Estimates reported are based on final regression equation. †  $p < .10$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

**Table 2:** Prediction of Attention Problems in Mid-Adolescence From Sleep Problems at Age 4 Years

Variable	<i>B</i> (SE)	$\beta$	<i>T</i>
Step 1			
Attention problems at age 4	.42 (.06)	.36	7.25***
Step 2			
Adoptive status	-.02 (.004)	-.26	-5.69***
Sex	-.01 (.01)	-.06	-1.37
Sleep problems at age 4	.10 (.05)	.11	2.14*

Note: Estimates reported are based on final regression equation. \*  $p < .05$ ; \*\*\*  $p < .001$ .

Although early sleep problems were a robust predictor of behavioral/emotional problems in mid-adolescence, there was no evidence that early depression/anxiety or aggression predicted sleep problems in mid-adolescence once adoptive status, child sex, and age 4 sleep problems were statistically controlled (not tabled). In contrast, only early attention problems predicted sleep problems in mid-adolescence after accounting for stability of sleep problems, child sex, and adoptive status ( $\beta = .11$ ,  $p < .05$ ,  $R^2 = 0.11$ ). In summary, whereas there is consistent evidence that early sleep problems are



consistently associated with an increase in later behavioral/emotional problems, there was less evidence of a reverse effect.

### Sleep and Behavioral Problems: Changes Over Time

Sleep problems were a nonspecific correlate of behavioral/emotional problems from age 4 to mid-adolescence. Sleep problems were moderately but significantly correlated with anxiety/depression (age 4,  $r_{421} = 0.39$ ; mid-adolescence,  $r_{393} = 0.52$ ; average correlation across the 11-year age period,  $r = 0.42$ ), attention problems (age 4,  $r_{421} = 0.38$ ; mid-adolescence  $r_{393} = 0.46$ ; average correlation across the 11-year age period,  $r = 0.37$ ), and aggression (age 4,  $r_{421} = 0.45$ ; mid-adolescence,  $r_{393} = 0.40$ ; average correlation across the 11-year age period,  $r = 0.38$ ).

**Table 3: Prediction of Aggression in Mid-Adolescence From Sleep Problems at Age 4 Years**

Variable	<i>B</i> (SE)	$\beta$	<i>T</i>
Step 1			
Aggression at age 4	.44 (.05)	.43	8.52***
Adoptive status	-.02 (.004)	-.22	-5.02***
Step 2			
Sex	-.02 (.01)	-.13	-2.87**
Sleep problems at 4	.12 (.05)	.11	2.28*

Note: Estimates reported are based on final regression equation. \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

The overlap between sleep problems and other behavioral/emotional problems was consistently moderate over time. However, there was evidence that the association between sleep problems and depression/anxiety increased with age. Specifically, the correlation between sleep and anxiety/depression increased from  $r = 0.39$  at age 4 to  $r = 0.52$  in mid-adolescence (see above). This increase was significant according to the Fisher  $r$  to  $z$  transformation ( $z = 2.33$ ,  $p < .05$ ). In contrast, the correlation between sleep and aggression or sleep and attention problems did not change significantly between age 4 and mid-adolescence.

### DISCUSSION

Sleep problems constitute an important correlate and risk factor for psychopathology in adults, but their psychopathological significance in children is much less clear. We examined three questions concerning the meaning of parent-reported sleep problems in a large prospective longitudinal study of a normal risk sample. First, we found that despite moderately stable individual differences in sleep problems, there was a sizable decrease from preschool to mid-adolescence. Second, sleep problems at age 4 years predicted an increase in depression/anxiety, inattention/overactivity, and aggression; evidence for a reciprocal association was inconsistent. Third,

there was a steady and significant increase in the overlap between sleep problems and depression/anxiety from early childhood to mid-adolescence. After a discussion of these findings, we address the limitations of the study and then suggest some clinical implications.

### **Stability and Change in Sleep Problems**

Findings concerning the course and stability of sleep problems extend prior work in this area. A decrease in reported problems, defined using a range of different measures, has been found in other reports (Clarkson et al., 1986). Similarly, previous studies also found that individual differences were stable across time (Bixler et al., 1979; Lozoff et al., 1985; Morrison et al., 1992). Thus, what was notable about our findings was that we replicated results from prior studies, but over a much longer time span and in a large normal-risk sample that was followed up prospectively from preschool to mid-adolescence.

### **Associations Between Sleep and Behavioral/Emotional Problems**

Results indicated a number of interesting associations between sleep problems and psychopathology, only some of which have been examined in detail in previous work. The first concerns the degree to which sleep problems are a specific versus nonspecific correlate of behavioral/ emotional problems in children. Analyses indicated considerable evidence for nonspecificity but only modest evidence for specificity. That is, on one hand, sleep problems were clearly a nonspecific correlate of behavioral/emotional problems because the overlap between sleep problems and depression/anxiety, inattention/overactivity, and aggression was moderate across all ages examined. In addition, sleep problems at age 4 predicted behavioral/emotional problems assessed 11 years later and were equally predictive of anxiety/depression, attention problems, and aggression.

On the other hand, there was at least one feature of the association between sleep problems and depression/anxiety that was not found for other behavioral problems syndromes, namely, an increased overlap with age. This finding is consistent with research examining both objective and subjective measures of sleep, which show strong links in adulthood but moderate, weak, or nonexistent overlap in children and adolescents (e.g., Carlson and Cordova, 1999; Garber and Kaminski, 2000). Observing this pattern in the same sample of children followed prospectively for 11 years offers the clearest evidence to date that the overlap of sleep problems and depression/anxiety is moderated by development.

A second consideration is why sleep problems covary with behavioral/emotional problems in children and, for depression/anxiety, why the co-occurrence may increase with age. Explanations for why depression/anxiety and sleep problems co-occur in adults or children and adolescents have varied widely, with some authors highlighting CNS involvement (Rao et al., 1996) and others suggesting that similar cognitive

mediators underlie both depression and insomnia (e.g., Harvey, 2001; Harvey, in press). Underlying some of the uncertainty is the question of whether this link is direct, arising from a common mechanism, or indirect. Our findings provide no necessary clues to the causal mechanisms that may be implied by a correlation. Nevertheless, two findings concerning development are noteworthy in this regard.

First, we found that sleep problems correlated with depression/anxiety and other problems to a moderate to large degree even in young children. If this finding is replicated, it would suggest that the search for causal mechanisms would need to involve very young children. Second, we obtained direct evidence that early sleep problems were associated with an increase in depression/anxiety, attention problems, and aggression; the reverse effect was not found, with the exception of attention problems. The implication is that disturbances in some features of sleep (e.g., its apparent regulatory function vis-à-vis biological rhythms and stress hormones) may lead to increases in behavioral/emotional disturbance, perhaps through biologically or cognitively mediated mechanisms. However, sleep problems may simply be a marker for developing psychopathology, or for some factor correlated with both sleep problems and other behavioral problems. Furthermore, the finding that early sleep problems predicted attention problems and aggression is consistent with other reports (Dahl, 1996; Dahl et al., 1991; Guilleminault et al., 1982). Whether or not the same mechanisms may account for the equally strong overlap between sleep and attention problems and aggression requires further research.

### **Limitations**

The results of this study and their interpretations should be considered in the context of potential limitations. One limitation concerns the restricted ethnicity of the sample. Ninety percent of the sample was white; these results may not generalize to minority populations.

Furthermore, the data were based exclusively on parent reports. Parent reports are an essential ingredient in the assessment of psychopathology in children and adolescents but may be less appropriate than self-reports in assessing sleep in older children, about whose sleep behavior parents typically have less knowledge. Furthermore, parent reports incorporate a number of methodological problems, including rater bias. In the context of the present study, rater bias might inflate stability of individual differences and diminish the distinctiveness between separate syndromes. Nevertheless, a number of findings could not obviously be explained by rater bias, including the mean change over time and the increasing overlap between depression/anxiety and sleep problems (this increasing overlap was not found with attention problems or aggression).

No questionnaire-based assessment of sleep problems has received extensive study. The measure we used, derived from the widely used CBCL,

has been used in a number of investigations (e.g., Stoleru et al., 1997), met basic criteria for reliability and was associated with depression/anxiety, as would be expected on the basis of diagnostic and laboratory-based assessments. Nevertheless, it is a general scale composed of different kinds of sleep problems. The pattern of findings obtained here may therefore not extend to specific and isolated disorders of sleep, such as insomnia or sleep terror. Furthermore, we did not have access to diagnostic data (although it is very likely that few children would have been diagnosed with a disorder), nor did we have access to laboratory data (e.g., EEG). The use of objective lab measures are impractical in studies of this size (Liu et al., 2000; Ohayon et al. 2000) and, as noted above, the concern here was with general disturbances with sleep rather than with specific problems that might require EEG information as part of the assessment. However, future work may benefit from the use of objective sleep measures such as actigraphic analysis of sleep/wake cycles, which can be used outside the laboratory. A related limitation is that we were not able to assess the extent to which the presentation of sleep problems changed over time. It may be that the increased overlap between sleep problems and depression/anxiety reflects a changing presentation of sleep problems and a consequent change in the relevance to depression/anxiety. Similarly, questions may be raised about the meaning of anxiety/ depression at 4 years, given that little is known about the manifestation of these syndromes in very young children. Anxiety/depression was only moderately stable across this 11-year time span ( $r_{360} = 0.26, p < .01$ ) and, therefore, we should be cautious about whether we predicted a real change in anxiety/ depression over this time span.

A final set of considerations concerns the nature of the sample. First, this was a normal risk sample that was composed of adoptive and nonadoptive (biological) families. The normal-risk status of the sample means that most of the children were not showing clinically elevated levels of disturbance, and it remains to be demonstrated that these results extend to the clinical range. Second, the fact that the sample included adoptive families is noteworthy, but this is unlikely to modify the substantive conclusions because there was no empirical evidence that the findings differed for nonadopted and adopted children, that is, there was no interaction between adoptive status and prediction of anxiety/depression. Adopted children did, however, exhibit higher levels of behavioral/emotional problems than nonadopted children, according to parent report.

### **Clinical Implications**

The results of the current study suggest that sleep problems in children are stable, even across extended periods of development characterized by substantial biological, social, and psychological changes. In addition, sleep problems forecast other behavioral problems. Further research on the treatment of sleep problems is needed to further elucidate the connections between sleep problems and other behavioral/emotional problems. Of particular interest is the extent to which effective treatment of sleep problems

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in young children reduces concurrent and later emerging behavioral/emotional problems. In addition, it is important for further clinical investigations to assess the degree to which sleep problems in children provide a source of major stress in parents. Identifying the extent to which sleep problems disrupt parenting and parental well being may be an important consideration in promoting the child's adjustment and in explaining treatment outcomes.

Future research will capitalize on the genetically informative nature of the CAP study and examine the etiology of individual differences in sleep problems and their covariance with later behavioral problems.

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