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Sleep Difficulties are Associated with Parent Report of Sluggish Cognitive Tempo

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Abstract

Objective—Sleep disturbance is considered both a behavioral symptom of and a contributor to functional difficulties in children with attention-deficit/hyperactivity disorder (ADHD). The construct of sluggish cognitive tempo (SCT) has also been linked to ADHD; however, little is known regarding the effects of sleep specifically on SCT symptoms. This study examined the association between parent-reported sleep disturbance and parent- and teacher-reported SCT, while controlling for the effects of ADHD and mood symptoms.

Method—Participants included 746 clinically referred children (65% male, age range: 5–18 years) with both parent and teacher ratings assessing symptoms of ADHD, mood symptoms (depression, anxiety), and SCT. Parents/caregivers also rated their child's sleep problems with regard to 4 core concerns: falling asleep, sleep restlessness, difficulty waking, and breathing difficulties. The SCT scale included three empirically derived subscales: sleepy/sluggish, low initiation/persistence, and daydreamy.

Results—After accounting for age, medication status, ADHD symptoms, depressive symptoms, and anxiety, sleep problems accounted for a small but significant proportion of additional variance in the prediction of parent-reported sleepy/sluggish SCT. Difficulty waking showed the strongest associations with parent-reported SCT. There were no significant relationships found between parent-reported sleep difficulties and teacher-reported SCT.

Conclusions—Some elements of sluggishness and lethargy inherent to the SCT construct may be associated with sleep difficulties, even after accounting for ADHD and mood symptoms; however, these associations are not consistent across SCT subscales and sleep problem domains.

Index terms

ADHD; processing speed; executive function; attention; childhood

The construct of “sluggish cognitive tempo” (SCT) has received increasing attention in developmental literature in the past 20 years.¹ SCT is characterized by sluggish, under-

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motivated, lethargic, slowed, and/or forgetful behavior.² Although this cluster of symptoms is related to core symptoms of attention-deficit/hyperactivity disorder (ADHD), especially inattention, recent research has consistently shown that some components of SCT are unique and separable from ADHD symptoms.³ For example, recent factor analytic studies revealed three distinct components of SCT: *sleepy/sluggish* (e.g., slow moving, lethargic, seems tired), *low initiation* (e.g., seems unmotivated, effort fades quickly, slow to complete tasks), and *daydreamy* (e.g., daydreams, lost in thought, in own world).^{2,4} Although the low initiation and daydreamy SCT factors seem to overlap with the inattentive symptoms of ADHD, the sleepy/sluggish factor seems unique and shares less variance with ADHD symptoms.⁴ Slow processing speed (also frequently observed in children with ADHD) is also associated with the SCT construct for children.⁵ SCT has been associated with impairment across functional domains,^{5,6} with greater impairment in youth with ADHD *plus* SCT relative to those with ADHD alone.⁶ Although SCT was not formally recognized in the DSM-5, careful assessment and identification of individuals with SCT may help to identify a unique and more heterogeneous subset of cause or response (or non-response) to treatment.

Sleep disturbance is commonly observed in children with ADHD.⁷ In fact, previous versions of the Diagnostic and Statistical Manual of Mental Disorders (DSM-II, III, III-R)^{8–10} included “restless sleep” as a diagnostic symptom of ADHD. The presence of sleep difficulties is not only associated with ADHD but also likely to exacerbate symptoms of ADHD.¹¹ It has also been hypothesized that some children diagnosed with ADHD may actually have a sleep disorder, that is, causing (or exacerbating) inattentive and/or hyperactive symptoms,¹² but the issue of cause and effect in these situations remains unclear. Sleep problems commonly associated with ADHD are associated with increased daytime drowsiness, cognitive sluggishness, and greater difficulty concentrating on school-related activities.¹³ A study of experimental sleep restriction assigned the control group 10 hours of sleep a night while restricting first and second graders to 8 hours and 6.5 hours for third graders and above. They found that restricting sleep increased academic difficulties and attention problems resembling those associated with ADHD.¹³ Additionally, Mayes et al¹⁴ found that children with ADHD (Inattentive subtype) had greater daytime sleepiness than children in the same clinical sample with ADHD (combined subtype), oppositional defiant disorder, anxiety or mood disorders, leading the researchers to question the cause of the inattentive symptoms in some children within their ADHD cohort.

To date, there has been limited research on the relationship between ADHD, SCT, and sleep. Langberg et al¹⁵ found that in college students diagnosed with ADHD, SCT was a significant predictor of daytime sleepiness, even after controlling for ADHD, anxiety, and depression symptoms. Additionally, they found that young adults with ADHD *plus* SCT and daytime sleepiness were more impaired than those with ADHD *without* SCT and daytime sleepiness. Another study in college students found that SCT symptoms were related to poorer quality of sleep and greater sleep disturbance during the night, even after controlling for ADHD symptoms and medication use.¹⁶ Another study examined the relationships between sleep disturbance, circadian preference, and ADHD/SCT in survey-based study of Romanian adults.¹⁷ A subsample of this group endorsing insomnia had significantly more ADHD and SCT symptoms than controls. Of those in the sample endorsing ADHD symptoms, approximately half of the group reported insomnia issues; in this “ADHD-likely”

group, they also found that SCT was correlated with poorer sleep conditions (time falling asleep, number of times waking during the night, etc.). However, the relationship between sleep, ADHD, and SCT in younger children has not yet been examined. The relative dearth of research examining these relationships in children represents a gap in the literature, and it is important to investigate the potential impact of sleep-related concerns on attention and, more specifically, SCT. Sleep disturbances associated with ADHD and the combination of SCT and sleep disturbances may account for the slowed processing and responding of some of these children. More critically, if SCT symptoms are due, at least in part to reduced quality of sleep, targeted interventions may help to reduce these symptoms and improve clinical outcomes for these children.

This study sought to examine the relationships among sleep quality, ADHD symptoms, and SCT across settings and reporters (home and school). The primary hypothesis was that sleep difficulties would be associated with both parent and teacher reports of inattention, mood symptoms, and SCT. We further predicted that the presence of sleep problems would predict SCT symptoms, even after controlling for ADHD and mood symptom severity. Given that multiple types of sleep disturbance can be observed in children, we also sought to determine which type of sleep problems (falling asleep, staying asleep, waking difficulties, breathing problems) was most strongly associated with SCT.

METHODS

Participants

Sample demographic information is presented in Table 1. The sample consisted of 746 children (65% male, mean age = 9.71 ± 2.99 years, range: 5–18 years) referred for neuropsychological assessment at a hospital-based outpatient service. Clinicians routinely enter assessment data into the clinical database by the secure electronic health record. In addition, parents and teachers of children referred to the clinic are asked to complete a set of academic and behavioral rating scales, including the sluggish cognitive tempo (SCT) and attention-deficit/hyperactivity disorder (ADHD) rating scales, on computer before assessment or on the day of the appointment (for parents); these data are also added to the departmental clinical database. The present sample includes parent and teacher ratings completed between December 2010 and July 2013. On approval by the local institutional review board, a deidentified data set was extracted from the clinical database. To be included, participants were required to have all of the following ratings: parent *and* teacher ratings of SCT, parent *and* teacher ratings of ADHD symptoms, and parent report of sleep problems. If a student had a response from more than one teacher, we used the rating from the general education or English/Language Arts teacher or, alternatively, the teacher who reported spending the most time with the student per week. A total of 132 participants were excluded because of missing parent or teacher data, leaving a final sample of 746 participants. Any participants taking medication for endocrine abnormalities (i.e., hypothyroidism) were excluded to rule out any biological causes of fatigue and/or sluggishness. Of the total sample, 186 participants (25%) were taking medication for ADHD at the time of assessment. Of those taking medication for ADHD, 89% were prescribed a stimulant for management of ADHD symptoms.

Study Measures

ADHD Rating Scale-IV, Home and School Versions—The ADHD rating scale-IV (ADHD-IV) is an 18-item scale measuring ADHD symptoms according to DSM-IV-TR/5 criteria.¹⁸ Items are rated from 0 (“never”) to 3 (“very often”), with 9 items for inattentive (IA) symptoms and 9 items for hyperactive/impulsive symptoms. For this study, a total IA subscale severity score for both parent and teacher ratings was created by averaging responses across the 9 items. The ADHD-IV has been shown to demonstrate adequate reliability and validity for parent ratings; internal consistency estimates for the Home version ranged from 0.86 to 0.88, with test-retest reliability over short periods of time ranging from 0.78 to 0.86.¹⁸ The School version has been shown to have adequate reliability and validity with internal consistency for teacher ratings ranging from 0.88 to 0.96 and test-retest reliability ranging from 0.88 to 0.90.¹⁹

Sluggish Cognitive Tempo Scale—The sluggish cognitive tempo (SCT) scale is a 14-item measure of teacher or parent reports of the symptoms associated with the SCT construct including lethargy, under activity, and slowness.² Responses range from 0 (“never/rarely”) to 3 (“very often”). Previous research has shown that the items load onto 3 distinct subscales: sleepy/sluggish, low initiation-persistence, and daydreamy.⁴ Data from parent reports in both the original community sample² and a clinical sample⁴ demonstrated adequate internal consistency. Test-retest reliability estimates for the parent-report version were adequate (ranging from 0.70 to 0.87). In the current sample, internal consistency was strong for both parent ($\alpha = .87$) and teacher ($\alpha = .92$) responses. In the current sample, SCT subscales showed good reliability: internal consistencies of the parent-reported SCT subscales in this sample were 0.86 for sleepy/sluggish, 0.81 for low initiation, and 0.80 for daydreamy; for teacher ratings, the internal consistencies were 0.93 for sleepy/sluggish, 0.86 for low initiation, and 0.88 for daydreamy.

Vanderbilt Parent Rating Scales, Anxiety, and Depression Scales—This is a brief scale of internalizing symptoms with 4 items for depressive symptoms and 3 items for anxiety symptoms rated from 1 to 4 as “never,” “sometimes,” “often,” or “very often.”²⁰ For the present analyses, we calculated a mean of the 4 depression items and a mean of the 3 anxiety items. The Vanderbilt internalizing symptoms scale items have demonstrated adequate validity and internal consistency (0.79).²⁰ In the present sample, the internal consistency of the anxiety scale was 0.81 and the depression scale was 0.87.

Sleep Problems Questionnaire—Parent report of their child’s sleep problems was obtained as part of the outpatient clinic assessment. The measure of sleep difficulties consisted of 4 parent report items designed to broadly survey types of sleep problems common to children with ADHD: difficulty getting to sleep, restlessness during sleep, difficulty waking, and sleep-related breathing problems (Table 1). The items were selected after a careful review of the relevant literature on sleep problems in children with ADHD, which revealed that four types of sleep disturbance have been most commonly documented. First, researchers have noted problems with *sleep onset* in children with ADHD including increased bedtime resistance and taking longer to fall asleep.²¹ There is also biochemical evidence for difficulties with sleep onset, in that some individuals with ADHD have a

delayed release of melatonin to induce sleep.²² Second, some children with ADHD demonstrate *restlessness during sleep* including tossing and turning, greater nocturnal activity, frequent waking during sleep, and even symptoms of restless leg syndrome.^{7,23} Third, *difficulty waking* in the morning has been observed including difficulty getting out of bed, not feeling alert in the morning, and waking up without feeling well rested.²⁴ Finally, studies have also found a relationship between sleep-disordered *breathing problems* (e.g., snoring, sleep apnea) and ADHD symptoms.²⁵ These difficulties have been documented in both parent report^{7,11,26} and actigraphy²⁷ studies. These 4 key areas of concern were adapted into questions for use as a succinct sleep problem screening tool as part of pediatric previsit symptom assessment in an outpatient clinic setting. Parents were asked to rate each item on a 3-point frequency scale (i.e., 1 = “never,” 2 = “sometimes,” or 3 = “often” a problem). These items had moderate internal consistency within the present sample ($\alpha = .66$).

Data Analysis Plan

First, 3 SCT subscale scores (i.e., sleepy/sluggish, low initiation, and daydreamy) were created by calculating a mean from the items loading on each SCT factor as identified in previous research.⁴ Second, zero-order correlations between sleep problems (parent report), inattention and hyperactivity (parent and teacher report), depression and anxiety symptoms (parent report), and SCT (parent and teacher report) were examined. Third, we used a series of hierarchical linear regression analyses to examine the contributions of sleep problems to parent and teacher report of SCT, after controlling for age, medication, ADHD symptoms, and mood symptoms. Each regression included age, medication status, parent-or teacher-reported inattention and hyperactivity/impulsivity, and parent-reported mood symptoms (depression and anxiety) in the first step and the 4 sleep problems items in the second step.

RESULTS

Sample characteristics on demographic and variables of interest included in the analyses are described in Table 1. Table 2 presents the correlation matrix for the variables of interest. Parent and teacher ratings of sluggish cognitive tempo (SCT) were significantly correlated; within raters, ratings of SCT and inattention were also significantly correlated. Sleep difficulty was significantly associated with parent ratings of depressive symptoms, such that all sleep items except breathing difficulties significantly correlated ($p < .01$) with depression symptoms. The same pattern was observed for parent-reported anxiety and sleep problems. All of the sleep items were correlated with both parent-reported inattention and hyperactivity, with the exception of breathing difficulties, which was significantly correlated with hyperactivity, but not inattention. Parent ratings of sleep problems, with the exception of breathing difficulties, were significantly correlated with parent reports of SCT, across all 3 subscales. Only difficulty falling asleep and restless sleep were related to teacher-reported inattention and hyperactivity. Difficulty falling asleep, difficulty waking, and restless sleep were weakly but significantly correlated with teacher rated sleepy/sluggish SCT, whereas only difficulty falling asleep was significantly correlated with teacher rated daydreamy SCT. Sleep breathing difficulties were not related to any of the teacher-reported SCT domains.

Table 3 presents the hierarchical regression analyses examining the contribution of sleep difficulty to *parent* reports of SCT. Specifically, we examined the influences of sleep problems on the sleepy/sluggish, low initiation, and daydreamy SCT subscales after controlling for age, parent-reported attention-deficit/hyperactivity disorder (ADHD) symptoms, and parent-reported depression and anxiety symptoms. For the sleepy/sluggish and daydreamy subscales, sleep difficulty was a small but significant predictor of SCT. For the sleepy/sluggish subscale, the “difficulty waking” item was the only sleep item contributing to SCT ratings ($\beta = .107, p = .003$). For daydreamy subscale, the only sleep item contributing to SCT was breathing difficulties ($\beta = -.112, p < .001$). A second set of regression analyses examined the contributions of sleep to *teacher*-reported SCT, after controlling for age, teacher-reported ADHD symptoms, and parent-reported depression and anxiety symptoms (Table 4). Sleep problems were not a significant predictor of sleepy/sluggish, low initiation, or daydreamy SCT, as reported by teachers.

DISCUSSION

In this sample of clinically referred youth, sleep problems were found to contribute to a small but significant proportion of sleepy/sluggish symptoms of sluggish cognitive tempo (SCT), even after accounting for contributions of age, medication status, attention-deficit/hyperactivity disorder (ADHD) symptoms (inattention and hyperactivity), and mood symptoms (anxiety and depression). Nevertheless, most of the other findings relating sleep to SCT were not significant. This pattern may indicate that sleep quality may not be the primary contributor to the sluggish, sleepy, and lethargic characteristics associated with the SCT construct.

For this study, the items for the sleep problems scale were identified based on the prevalence of these types of sleep-related difficulty in youth with ADHD and other neurodevelopmental disorders. Although restless sleep was previously considered a component of the diagnostic criteria for ADHD,^{8–10} in this sample, restlessness at night did not contribute to SCT symptoms as reported in either setting. It may be that in controlling for ADHD symptoms, the contribution of potentially ADHD-specific sleep difficulty was also minimized. Alternatively, it may be that restlessness during sleep shows a different pattern of associations with children’s functioning secondary to a different cause (e.g., potential associations with iron deficiency).²⁸

Parent reports of difficulty waking were significantly related to sleepy/sluggish SCT. There may be several explanations as to why this domain was related to SCT but difficulty falling asleep and restless sleep were not. Of the sleep domains assessed, difficulty waking may be the area that parents can best observe and accurately report. Parents may be less aware of and able to observe sleep problems that occur well after sleep onset (i.e., they may be asleep themselves and thus not able to note if the child is restless) relative to sleep onset concerns or problems waking in the morning. Alternatively, there may be other factors affecting the quality of sleep in children with ADHD and/or SCT (beyond observable restlessness) that lead to insufficient consolidated sleep and ultimately difficulty waking. Although findings have been inconsistent, a number of studies have shown that children with ADHD show reductions in sleep duration compared with controls (e.g., shorter total sleep time)²⁹ with

children with predominantly inattentive (IA) ADHD showing greatest daytime sleepiness.³⁰ Thus, an additional possibility for our findings is that children presenting with SCT symptoms represent a subset of individuals with low physiological arousal who are not getting “enough” sleep and or require more nighttime sleep than the average child without SCT symptoms, so seem difficult to wake in the mornings.

Our findings related to breathing difficulties remain unclear, especially given the inverse relationships with the daydreamy and low initiation components of SCT. One possibility may be that children with breathing difficulties display more hyperactive-impulsive symptoms of ADHD and, consequently, fewer symptoms of SCT. Supporting this notion is a published study that found a relationship between sleep-related breathing difficulties and increased hyperactivity in children.²⁵ The finding of a negative association between breathing difficulties and SCT may also be function overcorrecting (by controlling for IA ADHD symptoms that are highly correlated with SCT) resulting in a suppression of the association between SCT and certain sleep problems.

These results should be interpreted in light of several important limitations of this study. First, although the sleep problems measure used included items that had been identified in the literature as representative of the most common types of sleep problems observed in children, it has not been independently validated or standardized before this study and was specifically designed for efficiency given constraints on previsit symptom questionnaire length. Additionally, this study relied only on parent report of sleep difficulty and did not include more objective sleep data (i.e., actigraphy). Assessment of mood for this study (depression and anxiety symptoms) likewise relied on parent report, which although has been shown to be less valid for the diagnosis of internalizing disorders, was believed to be appropriate for screening of these symptoms given the age range of the sample (including children as young as 5 years, who cannot reliably report their own mood symptoms). There also may be some variability in the accuracy of teacher reports of student behavior, as there is a great amount of variability in time teachers spend with students across the elementary to high school range. In addition, the current sample consisted of children referred for a clinical assessment; therefore, this group of children likely displayed more severe inattention, SCT, and sleep difficulties than a typically developing population, and our findings may not be generalizable to a normative, typically developing population. Furthermore, patient diagnosis as determined after the clinical evaluation was not available for analysis.

Despite these limitations and our modest magnitude of associations, this is the first study, to our knowledge, examining contributions of sleep problems to the SCT phenotype in *children* and, as such, provides an initial look and a basis for further examination of sleep and SCT symptoms in both typically and atypically developing children. Sleep difficulty may offer a possible target for intervention, as sleep problems are not only associated with SCT with or without ADHD but also with other cognitive problems in isolation.³¹ ADHD and mood symptoms were also significantly predictive of SCT, and these domains may also be potential areas of clinical intervention. The present results indicate that difficulty waking may be an area for both research and clinical intervention for treatment in several areas including ADHD, mood disorders, and the sluggishness and lethargy related to the SCT construct. It may be possible to screen children at risk for sleep problems and determine

sleep hygiene patterns (e.g., bedtime routines, consistency of bedtime, bedtime resistance) and other factors that may be related to disturbed sleep which in turn causes difficulty waking. Further investigation is needed to better define the relationships between sleep, ADHD, and SCT and to determine whether there is a biological basis for SCT as distinct from ADHD. In the future, actigraphy studies would be helpful for measurement of sleep difficulties in children with greater parent-reported SCT, rather than relying on parent-report alone for sleep difficulties. In addition, future research may better elucidate the relationship between SCT and sleep in different pediatric populations (e.g., depression, ADHD, anxiety).

Although the effect sizes for contributions of sleep to SCT were uniformly small, it is notable that in this clinical sample, effects of sleep on parent-reported SCT were as large as or larger than effect sizes for depressive symptoms on SCT. As such, it may be that sleep quality, inattention, and mood each contribute differentially to aspects of the SCT phenotype. In this sample, it may be that sleep problems impact SCT symptoms differently in children with and without full ADHD symptoms. Given increasing concern about sleep restriction in children,³² particularly middle and high school-aged children whose school schedules require very early morning waking, these data suggest another aspect of the cognitive concerns related to sleep problems.

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Table 1**Sample Demographics**

	Mean (SD)
Race (%)	
White	62.5
African-American	20.0
Other	10.9
Unknown	6.6
Parent education (%)	
Less than high school	0.80
High school diploma, GED	28.0
Associates degree, vocational training	4.8
Bachelor's degree	31.0
Master's degree	25.7
Advanced graduate degree (MD, PhD, JD)	5.4
Unknown	4.3
Medication status (%)	
Stimulant	22.3
Nonstimulant	9.1
Other psychotropic medication	16.6
ADHD inattention	
Parent report	1.69 (0.72)
Teacher report	1.47 (0.77)
ADHD hyperactivity/impulsivity	
Parent report	1.23 (0.79)
Teacher report	0.95 (0.84)
Parent-reported depression	1.7 (0.74)
Parent-reported anxiety	2.23 (0.83)
SCT parent report	
Sleepy/sluggish	0.54 (0.57)
Low initiation	0.65 (0.53)
Daydreamy	1.25 (0.83)
SCT teacher report	
Sleepy/sluggish	0.78 (0.75)
Low initiation	1.34 (0.75)
Daydreamy	1.27 (0.90)
Sleep items	
Does your child have difficulty falling asleep at night? (usually takes longer than 15 min)	1.94 (.81)
Is your child restless during the night? (frequently tosses and turns)	1.86 (.79)
Is it difficult to wake your child in the morning? (He/she tends to wake up tired, irritated, confused, or combative)	1.82 (.80)

	Mean (SD)
Does your child have breathing difficulties during the night that result in waking during the night? (snoring, gasping)	1.30 (.60)

ADHD symptoms measured by the ADHD rating scale-IV. Depression symptoms measured by the Vanderbilt Parent Rating Scales. Each sleep item rated on a 3-point frequency scale (i.e., 1 = “never,” 2 = “sometimes,” or 3 = “often” a problem). ADHD, attention-deficit/hyperactivity disorder; SCT, sluggish cognitive tempo.

Table 2

Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																
2	.37 ^b															
3	.52 ^b	.34 ^b														
4	.12 ^b	.22 ^b	.30 ^b													
5	.75 ^b	.71 ^b	.79 ^b	.52 ^b												
6	.18 ^b	.23 ^b	.22 ^b	-.02	.23 ^b											
7	.17 ^b	.19 ^b	.18 ^b	.05	.22 ^b	.62 ^b										
8	.20 ^b	.23 ^b	.22 ^b	.06	.26 ^b	.29 ^b	.29 ^b									
9	.08 ^a	.05	.08 ^a	.02	.08 ^a	.05	-.01	.34 ^b								
10	.24 ^b	.17 ^b	.26 ^b	.08 ^a	.28 ^b	.16 ^b	.14 ^b	.56 ^b	.23 ^b							
11	.10 ^b	.01	.10 ^b	.02	.08 ^b	.01	-.11 ^b	.15 ^b	.54 ^b	.48 ^b						
12	.13 ^b	.24 ^b	.16 ^b	.06	.22 ^b	.33 ^b	.26 ^b	.33 ^b	.07 ^a	.01	-.11 ^b					
13	.12 ^b	.18 ^b	.12 ^b	-.02	.16 ^b	.32 ^b	.31 ^b	.75 ^b	.31 ^b	.31 ^b	-.01	.42 ^b				
14	.17 ^b	.20 ^b	.16 ^b	-.06	.18 ^b	.31 ^b	.29 ^b	.60 ^b	.22 ^b	.33 ^b	.03	.33 ^b	.49 ^b			
15	.08 ^a	.08 ^a	.08 ^a	.06	.11 ^b	.10 ^b	.09 ^a	.14 ^b	.40 ^b	-.04	-.02	.32 ^b	.25 ^b	.16 ^b		
16	.04	.07	.04	-.00	.05	.09 ^a	.07	.28 ^b	.80 ^b	.08 ^a	.30 ^b	.16 ^b	.38 ^b	.21 ^b	.57 ^b	
17	.08 ^a	.06	.01	-.02	.05	.05	.02	.18 ^b	.67 ^b	.02	.21 ^b	.11 ^b	.21 ^b	.29 ^b	.47 ^b	.62 ^b

1 = difficulty falling asleep; 2 = difficulty waking; 3 = restless sleep; 4 = sleep breathing difficulties; 5 = sleep total score; 6 = parent-reported depression; 7 = parent-reported anxiety; 8 = parent-reported inattention; 9 = teacher-reported inattention; 10 = parent-reported hyperactivity/impulsivity; 11 = teacher-reported hyperactivity/impulsivity; 12 = parent sleepy/sluggish SCT; 13 = parent low initiation SCT; 14 = parent daydreamy SCT; 15 = teacher sleepy/sluggish SCT; 16 = teacher low initiation SCT; 17 = teacher daydreamy SCT.

^aCorrelation is significant at the .05 level.

^bCorrelation is significant at the .01 level.

SCT, sluggish cognitive tempo.

Table 3

Predictions of Parent Ratings of SCT Components

	Sleepy/Sluggish SCT			Low Initiation SCT			Daydreamy SCT		
	β	R^2	p	β	R^2	p	β	R^2	p
Block 1:	—	.268	<.001	—	.605	<.001	—	.384	<.001
Age	.186	—	<.001	.022	—	.395	.05	—	.126
Stimulant medication	-.144	—	<.001	-.032	—	.220	-.045	—	.162
Nonstimulant medication	.064	—	.060	.071	—	.005	-.02	—	.519
Other psychotropic medication	.103	—	.003	-.014	—	.572	-.001	—	.975
Inattention	.365	—	<.001	.799	—	<.001	.539	—	<.001
Hyperactivity/impulsivity	-.185	—	<.001	-.158	—	<.001	.032	—	.408
Depression	.197	—	<.001	.077	—	.010	.112	—	.003
Anxiety	.032	—	.437	.056	—	.060	.062	—	.098
Block 2:	—	.018	.001	—	.005	.070	—	.013	.003
Difficulty falling asleep	.003	—	.943	-.011	—	.701	.035	—	.317
Difficulty waking	.107	—	.003	.023	—	.382	.049	—	.139
Restless during the night	.052	—	.186	-.038	—	.191	.011	—	.756
Breathing difficulties	.022	—	.521	-.049	—	.048	-.112	—	<.001
Total model R^2		.286			.610			.397	

SCT, sluggish cognitive tempo.

Table 4

Predictions of Teacher Ratings of SCT Components

	Sleepy/Sluggish SCT			Low Initiation SCT			Daydreamy SCT		
	β	R^2	p	β	R^2	p	β	R^2	p
Block 1:	—	.259	<.001	—	.671	<.001	—	.477	<.001
Age	.075	—	.028	-.001	—	.951	-.015	—	.610
Stimulant medication	-.034	—	.315	-.025	—	.282	-.009	—	.747
Nonstimulant medication	.036	—	.290	.027	—	.242	-.025	—	.381
Other psychotropic medication	.074	—	.030	-.013	—	.578	-.010	—	.736
Inattention	.580	—	<.001	.899	—	<.001	.780	—	<.001
Hyperactivity/impulsivity	-.320	—	<.001	-.189	—	<.001	-.215	—	<.001
Depression	.040	—	.326	.018	—	.522	.025	—	.475
Anxiety	.021	—	.606	.050	—	.067	-.007	—	.844
Block 2:	—	.005	.28	—	.002	.288	—	.006	.079
Difficulty falling asleep	.034	—	.382	-.034	—	.185	.069	—	.034
Difficulty waking	-.010	—	.778	.035	—	.145	.025	—	.412
Restless during the night	.024	—	.546	-.016	—	.552	-.054	—	.105
Breathing difficulties	.048	—	.161	-.018	—	.461	-.035	—	.225
Total model R^2		.264			.673			.483	

SCT, sluggish cognitive tempo.