**Association Between Sleep Problems and Symptoms of Attention-Deficit/Hyperactivity Disorder in Young Adults**

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**Study Objective:** To examine the association between sleep-related problems and symptoms of attention-deficit/hyperactivity disorder (ADHD) in a community sample of young adults in Taiwan.

**Design:** A college-based cross-sectional survey.

**Participants:** Two thousand two hundred eighty-four first-year college students (aged 18-20) in a university in Taiwan.

**Measurements and Results:** Each student completed a questionnaire regarding sleep schedule (self-estimated total sleep duration and sleep need), sleep problems (dyssomnia, parasomnia, and snoring), and the Chinese version of the Adult ADHD Self-Report Scale. Subjects were grouped separately for the inattention and hyperactivity subscales into highly likely ADHD (2.3%, 0.7%), probable ADHD (21.3%, 5.7%), and probably non-ADHD (76.4%, 93.6%) groups according to the scoring scheme of the subscales of the Adult ADHD Self-Report Scale. Results showed that, for both inattention and hyperactivity symptoms, the highly likely ADHD and probable ADHD groups were more likely than the non-ADHD group to have a variety of current and lifetime sleep problems. No significant difference in sleep problems was found between the highly likely ADHD and probable ADHD groups. Inattention, but not hyperactivity, was associated with greater sleep need and greater difference between sleep need and self-estimated nocturnal sleep duration. Hyperactivity, but not inattention, was associated with decreased nocturnal sleep duration.

**Conclusions:** Consistent with prior findings from children and adolescents, ADHD symptoms in young adults are related to sleep problems. Further studies on adults with ADHD should help to refine our understanding of the causal basis for any implications of this association.

**Keywords:** Sleep problems, inattention, hyperactivity-impulsivity, Adult ADHD Self-Report Scale

**Citation:** Gau SSF; Kessler RC; Tseng WL et al. Association between sleep problems and symptoms of attention-deficit/hyperactivity disorder in young adults. SLEEP 2007;30(2):195-201.
Dose-Response Effects of Cognitive-Behavioral Insomnia Therapy: A Randomized Clinical Trial

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Subject Objective: To determine the optimal number of therapist-guided Cognitive-Behavioral Insomnia Therapy (CBT) sessions required for treating primary sleep-maintenance insomnia.

Design and Setting: Randomized, parallel-group, clinical trial at a single academic medical center. Outpatient treatment lasted 8 weeks with final follow-up conducted at 6 months.

Participants: 86 adults (43 women; mean age 55.4±9.7 years) with primary sleep-maintenance insomnia (nightly mean wake time after sleep onset [WASO] = 93.4±44.5 minutes).

Interventions: One (week 1), 2 (weeks 1 and 5), 4 (biweekly), or 8 (weekly) individual CBT sessions scheduled over an 8-week treatment phase, compared with an 8-week no-treatment waiting period (WL).

Measurement: Sleep diary and actigraphy measures of total sleep time, onset latency, WASO, total wake time, and sleep efficiency, as well as questionnaire measures of global insomnia symptoms, sleep related self-efficacy, and mood.

Results: Statistical tests of subjective/objective sleep measures favored the 1- and 4-session CBT doses over the other CBT doses and WL control. However, comparisons of pretreatment data with data acquired at the 6-month follow-up showed only the 4-session group showed significant long-term improvements in objective wake time and sleep efficiency measures. Additionally, 58.3% of the patients receiving 4 CBT sessions met criteria for clinically significant improvement by the end of treatment compared to 43.8% of those receiving 1 CBT session, 22.2% of those provided 2 sessions, 35.3% of those receiving 8 sessions, and 9.1% of those in the control condition.

Conclusion: Findings suggest that 4 individual, biweekly sessions represents the optimal dosing for the CBT intervention tested. Additional dose-response studies are warranted to test CBT models that contain additional treatment components or are delivered via group therapy.

Keywords: Cognitive-behavioral therapy, primary insomnia

Citation: Edinger JD; Wohlgemuth WK; Radtke RA et al. Dose-response effects of cognitive-behavioral insomnia therapy: a randomized clinical trial. SLEEP 2007;30(2):203-212.

The Direct and Indirect Costs of Untreated Insomnia in Adults in the United States

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Objectives: To estimate the direct and indirect cost burden of untreated insomnia among younger adults (age 18 – 64), and to estimate the direct costs of untreated insomnia for elderly patients (age 65 and over).

Design: A retrospective, observational study comparing insomnia patients to matched samples without insomnia.

Settings: Self-insured, employer sponsored health insurance plans in the U.S.

Patients or Participants: 138,820 younger adults and 75,558 elderly patients with insomnia, plus equal-sized, matched comparison groups.

Interventions: NA

Measurements and Results: Direct costs included inpatient, outpatient, pharmacy, and emergency room costs for all diseases, for six months before an index date. The index date for insomnia patients was the date of diagnosis with or the onset of prescription treatment for insomnia, sometime during July 1, 1999 – June 30, 2003. Non-insomnia patients were assigned the same index dates as the insomnia patients to whom they were matched. Indirect costs included costs related to absenteeism from work and the use of short-term disability programs. Propensity score matching was used to find insomnia and non-insomnia patients who had similar demographics, location, health plan type, comorbidities, and drug use patterns. Regression analyses controlled for factors that were different even after matching was completed. We found that average direct and indirect costs for younger adults with insomnia were about $1,253 greater than for patients without insomnia. Among the elderly, direct costs were about $1,143 greater for insomnia patients.

Conclusions: Insomnia is associated with a significant economic burden for younger and older patients.

Keywords: Insomnia, Cost, Burden of illness

Citation: Ozminkowski RJ; Wang S; Walsh JK. The direct and indirect costs of untreated insomnia in adults in the united states. SLEEP 2007;30(3):263-273.
Sleep-Disordered Breathing and Cardiovascular Risk

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Abstract: Sleep-disordered breathing, broadly characterized by obstructive sleep apnea (OSA) and central sleep apnea (CSA), is an increasingly recognized public health burden. OSA, consisting of apneas or hypopneas associated with respiratory efforts in the face of upper airway narrowing or collapse, is a common disorder that can be effectively treated with continuous positive airway pressure (CPAP). OSA not only results in daytime sleepiness and impaired executive function, but also has been implicated as a possible cause of systemic disease, particularly of the cardiovascular system. CSA, which may coexist with OSA, has gained attention because of the association of Cheyne-Stokes respiration with an ever-increasing prevalence of heart failure in an aging population. This article reviews some of the extensive literature on pathophysiologic mechanisms as they may relate to the development of cardiac and vascular disease and examine the evidence suggesting OSA as a specific cause of certain cardiovascular conditions. Available evidence regarding the implications of CSA in the context of heart failure is discussed.

Keywords: Obstructive sleep apnea, central sleep apnea, cardiovascular disease, continuous positive airway pressure, hypertension

Citation: Caples SM; Garcia-Touchard A; Somers VK. Sleep-disordered breathing and cardiovascular risk. SLEEP 2007;30(3):291-304

Maintenance of Wakefulness Test as a Predictor of Driving Performance in Patients With Untreated Obstructive Sleep Anea

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Study Objective: To determine the ability of Maintenance of Wakefulness Test (MWT) to predict simulated driving performance in patients suffering from sleep apnea syndrome.

Design: Study involving one hour of simulated driving, one night of polysomnography (PSG), and a 4x40-minute MWT.

Setting: Sleep laboratory.

Patients: Thirty male patients with untreated obstructive sleep apnea syndrome (OSAS) (mean age [±SD] = 51 ± 8 years, range 34-62; mean body mass index (BMI) [±SD] = 29 ± 3, range 24-37; mean apnea/hypopnea index (AHI) [±SD] = 43 ± 24, range 14-96). As defined by MWT mean sleep latency, 23.3% of the patients were sleepy (0-19 min), 33.3% were alert (20-33 min), and 43.4% were fully alert (34-40 min).

Measurements: Nocturnal PSG, mean sleep latency at 4x40-minute MWT trials, Epworth Sleepiness Scale (ESS), and standard deviation from the center of the road (SDS) on driving simulator.

Results: Mean MWT scores inversely correlated with SDS during the simulated driving session (Pearson’s r = -0.513, P<0.01). We found a significant effect of MWT groups (sleepy, alert, or fully alert) on SDS (ANOVA, F2, 29 = 5.861, P<0.01). Post hoc tests revealed that the sleepy group had a higher SDS than the fully alert group (P = 0.006). ESS, AHI, microarousal index, and total sleep time did not predict simulated driving performance.

Conclusions: A pathological MWT mean sleep latency (0-19 min) is associated with simulated driving impairment. Before MWT can be used to predict the driving ability of untreated patients with OSAS, further studies are needed to confirm that pathological MWT scores are associated with real driving impairment.

Keywords: Sleep apnea, MWT, driving simulator, sleepiness.

Citation: Sagaspe P; Taillard J; Chaumet G et al. Maintenance of wakefulness test as a predictor of driving performance in patients with untreated obstructive sleep apnea. SLEEP 2007;30(3):327-330