

Sleep and Cognition in Older Adults

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Description of Problem

- Disturbed sleep in *both* younger and older adults causes daytime sleepiness and negatively affects cognitive performance
- More than half of adults over 65 years have trouble sleeping, characterized by both lighter sleep and frequent awakenings during the night.
- Contributing Causes:
- Circadian rhythms, regulated by the SN of the hypothalamus, diminish in amplitude and can become phase shifted with increasing age.
- Obstructive sleep apnea (OSA), particularly in men and those who are overweight-
 - Result is recurrent, brief hypoxemic events, which may not only wake one out of deep slumber but have insidious effects on brain

Sleep disorders as a marker of system health or causal factor for neurologic diseases?

- Normative data of the sleep-wake cycle in over 1200 randomly selected households with at least 1 residing 60+-year old in Paris (Ohayon & Vecchierini, 2005; Sleep)
 - Factors associated with very short sleep duration: obesity, poor health, insomnia, and cognitive impairment.
 - Factors associated with overly long sleep: organic disease, lack of physical exercise, and lower education.
- Suggests possibility that poor sleep quality and poor cognition with aging may be partially attributable to sedentary lifestyles

Observational Studies

- Largely cross-sectional or retrospective
- Use logs and objective actigraphy and polysomnography
- Largely done in older women from the Study of Osteoporotic Fractures Group (Blackwell, Yaffe, Ancoli-Israel, et al., 2007)
- Preclinical cognitive decline and subsequent sleep disturbance in older women (Yaffe, Blackwell, Barnes, et al., 2006)
 - Cognitive decline over 15 yrs on the MMSE (3 points) or TMT, Part B (>92 seconds) were associated with increased subsequent risk of sleep disturbance in nondemented.
- AD gene risk factor, APOE-4 associated with substantially increased risk for global cognitive impairment (Spira, Blackwell, Stone, et al., 2008; JAGS)

Sleep Interventions to Treat or Halt Cognitive Impairment

- 2-week RCT using Continuous Positive Airway Pressure (CPAP) vs. supplemental oxygen in 46 OSA patients to improve cognitive functioning (Lim, Bardwell, Loredano et al., 2007)
- Prior to treatment, patients with OSA showed impairments in most domains of cognition.
- The 3 treatment groups (CPAP, supplemental oxygen, and placebo-CPAP) were compared using repeated-measures analysis of variance (ANOVA).
- Although 2/3rd of participants improved over time, there was no significant Time x Treatment interaction.
- 2 weeks of CPAP or oxygen-supplementation treatment was insufficient to show overall beneficial cognitive effects, as compared with placebo-CPAP

Lifestyle Intervention to Treat Sleep Disturbance and Cognitive Impairment

- 12 older adults participated in a 2-week intervention (Benloucif & Zee, 2004) of daily 90-minute sessions divided into 3 sets of:
 - 1) mild physical activity (walking, stretching)
 - 2) social interaction (talking while playing board or card games) and
 - 3) mild to moderate physical activity (rapid walking, calisthenics or dancing).
- Results showed improved cognitive performance by 4-6% and improved subjective sleep quality.
- Key Limitations: No Control Group to address potential for practice effects over such a short duration

Most Compelling Model: Cognitive Reserve (CR) Hypothesis

- This study considered the possible relationship between OSA-related cognitive deficits and role of intellectual function (Alchanatis, Zias, Deligiorgis, et al., 2005)
- Using IQ test scores, 47 patients and 36 controls were divided into a High-IQ group and a normal-IQ group.
- In the patient groups, there were no significant differences in OSA severity or sleepiness.
- High-IQ patients and High-IQ controls performed similarly on tests of cognition.
- By comparison, Normal-IQ patients performed more poorly on cognitive testing than Normal-IQ controls.
- Suggests that factors associated with CR, such as high-intelligence and education, may have a protective effect against OSA-related cognitive impairment.

A time of day in which young (30 yrs) perform worse than older?

