

Self-Reported Sleep Disordered Breathing as Risk Factor for Mortality in the Elderly

Angeliki Tsapanou, MSc,*† Yian Gu, PhD,* Deirdre O'Shea, MSc,*
Jennifer Manly, PhD,‡§ Nicole Schupf, PhD,*†||
Nikolaos Scarmeas, MD, PhD,*†‡§ and Yaakov Stern, PhD*†§

Background: This study aimed to examine the association between self-reported sleep disordered breathing (SDB) (“awaken short of breath or with a headache”) and mortality in a large and ethnically diverse group of community-dwelling elderly people. *Methods:* A total of 1288 participants, 65 years and older, were examined longitudinally. Sleep problems were estimated using the Medical Outcomes Study Sleep Scale examining sleep disturbance, snoring, awaken short of breath or with a headache, sleep adequacy, and sleep somnolence. Cox regression analysis was used to examine the association between sleep problems and mortality. Age, gender, education, ethnicity, and body mass index were included as covariates. In further analyses we included hypertension, diabetes, heart disease, and stroke as additional covariates. *Results:* The participants were followed for up to 6 years (mean = 2.9, standard deviation = 1.1), and 239 (18.6%) participants died during the follow-up. In unadjusted models, SDB at the initial visit was associated with mortality (hazard ratio [HR] = 1.37; 95% confidence interval [CI] 1.21-1.55; $P < .0001$). After adjusting for all the covariates, the relationship between SDB and mortality

From the *Cognitive Neuroscience Division, Department of Neurology and The Taub Institute for Research on Alzheimer's disease and the Aging Brain, Columbia University College of Physicians and Surgeons, New York, New York; †National and Kapodistrian University of Athens Medical School, Athens, Greece; ‡The Gertrude H. Sergievsky Center, College of Physicians and Surgeons, Columbia University, New York, New York; §The Department of Neurology, College of Physicians and Surgeons, Columbia University, New York, New York; and ||The Division of Epidemiology, Joseph P. Mailman School of Public Health, Columbia University, New York, New York.

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Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study.

Address correspondence to Angeliki Tsapanou, MSc, Cognitive Neuroscience Division, Department of Neurology, Columbia University College of Physicians and Surgeons, PH18-326, 622 West 168th St, New York, NY 10032. E-mail: at2859@cumc.columbia.edu.

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remained significant (HR = 1.48; 95% CI 1.29-1.70; $P < .0001$). Participants with Caribbean-Hispanic ancestry have higher risk for mortality. *Conclusions:* Our results suggest that SDB is a risk factor for mortality in a large and ethnically diverse group of older adults, independent of demographic and clinical factors. Further research is needed to examine the underlying mechanisms of this association. **Key Words:** Sleep disordered breathing—mortality—elderly—self-reported sleep problems—longitudinal study.

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Introduction

Sleep problems are common among the elderly population¹ and have been linked to many disorders in the specific age group.²⁻⁴ In particular, sleep disordered breathing (SDB)—including difficulties breathing during sleep—has a high prevalence among older adults and often occurs even with atypical symptoms.^{5,6} Obstructive sleep apnea (OSA) is the most salient symptom of SDB, and has a prevalence rate of 30%-80% in the elderly.⁷ Given that SDB has been associated with increased risk of both cardiovascular disorders⁸ and dementia,⁹ understanding whether SDB can be linked to mortality in older adults is of paramount importance.

A number of studies have shown that of all sleep problems, sleep duration is the most predictive of mortality.¹⁰⁻²⁴ Sleep duration has been linked to mortality in older, but not middle-aged adults.¹⁴ Longer durations of sleep in older adults have been shown to increase the risk of dementia mortality.¹¹ Further, daytime napping, which is factored into measures of the total sleep duration, has been also associated with an elevated risk of cardiovascular disease mortality²⁵ and with all-cause mortality.²⁶ Similarly, excessive daytime sleepiness seems to be an independent risk indicator for cardiovascular mortality in older adults.²⁷ Finally, insomnia symptoms, especially difficulty initiating sleep and nonrestorative sleep have been linked to a higher risk of mortality.²⁸

In contrast, much less is known about the association between SDB and mortality. One recent 10-year-follow-up study suggests that OSA is associated with a higher risk of mortality.²⁹ A different study reported that OSA is specifically associated with cancer mortality.³⁰ However, even though untreated SDB seems to be a strong risk factor for mortality,^{31,32} the results of other studies examining the association between SDB and mortality have produced discrepant results.³³⁻³⁵

There are some significant limitations in the present literature exploring the association between SDB and mortality. First, the sample size of some of the existing studies is relatively small.³⁶⁻³⁹ Likewise, most of the studies to date, have not specifically focused on the impact of SDB in older adults, and instead, have included a wide range of ages in their population samples.^{29-32,40} Furthermore, other studies have limited their sample to include either male or female participants, and/or do not adequately

represent an ethnically diverse population sample.⁴¹⁻⁴³ All of these factors may contribute to the mixed findings present in the current body of literature surrounding this topic and also may limit the generalizability of their findings.

Thus, there is a relative paucity of longitudinal research examining the specific association in the older adults, and the existing results are often discrepant. To help reconcile these issues, in the present study, we aimed to examine the association between SDB and mortality, in a large and ethnically diverse sample of older adults.

Methods

Study Participants

Participants were selected from the Washington Heights-Inwood Community Aging Project (WHICAP) at Columbia University Medical Center.^{44,45} WHICAP is a longitudinal community-based research study aimed at identifying risk factors and biomarkers for aging and Alzheimer's disease in a multiethnic cohort that includes Caucasian, African-American, and Hispanic participants.⁴⁶ The age range of the participating pool that took part in the project was 65 years and older. Informed consent approved by the Internal Review Board (IRB) of the College of Physicians and Surgeons of Columbia University and the New York State Psychiatric Institute, was obtained before study participation for each participant.

Each participant underwent a structured in-person interview including an assessment of health and physical function, as well as a neuropsychological assessment in their preferred language (ie, English or Spanish). Participants were followed at intervals of approximately 1.5 years, repeating the baseline examination and consensus diagnosis at these time points.

From 2007 onward, sleep information was gathered from the participants. In the current study, we define the baseline visit as the visit when the sleep questionnaire was first administered to the participants.

The initial sample comprised 2358 participants. By the time when the sleep questionnaire was first introduced to the cohort, 1838 participants remained alive. Among these, we excluded 550 participants who had no sleep information or follow-up data. Thus, the final sample consisted of 1288 participants.

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