

Building a Scientific Basis to Address Adherence Disparities among Adults with CPAP-Treated Obstructive Sleep Apnea

Commentary on Billings et al. Is the relationship between race and continuous positive airway pressure adherence mediated by sleep duration? *SLEEP* 2013;36:221-227.

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The U.S. patient population has become increasingly more diverse over the past century, which has led to scientific discoveries elucidating health status and quality inequities across racial and ethnic groups. The Institute of Medicine's 2003 report, "Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care,"¹ clearly delineates the complexity of racial and ethnic health care disparities and calls for increased awareness of the health care gap between racial and ethnic groups in the U.S. Research over the past two decades on health disparities has identified the unequal burden of disease and health impairment inequities across racial and ethnic minorities and other "at risk" populations in the U.S.² This body of evidence has highlighted a critically poignant finding: biological differences are *significantly less* contributory to health disparities than social, economic, cultural, and environmental differences.³ It is with this perspective that scientific discovery will be most contributory to eliminating health disparities and permit the development of comprehensive and multi-level strategies to reduce this health care gap.

Recognition of disparities among adults of racial and ethnic groups with obstructive sleep apnea (OSA) has emerged in our own discipline, including disparate continuous positive airway pressure (CPAP) adherence outcomes for the treatment of OSA. Several published studies have reported that black CPAP users demonstrate lower CPAP adherence than other groups (predominantly white and Hispanic/Latino groups), and that race/ethnicity influences CPAP adherence.⁴⁻⁶ Follow-up with health care providers for CPAP-treated OSA may also be lower among minority adults.⁷ Such disparities heighten the health risks associated with suboptimally treated OSA, particularly in the black OSA population given the higher prevalence of comorbidities such as cardiovascular and metabolic disease with which OSA is clearly associated.⁸

Several investigations have sought to explain these disparate CPAP adherence outcomes, examining socioeconomic status and residential area as potential moderators of the CPAP adherence differences.^{5,9,10} These studies found that differences in CPAP adherence outcomes may be moderated, in part, by socioeconomic and residential factors when controlling for ac-

cess to care and care costs. Though these factors contribute to adherence disparities in the adult CPAP-treated population, translational intervention opportunities for the clinical management of diverse CPAP-treated OSA groups are not likely aligned with such empiric discoveries. To address disparities in CPAP adherence outcomes, research that critically examines individual-level factors of influence that are conducive to intervention is needed.

Building on their previous work,⁹ Billings and colleagues¹² report in this issue of *SLEEP* an examination of sleep duration as a mediator of disparate CPAP adherence outcomes among black and other race/ethnic groups. Approaching this complex problem from the hypothetical perspective that habitual sleep may differ by race and residential socioeconomic status among adults with CPAP-treated OSA, Billings et al. conducted a secondary analysis of data from the HomePAP study,¹¹ a randomized controlled non-inferiority trial testing the utility of portable monitoring devices for diagnosis and treatment of OSA. The HomePAP multisite U.S. trial consecutively enrolled 373 adults with high probability of moderate to severe OSA (AHI ≥ 15 events/h) and subjective sleepiness (Epworth Sleepiness Scale score ≥ 12), with primary outcome criteria at 1 and 3 months for CPAP acceptance, adherence, and time on treatment. Billings and colleagues' secondary analysis focused on the contribution of self-reported sleep duration and latency to CPAP adherence as the primary objective, and secondarily on self-reported insomnia symptom differences by race/ethnicity subgroups, as potentially influential on CPAP adherence. This novel approach to further understanding the disparities in CPAP adherence is particularly noteworthy as the field needs to identify intervention opportunities aimed at improving CPAP use among diverse populations of adults with OSA.

The sleep duration findings reported by Billings et al.¹² are consistent with previous findings,^{13,14} with black participants self-reporting shorter sleep duration than other groups, including whites and Hispanics. Longer sleep latency among black participants compared with others was also identified.¹² They found that both long sleep latency and short sleep duration were associated with CPAP adherence at 3 months for the entire sample with complete data ($n = 134$).¹² Short sleep (i.e., < 6 h/night) remained a significant independent predictor of lower CPAP adherence at 3 months. Insomnia symptoms at baseline were not associated with CPAP adherence. When race (black and Hispanic with referent group as white) was included, black race was predictive of lower 3-month CPAP use ($B = -87.8$ [SE 31.5]), and this relationship was attenuated but not entirely offset by baseline sleep duration, but not sleep latency.

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These novel findings provide preliminary evidence to support CPAP adherence intervention opportunities that address sleep hygiene and sleep schedule, particularly among those at risk for poor sleep habits. Based on our collective understanding of adult sleep habits, CPAP adherence, and health disparities, these at-risk groups include blacks, persons residing in low socioeconomic level neighborhoods, urban residents, and those with lower education and literacy levels.

Finally, the study by Billings and colleagues¹² highlights the importance of the CPAP adherence metric employed both in empiric and clinical settings. Over the past 27 years, since Sanders and colleagues¹⁵ publication first reporting CPAP adherence as a relevant health factor for CPAP-treated OSA, average hours of CPAP use per night has emerged as a consistent metric of CPAP adherence. Yet, as the findings of Billings and colleagues¹² suggest, simplifying CPAP adherence to average hours of CPAP use per night does not account for duration of sleep time on treatment, which is likely a more clinically meaningful and empirically precise metric of CPAP adherence. Recent CPAP dose-response studies suggest the commonly accepted adherence cut-point of 4 hours of use per night is likely minimalistic, and likely suboptimal treatment for many patients, when specific outcomes of import are considered.^{15,16} These findings, in addition to recognizing disparities exist among adults with OSA in terms of sleep duration and CPAP use patterns, bring attention to the need for a parsimonious metric of CPAP adherence for clinical and empiric application. Future research addressing CPAP adherence will therefore be further strengthened by including the simultaneous measurement of sleep duration with CPAP use in order to define CPAP adherence in an equitable and precise manner for meaningful translation to clinical practice.

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