Impact of Sleep Duration and Race on Recurrent Cardiovascular Events Following Acute Coronary Syndrome

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Short sleep duration, defined as sleeping <7 hours per night, is associated with poor cardiovascular (CVD) outcomes including mortality (1,2). There are known racial disparities for CVD (3) and for sleep health (4). However, racial disparities in the context of short sleep with CVD is an understudied area (2,5). The current study examined whether Black race modifies the association of sleep duration with recurrent CVD risk in patients with a history of acute coronary syndrome (ACS).

722 patients admitted for ACS (defined as ST elevation MI, non-ST elevation MI, or unstable angina) who identified as black (n = 175) or white (n = 547) were enrolled in-hospital and followed for 1 year in a single site, prospective observational cohort during 2009–2012. Columbia University Medical Center's IRB approved this study.

One month following enrollment, participants completed the Pittsburgh Sleep Quality Index (PSQI). Sleep duration was categorized as short (<7 hours/night) versus average sleep (7 hours/night) following previous guidelines (1,2). Major adverse cardiovascular events (MACE) were defined as the composite of death, recurrent MI, or unstable angina.

Hazard ratios (HR) and 95% confidence intervals (CI) for MACE were estimated from a Cox regression model that included sleep duration and race as the primary predictors, their interaction term, with age, sex, GRACE risk score, and Charlson comorbidity index included

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as covariates, after a preliminary forward selection analysis that considered 20 potential predictors of MACE excluding sleep duration.

At 1-year follow-up, there were 62 recurrent MACE. As previously reported, short sleep duration was associated with increased risk of recurrent MACE (1). Black relative to white race was also associated with increased risk of recurrent MACE in unadjusted and multivariable adjusted models (adjusted HR (95% CI) = 2.14 (1.26–3.63), $p = 0.005$). Sleep duration was not associated with race in the current sample ($p = 0.30$). However, there was a significant interaction of race and sleep duration ($p = 0.02$; Figure 1) such that black patients who regularly slept <7 hours/night 1 month post-ACS had a higher risk for recurrent MACE than white patients who slept 7 hours/night (adjusted HR (95% CI) = 2.88 (1.51–5.50), $p = 0.001$) as well as the other two race × sleep duration subgroups. The interaction remained significant after excluding snorers (1/week snoring based on PSQI) and patients with sleep duration >9 hours/night.

This study found that the occurrence of MACE was significantly greater among blacks who reported short sleep (<7 hours/night) 1-month post ACS than among whites with short sleep and those who slept 7 hours or more/night (both blacks and whites). There was not a significant difference in sleep duration between blacks and whites in the current sample; however, previous work indicates that Blacks are more than twice as likely to report short sleep duration than whites (4,5). A recent review suggests that sleep may be fundamental to understanding some of the racial disparities in cardiovascular risk (5). These data support and extend that hypothesis, showing that race modifies the adverse cardiac prognosis associated with short sleep duration.

Recent work has begun to delineate possible psychophysiological mechanisms linking short sleep to CVD, including increased allostatic load (2,4) from chronic short sleep contributing to elevated cortisol and inflammation (2). Less is known regarding the mechanisms linking Black race to both CVD and short sleep, although recent proposals have indicated greater exposure to discrimination and neighborhood factors such as noise and reduced safety may be important contributors (2,5).

One limitation of this study is the reliance on self-reported sleep duration. Future work should use multiple measures of sleep, including objective measures. Also, participants were drawn from one particular hospital setting in an urban metropolitan city, potentially limiting generalizability. Despite these limitations, the current report advances the science of cardiovascular health disparities and suggests that sleep may be a potential modifiable behavioral target for reducing racial health disparities.

Abbreviations

CVD   Cardiovascular Disease

ACS   Acute Coronary Syndrome

MI   Myocardial Infarction

PSQI   Pittsburgh Sleep Quality Index

MACE	Major Adverse Cardiovascular Events
HR	Hazard Ratio
CI	Confidence Interval

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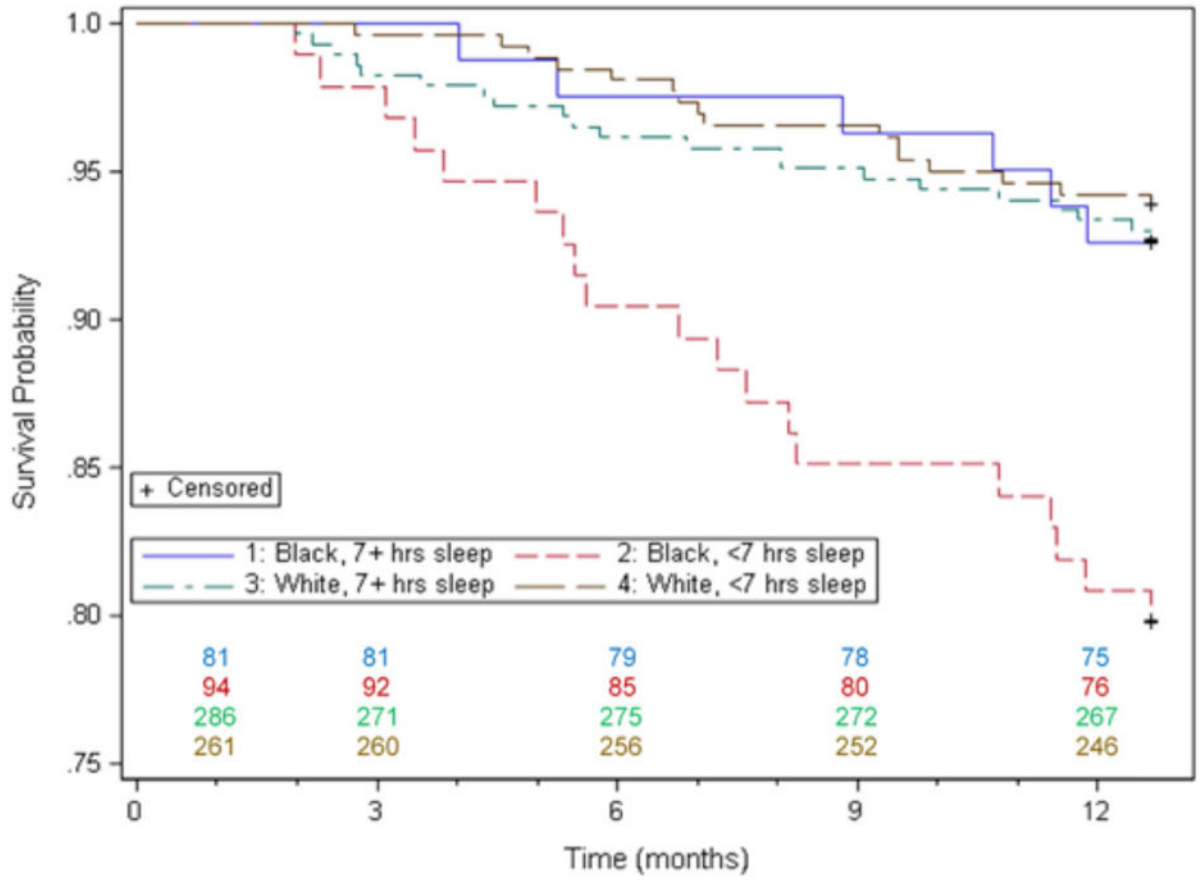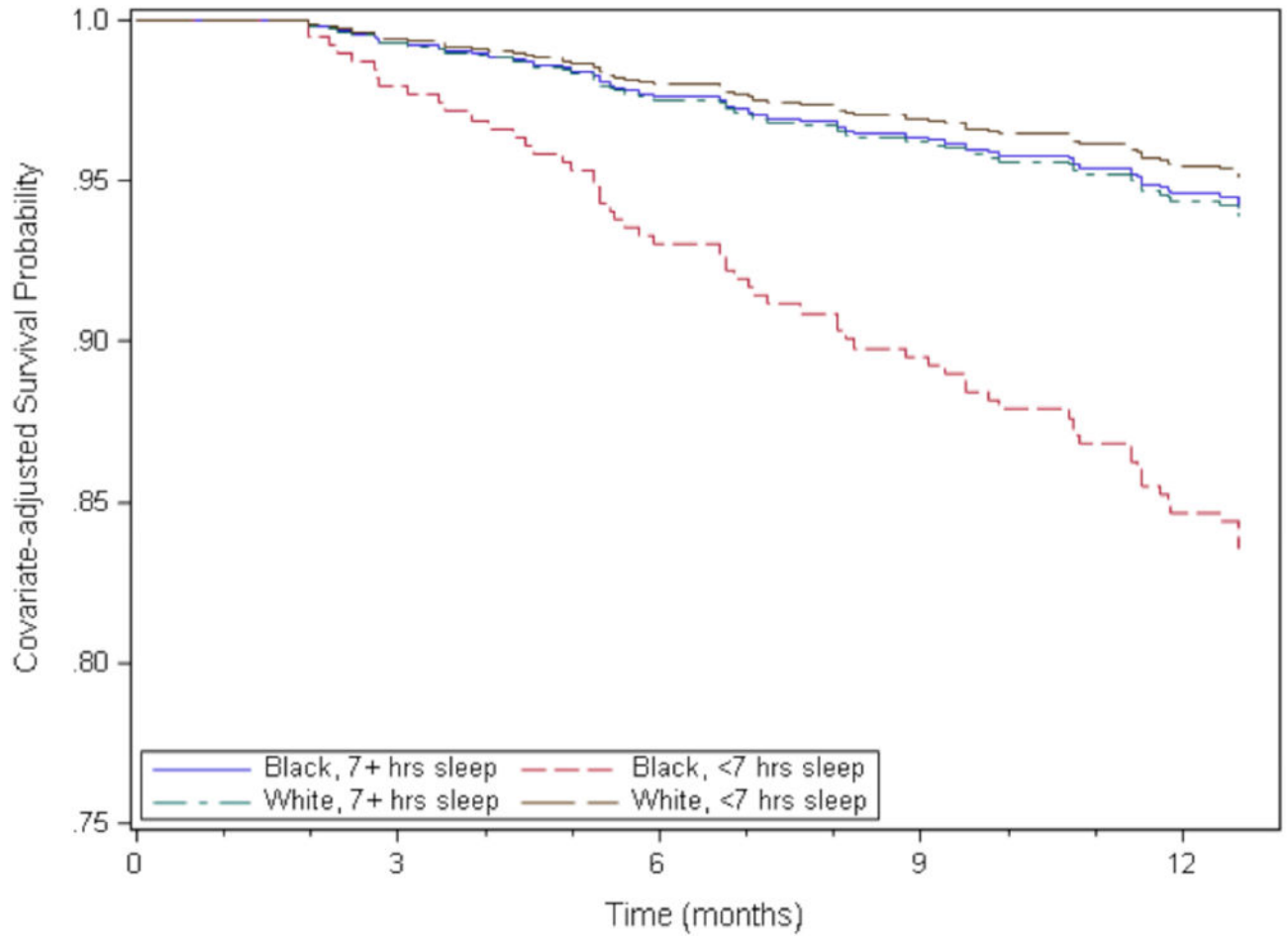
Figure 1. Unadjusted Kaplan-Meier Survival Curves (Panel A)**; and Covariate-adjusted Predicted Survival Curves (Panel B)** for Time to MACE by race and sleep duration
**p<0.001 by log rank test