

Racial/Ethnic Variations in Inflammation: Exploring the Role of Sleep Duration

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Introduction

A growing body of research suggests systemic inflammation is one biological pathway underlying racial/ethnic disparities in cardiovascular disease (CVD).

Existing research shows poor sleep is both patterned by race/ethnicity and associated with inflammation.

However, few studies have examined the extent to which sleep contributes to racial/ethnic variations in inflammation.

Aims

This study had two overarching aims:

1. Examine the relationship between race/ethnicity and inflammation
2. Examine whether sleep accounted for racial/ethnic variation in markers of inflammation

Data and Methods

Data come from a sample of 392 nurses employed with one of two regional hospitals in Texas from a larger parent study on the effects of sleep on antibody response to influenza vaccine.

The sample consisted of non-Hispanic White (n = 270), Black (n = 26), Hispanic (n = 42), Asian (n = 39) and Other (n = 15) nurses.

The outcomes for this study were four markers of inflammation (C-reactive protein [CRP], Interleukin-6 [IL-6], Interleukin-1 beta [IL-1 β], and tumor necrosis factor-alpha [TNF- α]).

For 7 days, participants wore an actigraphy device (Actiwatch Spectrum Pro) and completed sleep diaries to assess mean and total sleep time (TST; hours) and intraindividual variability (IIV) in TST.

Multivariable linear regression models were used to examine (1) whether race/ethnicity was associated with inflammation; and (2) whether accounting for mean and IIV in TST reduced race/ethnic gaps in inflammation. All analyses adjusted for age and sex.

Descriptive Statistics

Table 1. Characteristics of Study Participants

	White (n=270)	Black (n=26)	Hispanic (n=42)	Asian (n=39)	Other (n=15)
Age, mean (SD)	40.48 (11.30)	37.00 (9.96)	34.10 (8.93)	39.87 (11.73)	41.60 (10.45)
Female	93.70	84.62	88.10	87.18	93.33
Markers of Inflammation					
IL-1 β , pg/mL, median (IQR)	0.04 (0.09)	0.01 (0.05)	0.01 (0.08)	0.03 (0.08)	0.04 (0.08)
IL-6, pg/mL, median (IQR)	1.63 (1.63)	2.05 (1.28)	1.53 (0.90)	1.39 (1.63)	1.80 (1.34)
CRP, ng/mL, median (IQR)	25.88 (38.04)	19.46 (48.30)	16.75 (33.75)	16.16 (24.78)	23.05 (32.52)
TNF- α , pg/mL, median (IQR)	1.11 (0.57)	1.02 (0.42)	0.97 (0.43)	1.17 (0.52)	1.03 (0.38)
Sleep Characteristics					
Actigraphy Sleep, TST, mean	412.66 (52.88)	365.54 (68.49)	400.84 (59.18)	382.42 (55.30)	367.65 (52.20)
Actigraphy Sleep, TST, iSD	80.49 (41.90)	90.83 (45.69)	91.83 (39.26)	83.95 (43.12)	88.73 (44.58)
Diary Sleep, TST, mean	440.75 (53.85)	400.54 (63.19)	429.21 (58.94)	410.04 (56.27)	409.46 (40.64)
Diary Sleep, TST, iSD	88.79 (47.26)	98.91 (54.95)	109.58 (51.35)	96.53 (42.92)	114.22 (73.16)

Abbreviations: IQR, Interquartile range; SD, standard deviation
Note: Values reported as number (percentages) of participants unless noted otherwise.

Figure 1. Mean TST by Race/Ethnicity

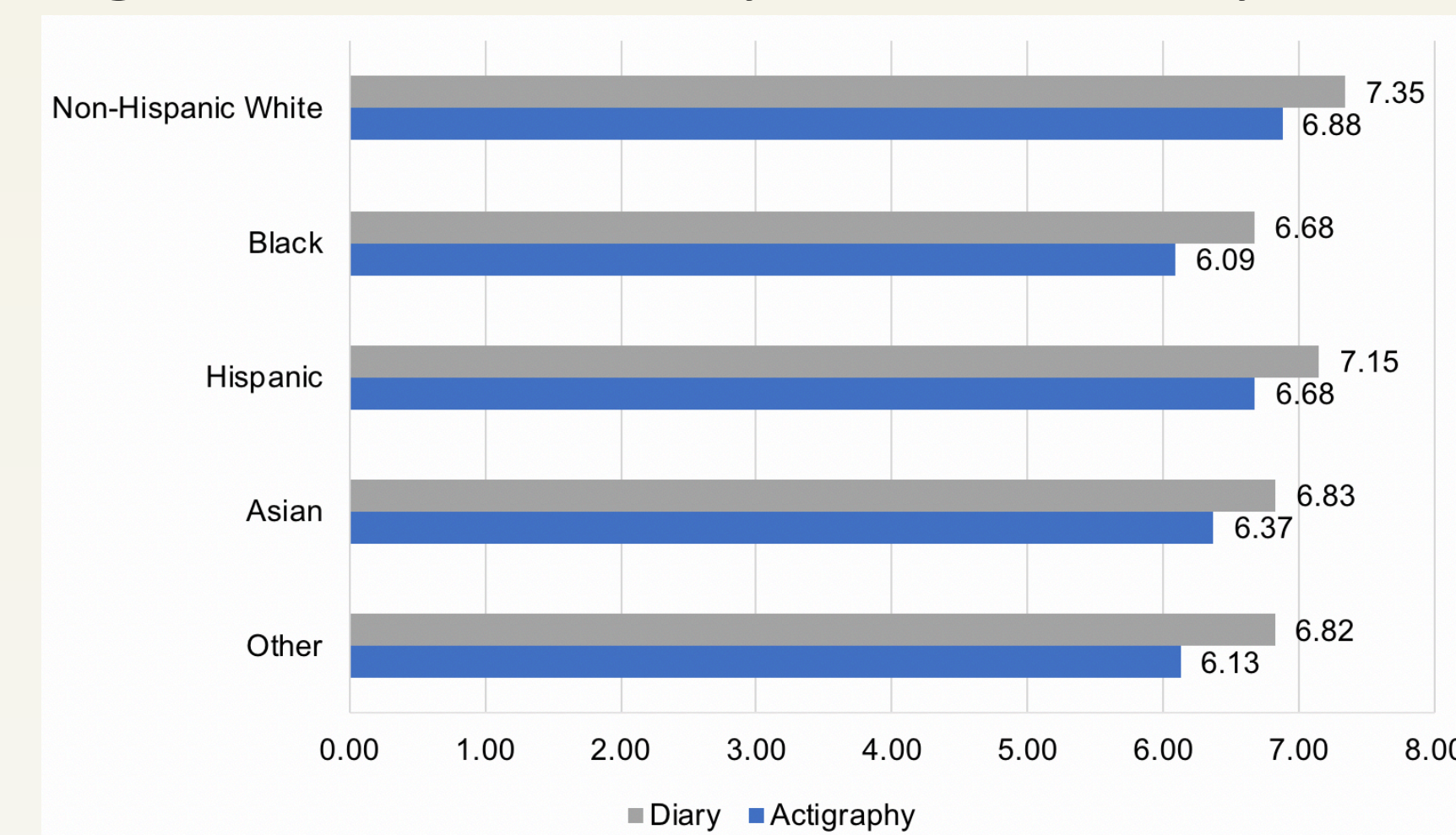
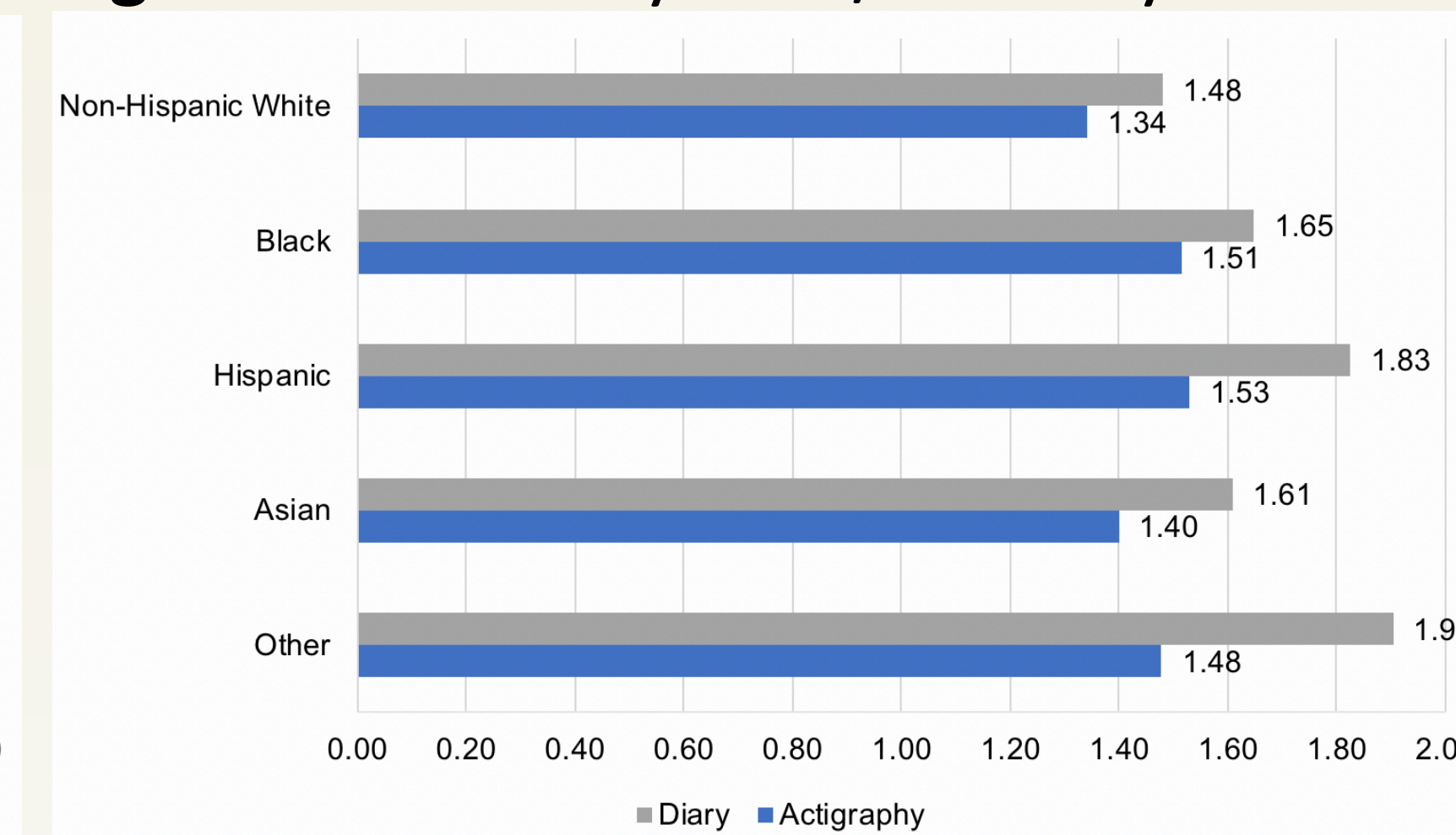


Figure 2. IIV TST by Race/Ethnicity



Diary-Determined Sleep

Figure 3. Diary-Determined Mean TST by Race/Ethnicity

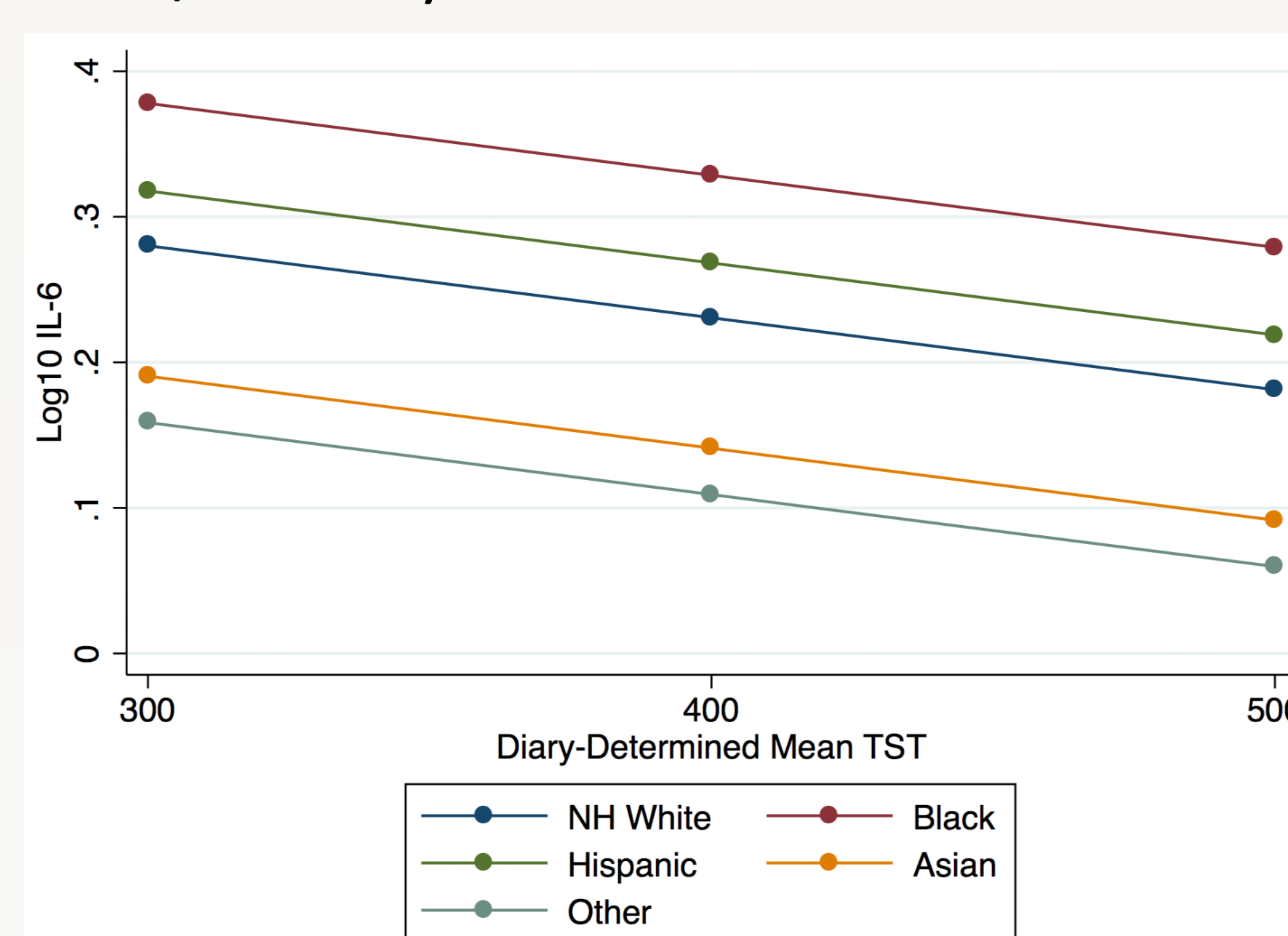
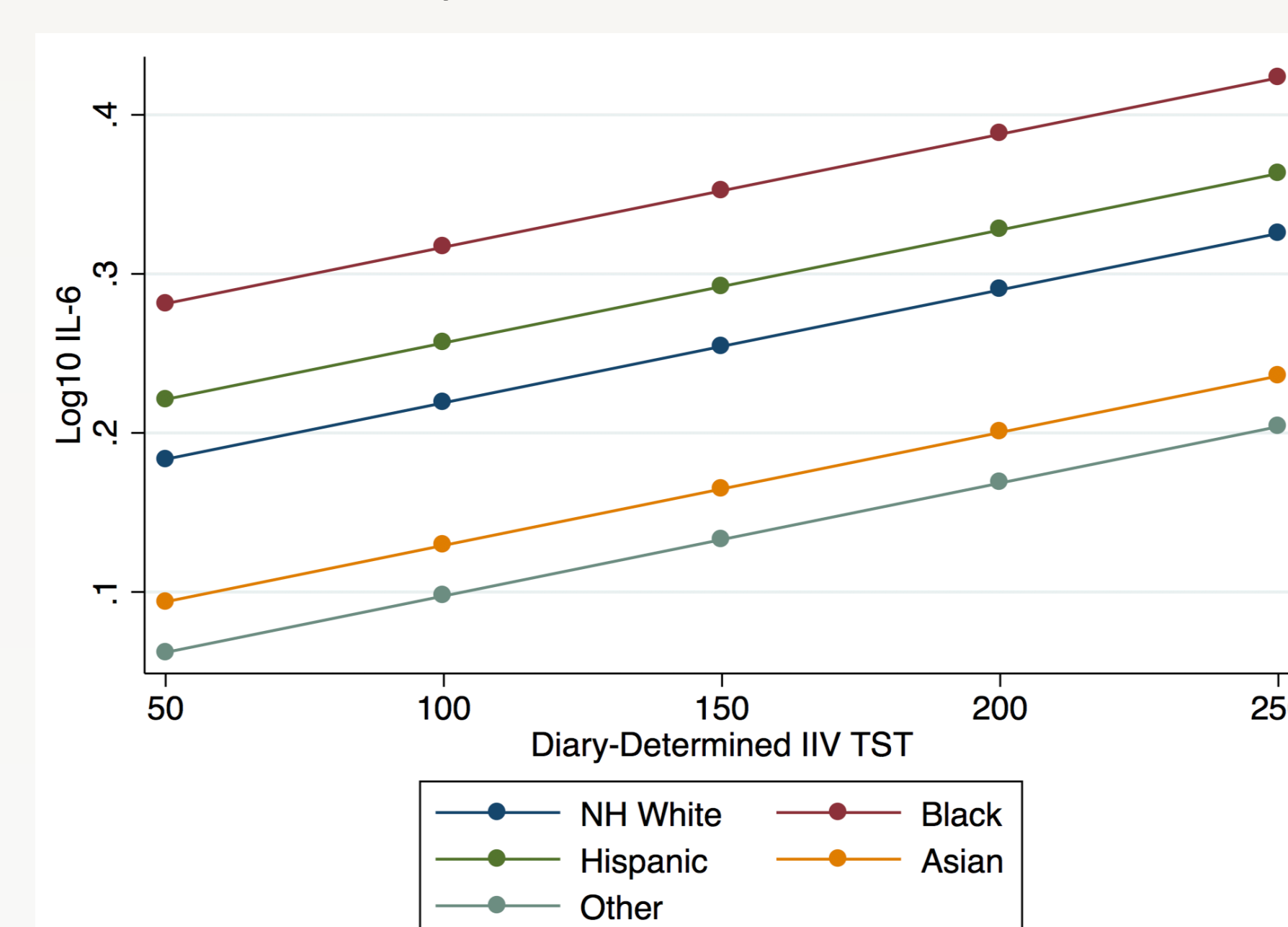


Figure 4. Diary-Determined IIV TST by Race/Ethnicity



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Actigraphy-Determined Sleep

Figure 5. Actigraphy-Determined Mean TST by Race/Ethnicity

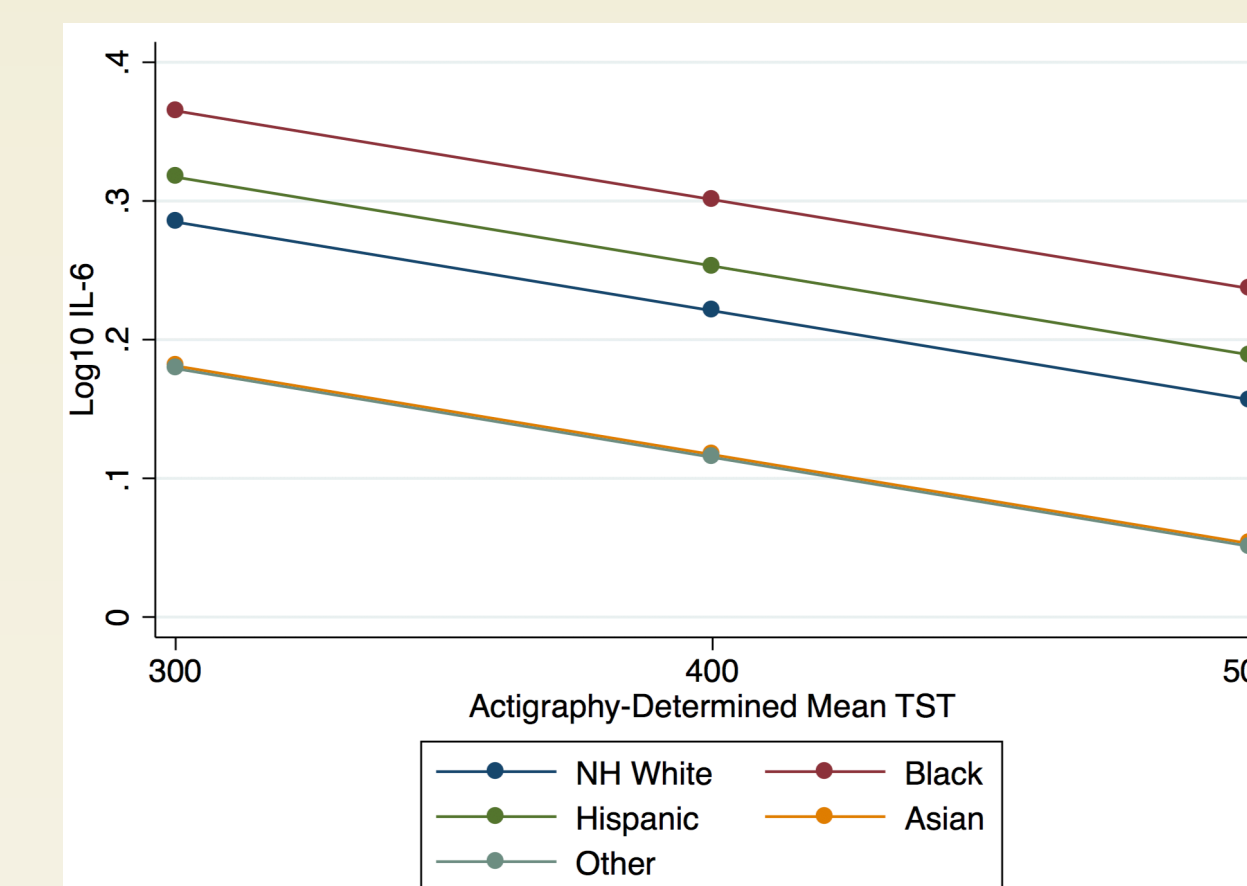
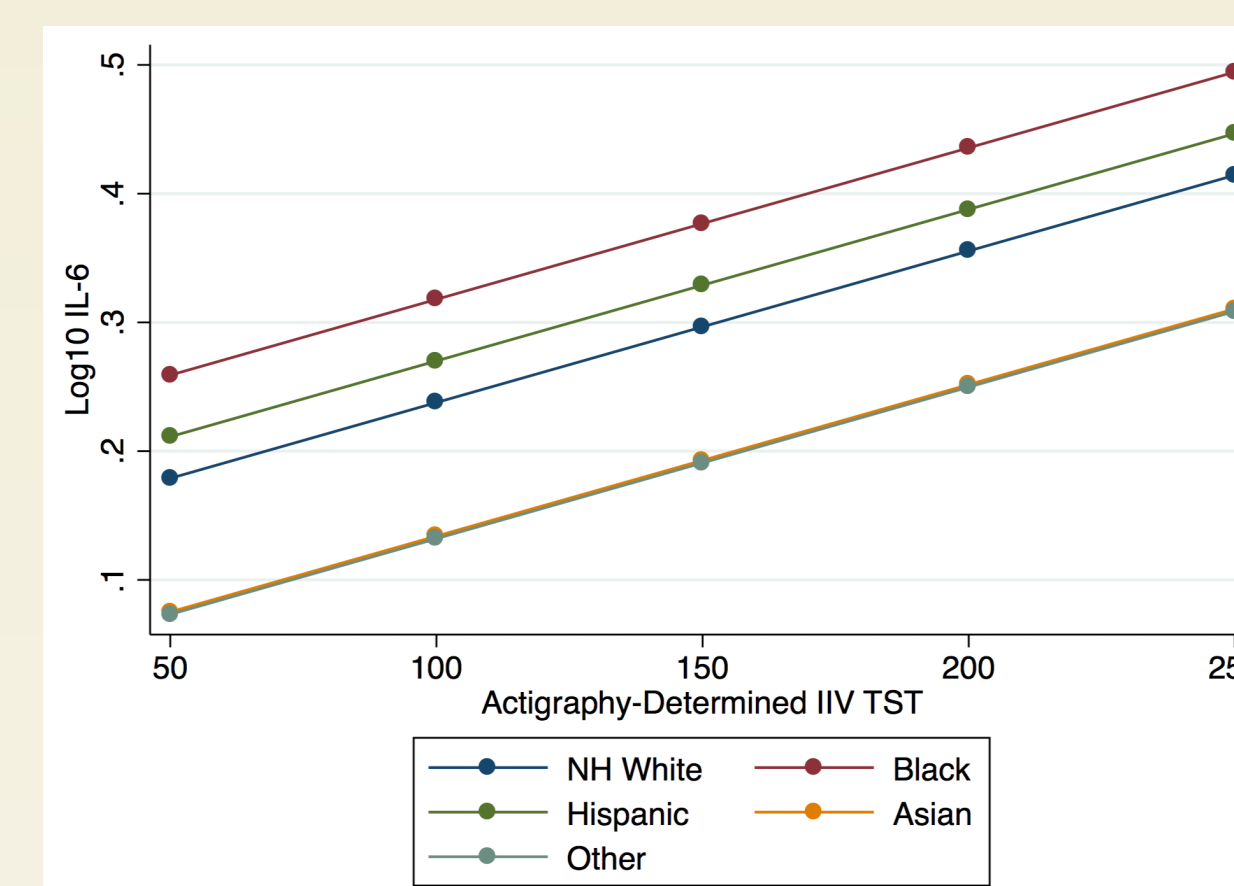


Figure 6. Actigraphy-Determined IIV TST by Race/Ethnicity



Findings

Descriptive results showed disparities in actigraphy- and diary-determined sleep by race/ethnicity: White nurses had the highest mean TST, followed by Hispanics, while Black nurses had the lowest TST.

White nurses had the lowest IIV in actigraphy- and diary-determined sleep, while Hispanic nurses had the highest IIV in actigraphy-determined sleep.

Results from linear regression models showed racial/ethnic differences in IL-6. Black nurses had significantly higher IL-6 compared to White nurses.

After adjustment for mean and IIV in TST, Black nurses were no longer more likely to have higher IL-6.

Conclusions

The relationship between impaired sleep and elevated levels of inflammation was not universal across race/ethnicity.

These findings suggest that sleep deprivation may be a mechanism underlying elevated levels of inflammation in Black nurses.

More work is needed to clarify the influence of sleep on multiple measures of inflammation across racially/ethnically diverse samples.