Sleep and the Inner City: How Race and Neighborhood Context Relate to Sleep Duration

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The biobehavioral mechanisms that contribute to racial/ethnic disparities in health are not fully understood. Studies show that short (<6.5 hours) and long (>8.5 hours) sleepers have higher health risks than mid-range sleepers. We investigate whether sleep duration varies by racial and neighborhood characteristics, particularly by neighborhood racial segregation patterns. With data from the National Health Interview Study (NHIS), we estimate a multinomial logistic regression that predicts short, mid-range, and long sleep behavior including covariates for race/ethnicity, neighborhood context, among other health and demographic characteristics. Black respondents have an increased risk of being short and long sleepers (OR=1.38 and OR=1.74, p<.001, respectively) relative to the white respondents. Living in a large city is associated with an increased risk of short sleeping of approximately 24% (p<.001) compared to non-urban areas. These results are consistent with the hypothesis that unhealthy sleep patterns among blacks and large city residents may contribute to health differentials.

EXTENDED ABSTRACT

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Introduction:

The behavioral and physiological mechanisms that contribute to racial/ethnic disparities in health are not fully understood. Differential rates in health behaviors contribute to some extent, yet they have not been able to account for all of the disparities, (Finch, Frank, and Hummer, 2000; Lantz et al., 2001), but sleep is not one of the health behaviors typically studied. Racism (LaVeist, 2000), discrimination (Williams, Neighbors, and Jackson, 2003), segregation (Williams and Collins, 2001), and variation in residential context (House, 2002) are other potential sources of the health disparities. These factors may be responsible for psychological stress that cause sleep disorders, low quality sleep, or sub-optimal sleep durations. We investigate the roles of both race/ethnic and neighborhood characteristics on an understudied yet potentially very important health indicator, sleep duration. We then investigate the extent to which sleep duration explains racial differentials in self-rated health.

Multiple studies have shown that short and long sleepers have higher health risks than their mid-range sleeping counterparts. In particular, sleeping 6.5–7.5 hours on an average weeknight is associated with the lowest risk of all-cause mortality (Kripke et al., 2002; Tamakoshi and Ohno, 2004; Wingard and Berkman, 1983). Controlling for demographic characteristics (e.g., age, race, education, occupation, marital status), health behaviors (e.g., exercise level, years of smoking, fat in diet), prior health conditions (e.g., body mass index, leg pain, and history of heart disease, hypertension, cancer, diabetes, stroke, bronchitis, emphysema, and kidney disease) and medication use, sleeping either a long or short amount increases the relative risk of all-cause mortality by up to 40 percent (Kripke et al., 2003). While the physiological mechanisms are not perfectly understood, evidence suggests that having, on average, a long sleep duration is associated with as high, if not higher, a mortality risk factor than having mid-range or short sleep duration on a regular basis. In addition, in a nationally representative US sample, both short and

long sleepers report more sleep problems (i.e., wakening during the night, wakening too early, wakening unrefreshed, and daytime sleepiness) compared to the mid-range sleepers (7 or 8 hours) (Grandner and Kripke, 2004).

Despite the clear associations between sleep and mortality described above, very few studies explicitly investigate how sleep patterns relate to sociodemographic characteristics. The few studies (Van Cauter and Spiegel, 1999; Biddle and Hamermesh, 1990; Moore et al., 2003; Hale, 2005) that explore these relationships are limited by sample size, available variables, and generalizability. Further, except for the study by Hale (2005), all of the studies fail to consider the correlates of short sleeping and long sleeping separately.

Purpose and Hypothesis:

We investigate whether the health indicator of sleep duration varies by racial and neighborhood characteristics. Because perceived racism, residential segregation, and sub-standard housing conditions may cause psychological stress that disrupt the body's physiological regulatory mechanisms, we hypothesize that blacks and large-city residents, particularly those in racially segregated communities, will be more likely to have high-risk sleep patterns, namely short sleeping and long sleeping, relative to their white and non-city counterparts, controlling for other social and demographic characteristics.

In addition, we investigate the role of sleep duration in predicting an individual's self-rated health and whether the higher prevalence of high-risk sleep patterns observed among blacks can account for some of the health disparities.

Data:

Our analysis is based on data from the 1990 National Health Interview Survey (NHIS) which has a nationally representative sample size of 40,130 individuals. Since 1957, the NHIS has continuously conducted nationwide household interviews to collect information concerning the health of the U.S. civilian non-institutionalized population. The survey collects information on race/ethnicity, socioeconomic characteristics, and self-reported health status.

Methods:

For the sleep outcome, we estimate a hierarchal multinomial logistic regression that predicts short (<6.5 hours) and long (>8.5 hours) sleep behavior relative to the category of mid-range (6.5-8.5 hours per night) sleeping. We estimate a series of three models: Model 1 includes only demographic characteristics (age, gender, race/ethnic categories, education, employment, income level). Model 2 adds in controls for health conditions (i.e. stress level, smoking behaviors, alcohol behaviors, body mass index, and self-rated health). Model 3 adds in variables about the size and density of the location of residence, as well as neighborhood (VSA) characteristics. We employ a parallel strategy for the self-rated health models, with the addition of sleep duration in the list of control variables.

Since the NHIS data do not have tract identifiers linked to the respondents, we rely on "very small areas" (VSA) in lieu of the traditional census tract proxy for neighborhoods to capture neighborhood characteristics and processes that may affect sleep and self-rated health. VSAs are smaller than census tracts and are more similar in size to census blocks or block groups. However, these VSAs should be viewed as independent of census areas, as they may overlap census block demarcations. The VSA strategy, which capitalizes on a unique feature of the sampling units and documentation in the NHIS redesign of 1989, was developed by Wells and Horm (1998). It was applied by Bond-Huie et al. (2002) in their analysis of death rates across racial/ethnic groups. This unique identifier allows for the computation of regression models that will control for observed, shared characteristics related to residential context.

Results:

Preliminary results show that non-Hispanic black respondents have an increased risk of being short and long sleepers (OR=1.38 and OR=1.74, $p<.001$, respectively) relative to the white respondents controlling for other demographic, health, and neighborhood characteristics. Mixed results with regard to various ethnic groups (i.e. Asians, Puerto Ricans, Mexican-Americans, Cubans, and other Hispanics) have been observed.

In addition, preliminary results show that living in a large city is associated with an increased risk short sleeping of around 24% ($p<.001$). Various definitions of town and city, farm and non-farm, city densities are being tested to identify the most appropriate model specification.

Conclusions:

The results are consistent with the hypothesis that unhealthy sleep patterns among blacks and large city residents may contribute to health differentials. This information can assist public health and health care professionals in identifying segments of the population that are at higher risk for sleep disorders or potential sleep-related disorders. An understanding of the correlations between race, neighborhood context, and sleep duration may provide help in explaining outcomes where there are other racial disparities, such as test score gaps. This research may guide social scientists to incorporate sleep and other biological variables into future analyses. And finally, it may build additional awareness of the importance of sleep hygiene to the non-sleep research community.

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