THE SOCIAL DETERMINANTS OF SLEEP:
Analysis using the Wisconsin Longitudinal Study

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Extended Abstract

The familiar phrase 'get a good night's sleep' reflects the Aristotelian concept that sleep is restorative. The health and social consequences of insufficient sleep are significant. Numerous medical studies find that the adverse effects of sleep deprivation include: decreased glucose tolerance and increased cortisol (Van Cauter et al., 1997), hypertension (Young et al., 1997a), increased risk of cardiovascular disease (Hayashi et al., 2003), depressed immunological function (Spiegel et al., 1999), depression (Pilcher et al., 1998), decreased cognitive performance (Spiegel et al., 1998), increased motor vehicle accidents (Young et al., 1997b), and decreased learning (Stickgold et al., 2000; Stickgold et al., 2001).

This paper examines the determinants of sleep from a population health perspective. Sleep patterns result from the interaction of biological cycles and psychosocial experiences. Yet, at present, from a population perspective, very little is known about the demography of sleep in the United States and how it relates to stress and health (Moore et al., 2002). We hypothesize that differentials in sleep quality contribute to the widely observed social gradient with health.

We address specific relationships between quality of sleep and social characteristics using the Wisconsin Longitudinal Study (WLS), which began in 1957 with a random sample of 10,317 Wisconsin high school graduates of that year, and followed up in 1964, 1975, and 1992/1993. The WLS[1] data to-date provide an unusual opportunity to study the life course from

[1] More information on the WLS is available at: http://dpls.dacc.wisc.edu/WLS/wlsarch.htm. There is also a 2003 wave, but we do not use this data.

late adolescence through age 60 in the context of comprehensive documentation of opportunities, experiences, and aspirations, and a few questions that measure trouble sleeping.

Preliminary results of bivariate logistic regressions reveal that multiple social characteristics predict self-report of trouble sleeping for two or more weeks during the past year. For example, women have an odds ratio of 1.45 ($p<.01$), people with no degree beyond high school have an odds ratio of 1.37 ($p<.05$), and widows have an odds ratio of 2.34 (n.s.). People who self-report above-average wealth have greatly reduced odds of trouble sleeping at .32 ($p<.05$), and single people also have a reduced odds of trouble sleeping at .62 ($p<.10$) compared to married people. We also find that each IQ point increase is related to a percentage point decrease in the probability of having trouble sleeping at night ($p<.10$). Surprisingly, we did not find a relationship between any of the Ryff scales of psychological well-being (1998) and our measure of trouble sleeping.

Using multivariate regressions to determine the driving determinants of trouble sleeping, we find that controlling for other characteristics (such as marital status, education, and wealth), the increased probability of women having trouble sleeping goes away. In fact, using the full model, we find that the only statistically significant predictor of trouble sleeping is self-reported high wealth. In the full model, high wealth reduces the odds ratio of trouble sleeping by approximately 70% ($p<.05$). The effect of having no degree and being divorced is still large, but not statistically significant, with odds ratios of 1.66 and 1.60, respectively.

The implications for these relationships shed light on the growing literature about social inequalities in health. If sleep is a mediator of the social gradient with health, improving sleep hygiene may be a particularly important mechanism for reducing health inequalities.

References:

Carskadon, M.A., Wolfson, A.R., Acebo, C., Tzischinsky, O., and Seifer, R. Adolescent sleep patterns, circadian timing, and sleepiness at a transition to early school days. Sleep 21(8):871-881, 1998.

Hayashi M, Fujimoto K, Urushibata K, Uchikawa S, Imamura H, Kubo K. "Nocturnal oxygen desaturation correlates with the severity of coronary atherosclerosis in coronary artery disease." *Chest.* 2003 Sep;124(3):936-41.

Moore, Phillip, Nancy E. Adler, David R. Williams, and James S. Jackson. "Socioeconomic Status and Health: The Role of Sleep." *Psychosomatic Medicine*. 2002 64: 337-344.

Pilcher, J. J., & Ott, E. S. The relationships between sleep and measures of health and well-being in college students: A repeated measures approach. *Behavioral Medicine, 23*(4), 170-178. 1998.

Ryff, Carol. *Scales of Psychological Well-being.* 1998.

Spiegel K, Leproult R, Van Cauter E. Impact of sleep debt on metabolic and endocrine function. *Lancet.* 1999;354:1435-1439.

Spiegel, K, Santucci, J., Colecchia E., Kosslyn S., Stickgold, R., Van Cauter E. Sleep 1998; 21(3 Suppl): 232

Stickgold R, Hobson JA, Fosse R, Fosse M. Sleep, learning and dreams: Off-line memory reprocessing. *Science*. 2001; 294:1052-1057.

Stickgold R, James L, & Hobson JA. Visual discrimination learning requires post-training sleep. *Nature Neuroscience*. 2000; 2:1237-1238.

Van Cauter E., Polonsky KS, Scheen AJ. Roles of circadian rhythmicity and sleep in human glucose regulation. Endocr Rev 18 (5): 716-38, 1997.

Young T, Blustein J, Finn L, Palta M. Sleep-disordered breathing and motor vehicle accidents in a population-based cohort. Sleep 20:608-613, 1997a.

Young T, Peppard P, Palta M, Hla K, Finn L, Morgan B, Skatrud J. Population-based study of sleep disordered breathing as a risk factor for hypertension. *Arch Int Med* 157:1746-1752, 1997b.