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Editorial

Sleep research in non-Western populations reveals novel insights about the breadth and diversity of human sleep patterns

Societies across the globe have been undergoing dramatic economic, social, and technological changes at variable rates over the past several decades, resulting in a mosaic of highly diverse modern sleep environments, all differing markedly from historical and ancestral conditions. Yet, most academic descriptions of "normal" human sleep disproportionately represent patterns observed in studies conducted in the United States and other post-industrial nations with well-funded sleep research programs. In the same way that there is no singular definition of a normal human pattern of daily behavior, resource availability, and ecology, there may not be a single, normal sleep-wake pattern.

With the goal of taking a more comprehensive and comparative approach to the study of human sleep, we have compiled together this special issue of *Sleep Health: Global and Evolutionary Perspectives on Sleep*. We include research by scholars from a diverse array of nations and academic backgrounds, studying sleep in sample populations that span a wide variety of cultures, subsistence patterns, and environmental conditions. Some notable and perhaps surprising results are summarized here.

Broadly, Prall et al.,[1] Samson et al.,[2] and Ekirch[3] address the relationship between sleep and nighttime darkness in the absence of electricity, which reflects possible mediation by regular yet dynamic patterns of nighttime activity. Prall et al. present the first analysis of objectively measured sleep in a pastoralist population, the Namibian Himba, finding extremely *low* average sleep duration and sleep efficiency even compared to hunter-gatherers. Samson et al. investigated the effects of lunar cycle on sleep in 2 independent African populations lacking access to electricity, Hadza hunter-gatherers and Malagasy vanilla farmers, finding that the farmers' sleep does not covary with the lunar cycle but that Hadza sleep *longer* on brighter nights with fuller moons. Ekirch propounds the unique insights of historical analyses of sleep, as well as discussing numerous cases of extended activity after dark prior to the introduction of artificial lighting, especially notably during the period of the night between "first sleep" and "second sleep."

Although there is a general feeling of inevitable chronic fatigue and high stress associated with nighttime care for newborns in the United States, mothers in non-Western populations, often with much higher birth rates, may not display this same pattern. Ball et al.,[4] Crittenden et al.,[5] and Vitzthum et al.[6] explore strategies for nighttime infant care and their relationships with parental sleep in Australia, Africa, and South America, which together suggest that the relationship between having babies and losing sleep may not be so fixed and uniform. Ball et al. introduce the Possums infant sleep program, which emphasizes cued responses to infant needs. Recognizing that infant sleep may be dynamically responsive to available informational stimuli, and thus highly variable, has helped many Australian mothers better manage the stresses and expectations of nighttime care for newborns. Crittenden et al. examine the effects of cosleeping with young children on maternal sleep among Hadza hunter-gatherers. For Hadza mothers, a greater number of cosleepers (individuals in the same sleeping surface) were associated with reduced sleep duration and greater sleep fragmentation, yet *no significant changes* in typical sleep duration were associated with nursing status. Vitzthum et al. investigated longitudinal changes in breastfeeding patterns among Aymara mothers living in the Bolivian Altiplano. In the second year of their infants' lives, mothers begin to wean, which is associated with an increase in time in bed in remote villages but a decrease in time in bed in near-town communities.

Schokman et al.,[7] Olorunmoteni et al.,[8] and Rae et al.[9] studied variation in sleep patterns as a function of socioeconomic status in non-Western countries. Schokman et al. performed an analysis of objectively measured sleep patterns in a lower-middle-income population in urban Sri Lanka, finding short average sleep duration and low sleep efficiency. However, low sleep efficiency was associated with a tendency to *over*estimate sleep duration by self-report, not underestimate it, as is more common in the United States. Olorunmoteni et al studied the effect of nighttime electronic use on sleep among Nigerian teenagers, finding that cell phones and television were associated with shorter weeknight sleep but not weekend sleep. However, they also found that this had the broad population-level effect of teens from higher-income families sleeping *less* during the week than teens from lower-income families. Rae et al. investigated self-reported sleep duration, body mass index, and insulin resistance among Black and White South African women. Despite the observation that short sleep duration may increase insulin resistance and obesity risk in the United States, lower body mass index and lower insulin resistance were associated with *shorter* nightly sleep among both Black and White South African women.

Doolin et al.[10] and Leocadio-Miguel et al.[11] compared self-reported sleep patterns among undergraduates and medical students across the globe. Doolin et al. examined how overall stress levels and worldview predicted reported sleep duration, finding that despite an overall association between stress and reduced sleep, Bolivian students were more stressed and American students had shorter average sleep duration. Leocadio-Miguel et al. compared reported sleep patterns among Brazilian undergraduates at universities located at 3 different latitudes and tested for interactions between the PER3 genotype and latitude. They found that more equatorial students had shorter average sleep and higher daytime energy levels and that the PER3 gene, which has been linked to light sensitivity, appeared to

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somewhat exacerbate the effect of latitude on student sleep and daytime fatigue.

All of these articles present novel findings and perspectives that challenge some of the common understandings of Western sleep that have heretofore been considered "normal" or even universal. We hope that consolidating these articles into this special issue of *Sleep Health* can create a launchpad for future multidisciplinary and globally integrative research and that this broader perspective can lead to new insights into the nature of human sleep.

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