Introduction

The scientific community long has viewed sleep as a basic biological function, a behavior as natural, necessary, and universal as eating. Accordingly, sleep has been studied like other such functions, where settings and social conditions are treated as moderating factors that influence exposure to sleep constraints or disrupters such as discomfort and noise, worries, or work demands. Culture has been disregarded altogether. Only recently has it become clear that sleep, like eating, is heavily conditioned by culture, and that a great deal might be learned about the bases of sleep and sleep disorders through the study of cultural factors. This chapter builds on that insight and explores the role of culture in sleep practices, perceptions, and problems.

The discussion necessarily remains exploratory because the cross-cultural ethnographic and empirical evidence base remains thin. Such a curious omission of the most prevalent human behavior from anthropological and ethological inquiry stems partly from a view of behavior as produced by a conscious agent, and of sleep itself as absent of meaning and cultural constructions, except in dreams. Thus, we find reciprocal gaps in the literature, that of culture in sleep science and that of sleep in cross-cultural research. Together, the paucity of data plus the emerging recognition of culture's possible significance offer an exciting opportunity for sleep science, for which conceptual frameworks and hypotheses
are needed to map the field of inquiry and inform systematic research that will fill a real lacuna in current understandings of sleep.

The present discussion aims to help bridge that gap from a developmental perspective, using the approaches of biocultural anthropology. Commencing with a consideration of adaptive-evolutionary constraints that have shaped the place of sleep in human development, this chapter outlines a bioecocultural model that provides a framework for integration of culture into the study of human development. This model inspired a study of the comparative developmental ecology of sleep that is then summarized in terms of initial insights into cultural patterns and variation in the physical ecology of sleep, and the recognition of sleep as a form of social behavior. The suggestive findings from this cross-cultural survey are followed by results from an empirical investigation of the role of culture in shaping sleep across the life course in a specific society, namely Egypt. Study results showed that cultural factors powerfully structured sleep, accounting for much of the variance in sleep across the life course. This example engages a number of issues regarding the impact of culture change and globalization (schooling, media, family and residential patterns, nutrition) on sleep schedules and consequently on functioning and health. The emerging global literature on these topics is briefly surveyed.

A concluding section deploys psychological anthropology to consider the role of cultural models in how sleep is conceptualized and how such models inform behavior and perception, with particular regard to parental behavior. Building on a cultural consensus analysis from our study of parenting and development of child self-regulation in American families, I delineate two key dimensions in an American cultural model of sleep, along with the resultant scripts for sleep and parenting practices. Then, based on our comparative work, contrasting elements in non-Western cultural models of sleep and their attendant scripts are proposed. A central insight from this perspective is that sleep is embedded in a moral framework that powerfully shapes not only behavior, but also evaluations of sleep as appropriate or disordered. Thus, the cultural construction of sleep across the life course can also be understood as a project that directly concerns crucial intangibles such as personhood, morality, and social relations, as well as the urgent practical ones of health, subsistence, and survival.

Adaptive and Evolutionary Back

The lingeringly mysterious adaptive scope of this chapter (see Worthman, 2003) and comparative study and raises four points: first, evolution of environments, using an array of sociality and culture are obligatory to and integral to development and function shapes human ecology. Children become competent by living in social contexts and culture. Fourth, and related, mental design anticipates reliable infant rearing for assembling complex nervous system (Worthman, 2003). Design implications for sleep in the daily activities necessary for survivable to the range of ecological and environmental. Indeed, humans manifest pro-schedules and tolerating sleep restrictions culturally prescribed sleep practices that are presented by specific environmental analysis of selected non-Western cultures. Afternoon napping is not related to higher to the presence of malaria and other factors (Barone, 2000). Then, in line with sleep should commonly occur in situations of group life. Co-sleeping has been seen as an instance, all reports in an ethnography identified infants as sleeping in the same bed (Paxson, 1971). Finally, dependence on environmental conditions suggests that ontogeny is shaped by sleeping practices. The deontic moral framework, regularities in patterning and co-operation are an important factor in the development of sleep regulation.
Adaptive and Evolutionary Background

The lingeringly mysterious adaptive foundations of sleep lie outside the scope of this chapter (see Worthman, 2008), but a consideration of adaptive constraints on human sleep patterns must be a starting point for any comparative study and raises four points. First, humans inhabit a huge range of environments, using an array of cultural and biological adaptations to flourish under widely diverse ecological conditions. Second, sociality and culture are obligatory to humans, indispensable for survival and integral to development and function. Third and consequently, culture shapes human ecology. Children are provisioned, learn language, and become competent by living in social groups structured and operating through culture. Fourth, and related to cultural dependence, developmental design anticipates reliable inputs from the expectable environments of rearing for assembling complex features such as the immune or nervous system (Worthman, 2003). Thus, culture gets under the skin.

Design implications for sleep include that it must be fitted into the daily activities necessary for survival and consequently must be malleable to the range of ecological and cultural circumstances that humans inhabit. Indeed, humans manifest prodigious capacity for adjusting sleep schedules and tolerating sleep restriction (Worthman, 2008). Furthermore, culturally prescribed sleep practices may themselves meet adaptive challenges presented by specific environments. For example, cross-cultural analysis of selected non-Western cultures has found that the practice of afternoon napping is not related to hot climates or agricultural labor, but to the presence of malaria and other parasitic and infectious diseases (Barone, 2000). Then, in line with most of humans’ primate relatives, sleep should commonly occur in social groups, for safety and as an extension of group life. Co-sleeping has been widespread across societies. For instance, all reports in an ethnographic sample of 173 traditional societies identified infants as sleeping in the same bed or room as others (Barry & Paxson, 1971). Finally, dependence of development on input from rearing conditions suggests that ontogeny of sleep regulation would be shaped by sleeping practices. The developmental ecology of sleep—that is, regularities in patterning and conditions of sleep—may therefore be an important factor in the development of the systems related to its regulation.
The Ecobiocultural Perspective on Human Development

The primary role of culture in shaping rearing environments has prompted the claim that of all the things one could do to influence the development of an infant "the most important would be to decide where on earth—in what human community—that infant is going to grow up" (Weisner, 1996, p. 276). A developmental-ecological framework builds on both adaptationist and cultural ecological perspectives and provides a powerful basis for a fresh approach to sleep. The ecobiocultural approach integrates the pervasive influence of culture on living conditions and experience, with the environmental expectancy of the developing child (reviewed in Worthman, in press). Cultural beliefs, values, and cognitive-affective orientations directly inform behaviors, practices, physical conditions, materials, and settings that members of the culture produce, to yield the patterned matrix of human ecology. The actual conditions under which children grow up, or the developmental niche, thereby are society-specific products of culturally grounded views and practices for the care and rearing of the young (Super & Harkness, 1986).

The developmental niche of any society must also work with human variation and incorporate elasticity responsive to the individual child. Cultural goals and values built in to the niche (e.g., parent assessments and responses) engage with the child’s endogenous or constitutional conditions including temperament, epigenetics and genetics, physical or functional features, capacities, and health to both drive and respond to her/his perceived developmental states and needs toward culturally desired results. Outcomes such as state regulation, physical function and health, and cultural competence are formed in this cultured space. Systems that regulate sleep, as well as those influenced by sleep patterns, count among these outcomes, and thus can be viewed as products of the developmental niche. Such logic argues for the possibly constitutive role of culture in sleep behavior and regulation, and provides a general framework for linking “distal” cultural factors to more proximal accounts, such as Sadeh and Anders’ transactional model of infant sleep problems (Sadeh & Anders, 1993). Methodologically, it follows that ethnography should play a key role in the study of human development and sleep.

The bioecocultural model supports research design by operationalizing culture and its actions in development in terms of observable phenomena, including the behaviors and conditions that constitute the context model represents a powerful tool for cultures in relation to human development patterns of sleep behavior at the development not only of sleep life—emotional, social, and productive. The next section describes a general approach to sleep and the unexpected insights yield cross-cultural ethnographic study.

A Comparative Ecology of Sleep

The gap between paradigms for human sleep and how it is practiced around the world has been a focus of study over a decade ago in anthropology (Worthman, 1999). It was a time when variation in sleep behavior scarcely begun at that time (Reima Souza, Medeiros, & Almirao, 1998; 2000). Although direct comparisons were scant, the physical and social context in ethnographic and historical accounts of sleep behavior at any age and physical conditions (e.g., where, when and what sleep was practiced) were based on inventories from colleagues having diverse research strategies and geographic locations (e.g., Paraguay to horticulturalists in Northeast Africa and Pakistan and Kenya, and agricultural...
shaping rearing environments has things one could do to influence the it important would be to decide where ity—that infant is going to grow up” mental-ecological framework builds on ecological perspectives and provides a h to sleep. The ecobiocultural approach e of culture on living conditions and nal expectancy of the developing child Cultural beliefs, values, and cognitive-form behaviors, practices, physical contact members of the culture produce, to human ecology. The actual conditions or the developmental niche, thereby are urally grounded views and practices for (Super & Harkness, 1986). Any society must also work with human icity responsive to the individual child. in to the niche (e.g., parent assessments he child’s endogenous or constitutional ent, epigenetics and genetics, physical or and health to both drive and respond to nal states and needs toward culturally ch as state regulation, physical function etence are formed in this cultured space. well as those influenced by sleep patterns, and thus can be viewed as products of the gic argues for the possibly constitutive role d regulation, and provides a general frame- ral factors to more proximal accounts, such ional model of infant sleep problems (Sadeh logically, it follows that ethnography should f human development and sleep.
el supports research design by operational- s in development in terms of observable phenomena, including the behaviors, perceptions, relationships, and conditions that constitute the context of rearing. Thus, an ecobiocultural model represents a powerful tool for systematic study of sleep in other cultures in relation to human development. It draws attention to on-the-ground patterns of sleep behavior and experience as important factors in the development not only of sleep itself, but also of the other aspects of life—emotional, social, and productive—of which it forms an integral part. The next section describes a general framework for the ecology of sleep and the unexpected insights yielded from its use in an exploratory cross-cultural ethnographic study.

A Comparative Ecology of Sleep

The gap between paradigms for laboratory-based investigation of sleep and how it is practiced around the world formed the impetus for our initial study over a decade ago to begin filling this gap from the side of anthropology (Worthman, 1999). Investigation of cross-cultural patterns and variation in sleep behavior and corresponding physiology had scarcely begun at that time (Reimao, Souza, & Gaudioso, 1999; Reimao, Souza, Medeiros, & Almirao, 1998; reviewed in McKenna 1996; McKenna 2000). Although direct comparative empirical reports on sleep behavior were scant, the physical and social ecology of sleep was more accessible in ethnographic and historical accounts (Ekirch, 2005; McKenna et al., 1993). Thus, we used the ecobiocultural model to formulate an a priori descriptive framework for characterizing the developmental ecology of sleep in diverse societies, in microecological terms that determine sleeping conditions (e.g., where, when, how, and with whom), along with macroecological cultural, demographic, and climatic factors that pattern sleep behavior at any age and physical or social condition (see Table 8.1, left column). The framework was used to elicit structured ethnographic inventories from colleagues having society-specific expertise (Robert Bailey, Fredrik Barth, Magdalena Hurtado, Bruce Knauff, Mel Konner, and John Wood) concerning ten traditional cultures ranging in subsistence strategy and geographic location, from foragers in Botswana and Paraguay, to horticulturalists in New Guinea and Zaire, pastoralists in Pakistan and Kenya, and agriculturalists in Bali. This analysis revealed
TABLE 8.1  Sleep ecology and settings: elements and contrasts

<table>
<thead>
<tr>
<th>Elements of sleep ecology</th>
<th>Characteristics of sleep settings</th>
<th>“non-Western”/globalizing historic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microecology</td>
<td>Security</td>
<td>present</td>
</tr>
<tr>
<td>Proximate physical ecology</td>
<td>risk from pathogens, predators, elements, enemies</td>
<td></td>
</tr>
<tr>
<td>Bedding</td>
<td></td>
<td>absent</td>
</tr>
<tr>
<td>Presence of fire</td>
<td>Sensory stimulation</td>
<td>moderate-high</td>
</tr>
<tr>
<td>Sleeping place or structure</td>
<td>sleeping arrangements: co-sleeping</td>
<td>low-minimal</td>
</tr>
<tr>
<td>Proximate social ecology</td>
<td>body contact</td>
<td>extensive</td>
</tr>
<tr>
<td>Sleeping arrangements</td>
<td>thermal properties</td>
<td>limited</td>
</tr>
<tr>
<td>Separation of sleep-wake states</td>
<td>use of fire</td>
<td>stable</td>
</tr>
<tr>
<td>Biotic macro- and micro-ecology</td>
<td>noise</td>
<td>heat/cold</td>
</tr>
<tr>
<td>Domestic animals</td>
<td>light</td>
<td>dynamic</td>
</tr>
<tr>
<td>Parasites and nighttime pests</td>
<td>odors</td>
<td>dim/dark</td>
</tr>
<tr>
<td>Macropredators (animal, human)</td>
<td>bedding</td>
<td>present</td>
</tr>
<tr>
<td>Macroeconomy</td>
<td>Variability of sensory properties</td>
<td>minimal</td>
</tr>
<tr>
<td>Labor demands</td>
<td>regulation of thermal conditions</td>
<td>minimal</td>
</tr>
<tr>
<td>Social activity</td>
<td>disturbance (noise, movement, light)</td>
<td>minimal</td>
</tr>
<tr>
<td>Ritual practices</td>
<td></td>
<td>minimal</td>
</tr>
<tr>
<td>Beliefs about sleep and dreaming</td>
<td></td>
<td>minimal</td>
</tr>
<tr>
<td>Status (social status, class, gender)</td>
<td></td>
<td>minimal</td>
</tr>
<tr>
<td>Life history, lifespan processes</td>
<td></td>
<td>minimal</td>
</tr>
<tr>
<td>Ecology, climate</td>
<td></td>
<td>minimal</td>
</tr>
<tr>
<td>Demography and settlement patterns</td>
<td></td>
<td>minimal</td>
</tr>
</tbody>
</table>

Areas of commonality along with differences in microecology under which people experience different conditions on sleep patterns. Unexpectedly, the comparative analysis of contemporary sleep ecology on a small non-Western sample revealed solitary sleep rare; bedtimes fluid and wide present; conditions dim or dark; and little or no acoustic disturbances. As such, sleep settings included security and comfort through the use of fire in time and space; and little climate regulation as physical boundaries to sleep space. “Modernized” sleep conditions include habitual solitary or le sleep, and wake times with confuse bedding; absence of fire; darkness as physical boundaries to sleep space;

Our cross-cultural survey also noted that although infants and toddlers were provided with sleeping arrangements, sleep was an exception rather than the norm.
areas of commonality along with diversity in the proximal conditions or microecology under which people sleep, and documented the pervasive effects of social, cultural, and physical ecological factors, or macroecology, on sleep patterns (Worthman & Melby, 2002).

Unexpectedly, the comparative evidence flagged some characteristics of contemporary sleep ecology and practices as unusual (Table 8.1). Across this small non-Western sample, sleep settings were social and solitary sleep rare; bedtimes fluid and napping common; bedding minimal; fire present; conditions dim or dark and relatively noisy with people, animals, and little or no acoustic and physical barrier to ambient conditions. As such, sleep settings offered rich and dynamic sensory properties including security and comfort through social setting; fuzzy boundaries in time and space; and little climate control. Postmodern industrial societies, by contrast, appear to have relatively impoverished, stable sensory properties including solitary or low-contact sleep conditions; scheduled bedtimes and wake times with consolidated sleep; padded bed and profuse bedding; absence of fire; darkness; silence; and high acoustic as well as physical boundaries to sleep spaces. Features of these much more static “modernized” sleep conditions that may make sleep regulation more challenging include habitual solitary sleep or limited cosleep from infancy onward; a “lie down and die” model of sleep in restricted intervals with few, brief sleep-wake transitions; and sensory deprivation of physical and social cues in sleep settings. An untested question is whether distinctively “modernized” habits and settings place high, sustained burdens on the development of sleep-wake regulation systems and, in turn, contribute to contemporary sleep problems and disorders. Conversely, another hypothesis might propose that traditional settings placed high, sustained sensory loads straining sleep maintenance, fostering sleep fragmentation, and requiring more distributed and variable sleep that necessitated robust sleep-wake regulation.

Our cross-cultural survey also identified features of the developmental niche for sleep that were common across the sample but distinctive from prevailing Western practices. First is extensive co-sleeping and -rooming. In line with the cross-cultural evidence (Barry & Paxson, 1971), virtually all infants and most children in our sample normatively were provided with sleeping partners from birth onward, and solitary sleep was an exception rather than a rule. Second, as with adults, fixed
bedtimes were absent for children: daily routines were common, but also highly flexible. As with adults, sleep commonly occurred as needed, interspersed with ongoing quotidian affairs. Thus, for example, young children listen, observe, and may doze during family food preparation and gossip, or during evening parleys or rituals. Third, and related to the absence of fixed bedtimes and the ability to accommodate individual sleep needs around the clock, we found no strong sense of specific, stage-graded developmental needs for sleep. Most societies surveyed regarded sleep not as a wholly distinct state, but as a range of attentional states situated along a spectrum graduated from here-and-now engagement, through somnolence, to light sleep, to profound “awayness.” Developmental goals commonly concerned socialization for appropriate sleep intensity along an attentional spectrum for physical or spiritual safety in sleep. Fourth was the common importance of normative and moral frameworks that structure sleep. For instance, concerns for spiritual safety mandated co-sleeping and socialization for light sleep in some societies, including the Papua New Guinean Gebusi and Zairian Lese. These four features of the developmental niche for sleep reflect cultural influences grounded in shared models and schemas concerning sleep that will be discussed in later sections of this chapter.

Cultural Patterning of Sleep across the Life Course: An Egyptian Case Study

Our initial cross-cultural analysis intrigued the sleep science community (Jenni & O’Connor, 2005) and elicited cogent questions about generalizability to contemporary urban populations. Our survey, too, had revealed a need for studies of sleep in the context of everyday activities and social settings. Consequently, we undertook a household-based study among Egyptian families living at two sites, Cairo or a densely settled agrarian village. Egypt holds one of the longest continuous records for urbanized, stratified, cosmopolitan living, has moderate to very high population densities, and maintains the historic circum-Mediterranean tradition of co-sleeping and bimodal sleep. Study data included one week of continuous activity records by all household members, details of each sleep event, sleep history since birth, and eth (Worthman & Brown, 2007).

Qualitative evidence from interviews revealed a strong customary preference for co-sleeping, as expectable, protective, comforting, relationships and family life (Worthman et al., 2007). We found no strong sense of specific stage-graded developmental needs for sleep. Most societies surveyed regarded sleep not as a wholly distinct state, but as a range of attentional states situated along a spectrum graduated from here-and-now engagement, through somnolence, to light sleep, to profound “awayness.” Developmental goals commonly concerned socialization for appropriate sleep intensity along an attentional spectrum for physical or spiritual safety in sleep. Fourth was the common importance of normative and moral frameworks that structure sleep. For instance, concerns for spiritual safety mandated co-sleeping and socialization for light sleep in some societies, including the Papua New Guinean Gebusi and Zairian Lese. These four features of the developmental niche for sleep reflect cultural influences grounded in shared models and schemas concerning sleep that will be discussed in later sections of this chapter.
family routines were common, but also commonly occurred as needed, in affairs. Thus, for example, young people during family food preparation or rituals. Third, and related to the ability to accommodate individual and no strong sense of specific, stage-specific practices. Most societies surveyed regarded but as a range of attentional states from here-and-now engagement, profound "awayness." Developmental attention for appropriate sleep intensity physical or spiritual safety in sleep. Concerns of normative and moral framework, concerns for spiritual safety for light sleep in some societies, Gebusi and Zairian Lese. These four for sleep reflect cultural influences items concerning sleep that will be explored.

cross the Life Course:

rigged the sleep science community ced cogent questions about generalizations. Our survey, too, had revealed text of everyday activities and social ok a household-based study among s, Cairo or a densely settled agrarian est continuous records for urbanized, moderate to very high population c circum-Mediterranean tradition of dy data included one week of con-ehold members, details of each sleep event, sleep history since birth, and ethnographic interviews about sleep (Worthman & Brown, 2007).

Qualitative evidence from interviews and sleep histories endorsed a strong customary preference for co-sleeping, which was regarded as expectable, protective, comforting, and integral to foundational relationships and family life (Worthman & Brown, 2007). All participants reported routine co-sleeping and breastfeeding during infancy, followed by co-sleeping in early childhood. The great majority also reported co-sleeping or co-rooming through middle and late childhood, as well as through adulthood. All reported napping routinely earlier in life, and most endorsed its virtues even if they rarely napped later on. Customary practices of providing sleep partners for persons of all ages are constrained by rules of sexual propriety that reduce the feasibility of reliably doing so for adolescents and single young adults. Hence, established patterns of co-sleeping and co-rooming were most likely to be disrupted during adolescence and unmarried young adulthood, if there was no age-and-gender-appropriate sleeping partner available.

Family activity records revealed that participants averaged 8.4 hours of sleep per day, but followed a pattern of bimodal sleep with daytime napping and habitual co-sleeping (Worthman & Brown, 2007). Cultural norms for sleep and sleeping arrangements strongly determined sleep pattern and amount across the life course, such that age, gender, likelihood of co-sleeping, and relationship to co-sleeper varied with age and gender of the sleeper. Specifically, key features of sleep behavior (onset, night sleep, arousals, and total sleep) all were strongly predicted by culturally moderated factors, most particularly bed-sharing habits, followed by age and gender. Family relationships formed the context for sleep. Hence, most nighttime sleep events and a near majority of afternoon naps involved co-sleeping. Furthermore, few sleep events (one-fifth) were solitary, without roommate or bed partner. In this setting, sleep with a partner appeared to be more regular, compact, and undisturbed: co-sleeping, but not co-rooming, was associated with earlier, less variable onset of night sleep; shorter, less variable length of nighttime sleep; less sleep disturbance represented by reported arousals; and less total sleep per day.

Co-sleeping may qualify as the most intimate behavior that can be shared by partners of all ages and genders. While sharing their sleeping
hours, co-sleepers in close body contact share space, air, warmth, and time (a third of the day) during a vital chronobiological period. Such shared experience creates a context for mutual regulation that also shapes the developmental course of systems regulating arousal and affect (McKenna, Mosko, Dungy, & McAninch, 1990). Based on his experimental preclinical work, Hofer (1978) early proposed that relationships act as regulators that inform development and shape adult function. Subsequent research has borne out this prediction and revolutionized understandings of the roles of early environment and epigenetics in the process of development. Work among rodents, in particular, has detailed the impact of expectable environments of rearing and functioning, particularly maternal behavior and early postnatal conditions, on organization of arousal and affect regulation, among many other systems (Szyf, McGowan, & Meaney, 2008; Weaver, 2007). Different developmental periods thus present particular opportunities and vulnerabilities to contextual cues that drive regulation of systems closely involved in sleep (McKenna, 2000).

In line with such views, data from our family study in Egypt indicate that co-sleeping habits directly influenced sleep budgets and sleep quality, and that interruption of these habits in adolescence and young adulthood was associated with increased likelihood of sleep dysregulation and disruption in males and females, respectively. But the data do not address the logical questions of whether and how sleeping arrangements, and co-sleeping in particular, influence the development of systems that regulate sleep and arousal (Thoman, 2006). These compelling issues remain open to empirical investigation in emerging comparative research on sleep.

Culture and Sleep: Recent Directions

Research on sleep and human development in different settings is expanding in two directions: one being documentation of sleep patterns and related outcomes in increasing numbers of non-Western settings, another being the emergence of comparative cross-national cross-cultural research. The former is particularly valuable for drawing attention to divergent as well as shared issues across contexts that vary by wealth and technology, as well as other cultural factors needed to characterize relationships of sleep niche to the formation of sleep–wake patterns.

Culture, Culture Change, and Child Sleep

Globalization and the forces of rapid social, economic, and cultural development create new forms of labor, introduction of new technologies, altered settlement patterns (particularly the urbanization of family household structures likely has profound effects on sleep), and the lifestyle furtherposing impose different conditions regulation that raise the stakes for changes in the developmental niche systems, including sleep.

A major factor driving contemporary economic and activity is formal education. By 2008, schooling had progressed to the point where 93% of children and 78% of secondary school students were in school (Watkins, 2008). This phenomenon has been accompanied by the introduction of new forms of labor, introduction of new technologies, altered settlement patterns (particularly the urbanization of family household structures likely has profound effects on sleep regulation), and the lifestyle furtherposing impose different conditions regulation that raise the stakes for changes in the developmental niche systems, including sleep.

A major factor driving contemporary economic and activity is formal education. By 2008, schooling had progressed to the point where 93% of children and 78% of secondary school students were in school (Watkins, 2008). This phenomenon has been accompanied by the introduction of new forms of labor, introduction of new technologies, altered settlement patterns (particularly the urbanization of family household structures likely has profound effects on sleep regulation), and the lifestyle furtherposing impose different conditions regulation that raise the stakes for changes in the developmental niche systems, including sleep.

A major factor driving contemporary economic and activity is formal education. By 2008, schooling had progressed to the point where 93% of children and 78% of secondary school students were in school (Watkins, 2008). This phenomenon has been accompanied by the introduction of new forms of labor, introduction of new technologies, altered settlement patterns (particularly the urbanization of family household structures likely has profound effects on sleep regulation), and the lifestyle furtherposing impose different conditions regulation that raise the stakes for changes in the developmental niche systems, including sleep.

A major factor driving contemporary economic and activity is formal education. By 2008, schooling had progressed to the point where 93% of children and 78% of secondary school students were in school (Watkins, 2008). This phenomenon has been accompanied by the introduction of new forms of labor, introduction of new technologies, altered settlement patterns (particularly the urbanization of family household structures likely has profound effects on sleep regulation), and the lifestyle furtherposing impose different conditions regulation that raise the stakes for changes in the developmental niche systems, including sleep.

A major factor driving contemporary economic and activity is formal education. By 2008, schooling had progressed to the point where 93% of children and 78% of secondary school students were in school (Watkins, 2008). This phenomenon has been accompanied by the introduction of new forms of labor, introduction of new technologies, altered settlement patterns (particularly the urbanization of family household structures likely has profound effects on sleep regulation), and the lifestyle furtherposing impose different conditions regulation that raise the stakes for changes in the developmental niche systems, including sleep.

A major factor driving contemporary economic and activity is formal education. By 2008, schooling had progressed to the point where 93% of children and 78% of secondary school students were in school (Watkins, 2008). This phenomenon has been accompanied by the introduction of new forms of labor, introduction of new technologies, altered settlement patterns (particularly the urbanization of family household structures likely has profound effects on sleep regulation), and the lifestyle furtherposing impose different conditions regulation that raise the stakes for changes in the developmental niche systems, including sleep.

A major factor driving contemporary economic and activity is formal education. By 2008, schooling had progressed to the point where 93% of children and 78% of secondary school students were in school (Watkins, 2008). This phenomenon has been accompanied by the introduction of new forms of labor, introduction of new technologies, altered settlement patterns (particularly the urbanization of family household structures likely has profound effects on sleep regulation), and the lifestyle furtherposing impose different conditions regulation that raise the stakes for changes in the developmental niche systems, including sleep.

A major factor driving contemporary economic and activity is formal education. By 2008, schooling had progressed to the point where 93% of children and 78% of secondary school students were in school (Watkins, 2008). This phenomenon has been accompanied by the introduction of new forms of labor, introduction of new technologies, altered settlement patterns (particularly the urbanization of family household structures likely has profound effects on sleep regulation), and the lifestyle furtherposing impose different conditions regulation that raise the stakes for changes in the developmental niche systems, including sleep.

A major factor driving contemporary economic and activity is formal education. By 2008, schooling had progressed to the point where 93% of children and 78% of secondary school students were in school (Watkins, 2008). This phenomenon has been accompanied by the introduction of new forms of labor, introduction of new technologies, altered settlement patterns (particularly the urbanization of family household structures likely has profound effects on sleep regulation), and the lifestyle furtherposing impose different conditions regulation that raise the stakes for changes in the developmental niche systems, including sleep.

A major factor driving contemporary economic and activity is formal education. By 2008, schooling had progressed to the point where 93% of children and 78% of secondary school students were in school (Watkins, 2008). This phenomenon has been accompanied by the introduction of new forms of labor, introduction of new technologies, altered settlement patterns (particularly the urbanization of family household structures likely has profound effects on sleep regulation), and the lifestyle furtherposing impose different conditions regulation that raise the stakes for changes in the developmental niche systems, including sleep.

A major factor driving contemporary economic and activity is formal education. By 2008, schooling had progressed to the point where 93% of children and 78% of secondary school students were in school (Watkins, 2008). This phenomenon has been accompanied by the introduction of new forms of labor, introduction of new technologies, altered settlement patterns (particularly the urbanization of family household structures likely has profound effects on sleep regulation), and the lifestyle furtherposing impose different conditions regulation that raise the stakes for changes in the developmental niche systems, including sleep.

A major factor driving contemporary economic and activity is formal education. By 2008, schooling had progressed to the point where 93% of children and 78% of secondary school students were in school (Watkins, 2008). This phenomenon has been accompanied by the introduction of new forms of labor, introduction of new technologies, altered settlement patterns (particularly the urbanization of family household structures likely has profound effects on sleep regulation), and the lifestyle furtherposing impose different conditions regulation that raise the stakes for changes in the developmental niche systems, including sleep.

A major factor driving contemporary economic and activity is formal education. By 2008, schooling had progressed to the point where 93% of children and 78% of secondary school students were in school (Watkins, 2008). This phenomenon has been accompanied by the introduction of new forms of labor, introduction of new technologies, altered settlement patterns (particularly the urbanization of family household structures likely has profound effects on sleep regulation), and the lifestyle furtherposing impose different conditions regulation that raise the stakes for changes in the developmental niche systems, including sleep.

A major factor driving contemporary economic and activity is formal education. By 2008, schooling had progressed to the point where 93% of children and 78% of secondary school students were in school (Watkins, 2008). This phenomenon has been accompanied by the introduction of new forms of labor, introduction of new technologies, altered settlement patterns (particularly the urbanization of family household structures likely has profound effects on sleep regulation), and the lifestyle furtherposing impose different conditions regulation that raise the stakes for changes in the developmental niche systems, including sleep.

A major factor driving contemporary economic and activity is formal education. By 2008, schooling had progressed to the point where 93% of children and 78% of secondary school students were in school (Watkins, 2008). This phenomenon has been accompanied by the introduction of new forms of labor, introduction of new technologies, altered settlement patterns (particularly the urbanization of family household structures likely has profound effects on sleep regulation), and the lifestyle furtherposing impose different conditions regulation that raise the stakes for changes in the developmental niche systems, including sleep.

A major factor driving contemporary economic and activity is formal education. By 2008, schooling had progressed to the point where 93% of children and 78% of secondary school students were in school (Watkins, 2008). This phenomenon has been accompanied by the introduction of new forms of labor, introduction of new technologies, altered settlement patterns (particularly the urbanization of family household structures likely has profound effects on sleep regulation), and the lifestyle furtherposing impose different conditions regulation that raise the stakes for changes in the developmental niche systems, including sleep.

A major factor driving contemporary economic and activity is formal education. By 2008, schooling had progressed to the point where 93% of children and 78% of secondary school students were in school (Watkins, 2008). This phenomenon has been accompanied by the introduction of new forms of labor, introduction of new technologies, altered settlement patterns (particularly the urbanization of family household structures likely has profound effects on sleep regulation), and the lifestyle furtherposing impose different conditions regulation that raise the stakes for changes in the developmental niche systems, including sleep.

A major factor driving contemporary economic and activity is formal education. By 2008, schooling had progressed to the point where 93% of children and 78% of secondary school students were in school (Watkins, 2008). This phenomenon has been accompanied by the introduction of new forms of labor, introduction of new technologies, altered settlement patterns (particularly the urbanization of family household structures likely has profound effects on sleep regulation), and the lifestyle furtherposing impose different conditions regulation that raise the stakes for changes in the developmental niche systems, including sleep.
Developmental Cultural Ecology of Sleep

It is important to share space, air, warmth, and other chronobiological periods. Such mutual regulation that also shapes systems regulating arousal and affect (Winch, 1990). Based on his experiences, early proposed that relationships of development and shape adult function. This prediction and revolutionized environment and epigenetics in the rodents, in particular, has detailed components of rearing and functioning, partly postnatal conditions, on organization, among many other systems (Szyf, 2007). Different developmental opportunities and vulnerabilities to conditions of systems closely involved in sleep

Our family study in Egypt indicates increased sleep budgets and sleep qualities in adolescence and young adulthood, likelihood of sleep dysregulation and pectively. But the data do not address and how sleeping arrangements, and the development of systems that regulate these issues remain emerging comparative research on

Directions

development in different settings is being documented of sleep patterns across numbers of non-Western settings comparative cross-national cross-cultural studies valuable for drawing attention to across contexts that vary by wealth and technology, as well as other cultural factors such as lifestyle. The latter is needed to characterize relationships of sleep ecology and developmental niche to the formation of sleep-wake patterns and self-regulation.

Culture, Culture Change, and Child Sleep

Globalization and the forces of rapid social change are transforming the developmental niche in many ways. These include changing daily schedules for new forms of labor, introduction of mass media and technologies, altered settlement patterns (particularly urbanization) and housing, and shifts in family and household structure. Each of these transformations likely has profound effects on sleep ecology and behavior, but research on these concerns remains an urgent need. These changes in lifestyle furthermore impose different demands on attention and emotion regulation that raise the stakes for understanding how corresponding changes in the developmental niche influences development of these systems, including sleep.

A major factor driving contemporary young people's daily schedules and activity is formal education. By 2006, the global project of universal schooling had progressed to the point that 88% of primary school-aged children and 78% of secondary school-aged youth were in school (Watkins, 2008). This phenomenon has important consequences for sleep (see also Wolfson and Richards, chapter 12 in this volume for environmental factors that pose challenges for young adolescents' sleep). Children must be present and alert during the school hours, which means that school start times determine wake times, while factors that erode alertness will impair school performance. For example, an early start (7:10 A.M.) for fifth-grade Israeli students, compared to the usual 8:00 A.M., was related to less sleep and greater daytime sleepiness, as well as increased difficulty concentrating regardless of hours slept (Epstein, Chillag, & Lavie, 1998). Schooling also makes children sedentary. Daytime inactivity has been linked to reduced sleep time and quality in British youth (Murdey, Cameron, Biddle, Marshall, & Gorely, 2004), and to degree of sleep disturbance in a multiethnic study of American adolescents (Gupta, Mueller, Chan, & Meininger, 2002). Schooling places scheduling demands on families whose ability to meet those demands vary by factors such as parent education and workloads. Thus, for instance, schoolchildren in

Developmental Cultural Ecology of Sleep
Riyadh, Saudi Arabia, with less educated mothers had later bedtimes and less weekday sleep, while those with working mothers had more total sleep (BaHammam, Bin Saeed, Al-Faris, & Shaikh, 2006). The same was true among Portuguese schoolchildren, who also exhibited a direct relationship of physical activity with total sleep (Padez, Mourao, Moreira, & Rosado, 2009).

These and other studies document the impact of media use on children's activity and sleep budgets. Children who watch more television sleep less than those who watch less. Similarly, the spread of computer use among Brazilian adolescents has been related to sleep disruption and daytime sleepiness (Mesquita & Reinao, 2007). We observed the same phenomena in our Egypt study (Worthman & Brown, 2007). Such effects promise to intensify as access to these media spreads worldwide. The attractions of media are not the only source of time load and schedule disruption for young people. In developing countries, children's domestic or paid labor is vital for household welfare and adds to the scheduling burden of school. Moreover, school overcrowding in many regions may prompt rotating morning and evening shifts that, together with parent labor schedules, further complicate timetables and compromise youth sleep (Radosevic-Vidacek & Koscevic, 2004; Teixeira, Fischer, de Andrade, Louzada, & Nagai, 2004). Accommodation of shifting sleep schedules comes at a cost to neurobehavioral functioning in children: for instance, Sadeh and colleagues have reported that children could adjust to small reductions or extensions within the range of naturalistic variation, but showed large effects on response times and continuous performance tasks (Sadeh et al., 2003).

Combined, these sleep studies also illuminate sources for the global spread of obesity not only in adults, but increasingly in youth (Darnton-Hill, Nishida, & James, 2004). Reduced sleep has been linked firmly to greater risk for childhood obesity in diverse populations (Chen, Beydoun, & Wang, 2008; Hui, Nelson, Yu, Li, & Fok, 2003). Increased inactivity has been related to sleep reduction, and both in turn are related to schooling and media use. Thus, calls for sleeping longer to combat obesity would also need to consider schooling demands and media opportunities when both may be valued by youth as means to build vital skills and social networks.

Even as obesity spreads, malnutrition affects brain development. Nevertheless, it is considered. The scant evidence on development suggests disruption in malnourished infants' neurological development that can be rehabilitated (Shaaban, El-Sayed, Nassar, Assa, 2007). Developing countries who participate in on top of school and nutrition, activities, and sleep testing-sparing role (Benefice, Garnier, & Ne, 2004). School overcrowding, in this sample, is than reported for Western counterparts. Continuing expansion in nutrition enlarges the need for understanding on sleep and its regulation.

In sum, viewed globally, schedules of children increasingly are driven by the school and influenced by media use. The attraction on sleep remains understudied and critical for delineating actual normative conditions for sleep schedule, duration, timing, and quality.

Cross-cultural Studies

A new generation of empirical cross-cultural studies aims to characterize sleep across settings and behaviors in larger, if not as large, within Western populations as well. For delineating actual normative conditions characterizing their within-population research with developmental study identification of the predictors of behavior and quality, self-regulation, and direction include reports documenting for sleep schedule, duration, dif
ed mothers had later bedtimes and working mothers had more total
ris, & Shaikh, 2006). The same was
i, who also exhibited a direct rela-
1 sleep (Padez, Mourao, Moreira, &
nt the impact of media use on chil-
children who watch more television
i. Similarly, the spread of computer
been related to sleep disruption and
miao, 2007). We observed the same
thman & Brown, 2007). Such effects
ese media spreads worldwide. The
ly source of time load and schedule
ing countries, children's domes-
ld welfare and adds to the scheduling
overcrowding in many regions may
ng shifts that, together with parent
2 timetables and compromise youth
; 2004;Teixeira, Fischer, de Andrade,
odation of shifting sleep schedules
functioning in children: for instance,
that children could adjust to small
re range of naturalistic variation, but
times and continuous performance
also illuminate sources for the global
x, but increasingly in youth (Darnton-
duced sleep has been linked firmly to
diverse populations (Chen, Beydoun,
, & Fok, 2003). Increased inactivity has
both in turn are related to schooling
ging longer to combat obesity would
mands and media opportunities when
means to build vital skills and social

Even as obesity spreads, malnutrition still affects many and directly
affects brain development. Nevertheless, its relationship to sleep is rarely
considered. The scant evidence on development of sleep–wake patterns
suggests disruption in malnourished infants, which may reflect delayed
neurological development that can be remediated by nutritional reha-
bilitation (Shaaban, Ei-Sayed, Nassar, Asaad, & Gomaa, 2007). Children in
developing countries who participate in subsistence and domestic labor
on top of schooling often are marginally nourished. A rare empirical
study of nutrition, activity, and sleep tested whether sleep plays an
energy-sparing role (Benefice, Garnier, & Ndiaye, 2004).Despite heavy daily
workloads, sleep duration in this sample of Senegalese girls was no greater
than reported for Western counterparts (Benefice et al., 2004). Activity
level during the day did not predict amount of sleep, although malnour-
ished Senegalese girls did sleep longer and more deeply than their better
nourished peers. Continuing expansion of inequities in resources and
nutrition enlarges the need for understanding the impact of malnutrition
on sleep and its regulation.

In sum, viewed globally, schedules, activity levels, and sleep budgets
of children increasingly are driven by their workloads for subsistence plus
school and influenced by media use. The impact of widespread malnutri-
tion on sleep remains understudied and merits attention.

Cross-cultural Studies

A new generation of empirical cross-national research is just emerging
and aims to characterize sleep practices and ecology during human
development. A parallel trend is the documentation of everyday sleep
settings and behaviors in larger, if not yet population-based, samples
within Western populations as well. These studies are valuable not only
for delineating actual normative conditions and practices, but also for
characterizing their within-population variability. Alliance of such
research with developmental study designs will significantly accelerate
identification of the predictors of key outcomes, including sleep behav-
ior and quality, self-regulation, and sleep difficulties. Early steps in this
direction include reports documenting developmental curves and vari-
ation for sleep schedule, duration, difficulties, and bed sharing in a Swiss
longitudinal study of nearly 500 children ages 1 month through 10 years (Iglowstein, Jenni, Molinari, & Largo, 2003; Jenni, Fuhrer, Iglowstein, Molinari, & Largo, 2005). Population-typical age curves that include centile distributions of individual variation provide both bases for individual assessment and a “reality check” for the cultural expectations that inform parental and clinical goals and assessments.

More recent studies have begun to solicit details of sleep ecology (setting, arrangements, and parent behaviors), using the internet to recruit larger samples of parental reports on early sleep. Findings from a sample of over 5,000 parents in the United States and Canada document features of sleep ecology to age three and their relationship to sleep patterns including the emergence of sleep consolidation (Sadeh et al., 2009). They also emphasized dramatic infant variation in sleep duration during the first year. Excluding age, parent behaviors (regularity of bedtime routines, sleep interventions) were the principal factors related to nighttime sleep duration and quality. A limitation of this approach is reliance on parent perceptions that are filtered by their access to and evaluation of the relevant information. Yet there may be advantages insofar as parent perceptions, such as are reflected in reported sleep problems, predict childcare and form the developmental niche.

The same internet measure was used to sample nearly 30,000 parents of under-3 children in 12 Asian and 5 Western Anglophone countries or regions. This new evidence shows large population differences in sleep schedules and duration, bed- or room-sharing practices, and perceived sleep problems (Mindell, Sadeh, Wiegand, How, & Goh, in press). While it lends empirical support for our earlier ethnographic analysis, more importantly this study lays the foundations for identification of population differences and similarities in sleep conditions, behaviors, and outcomes. For example, parent behaviors emerged as the strongest predictors of nighttime sleep and mediated the relationship of co-sleeping and co-rooming with reduced sleep duration and quality (Mindell, Sadeh, Kohyama, & How, in press).

In summary, new evidence about sleep ecology in infancy and toddlerhood consistently points to the impact of social actors (parents) on the development of sleep patterns and problems. Thus, the developmental niche sculpts the systems regulating sleep.

Cultural Models of Child Development
Parenting, and Sleep

Expanding cross-cultural research probes practices and outcomes also increases the cultural rationales and meanings that underlie and behaviors. Cultures are distinguished by behavior and living conditions, but they motivate behavior and give meaning to it. Thus an account of the role of culture in sleep would be incomplete without a cultural approach that recognizes cultural belief appropriate parenting are powerful determinants of the developmental niche in which children grow up as satisfactory or problematic. This section of cultural analysis that permits linkage to physical health.

Cultural Models

Culture comprises complex arrays of practices, and it is organized by intersecting experience-based properties that generate accounts of how things make sense of experience, address certain questions, and act on them. Cultural models act as a phenomenological domain (a basis for thought and action, by recoding the domain mapped by the model to the domain mapped by the model). Cultural models are cognitive cultural resources that generate accounts of how things make sense of experience, address certain questions, and act on them. Cultural models act as a phenomenological domain (a basis for thought and action, by recoding the domain mapped by the model to the domain mapped by the model). Cultural models act as a phenomenological domain (a basis for thought and action, by recoding the domain mapped by the model to the domain mapped by the model).
Cultural Models of Child Development, Parenting, and Sleep

Expanding cross-cultural research probing associations between sleep practices and outcomes also increases the need for inquiry into the cultural rationales and meanings that underlie differences in sleep ecology and behaviors. Cultures are distinguished by not only distinctive patterns of behavior and living conditions, but also the beliefs and values that motivate behavior and give meaning to experience. From this it follows that an account of the role of culture in the developmental ecology of sleep would be incomplete without a consideration of cultural cognition, or how culture operates in thought and emotion. The ecobiocultural approach suggests that, by systematically informing caregiver perceptions and behavior, cultural beliefs about human development and appropriate parenting are powerful determinants of both the developmental niche in which children grow up, and the assessment of outcomes as satisfactory or problematic. This section considers an approach to cultural analysis that permits linkage to human behavior, experience, and health.

Cultural Models

Culture comprises complex arrays of distributed beliefs, values, and practices, and it is organized by intersecting cognitive models or schemas that provide integrated accounts of how the world works and how one lives in it. These cognitive cultural resources have both shared and individual, experience-based properties that generate meanings, motives, and action to make sense of experience, address challenges, and pursue goals (Strauss & Quinn, 1997). Cultural models act as cognitive frameworks that organize a phenomenological domain (such as human development) as a basis for thought and action, by recruiting multiple cognitive resources to the domain mapped by the model (Shore, 1996). Schemas, in turn, are structured, experience-based sets of representations regarding a perception (child) or concept (daughter) that include both generalized propositions and specific exemplars, and embodied-affective and motivational features (Shore, 1996). Schemas also concern social phenomena from
roles (father), to persons (dad), to stereotypes (dads), to self (person). Models and their informing schemas range in particularity from specific scripts (infant feeding) to foundational schemas (gender) that inform multiple domains. And they are not merely abstractions, but also automatic and visceral.

By scaffolding both behavior and interpretation of others' behavior, cultural models and schemas move out of the realm of personal experience to circulate "in the world" and become tangibly "real" (Garro, 2000). Cultural cognition also attains moral force through the internalized values that motivate scripts, and the ability to live by shared codes and do the right thing thereby become crucial to cultural competence, and even to health. For example, ability to achieve internalized cultural lifestyle goals has been associated with physical and mental health status in both Brazilians and rural African Americans (Dressler, 2004; Dressler, Balieiro, Ribeiro, & Dos Santos, 2007).

Cultural Model of Child Development, U.S.

Results from our study of middle-class Atlanta families exemplify how cultural models and scripts work, translating a large domain into the organization of daily life (DeCaro & Worthman, 2007). Parental models of young child development identified two core needs, namely that for security and safety, as well as that for opportunity and growth. The former requires stability, control, predictability, and support that create a protected space for development. The latter involves enrichment, stimulation, exploration, and spontaneity for physical and psychosocial growth. Resolution of the tension between these two fundamental needs relied on parent efforts to strike a balance between them that optimizes the specific child's development. Action schemas for parenting related to security/safety included producing a predictable, simple schedule with continuous surveillance by "good" caregivers. Those for opportunity/growth included good schooling, extracurricular activities, and play opportunities. That for balance included tailoring to individual child needs and abilities, and subordination of parental priorities and schedules to children's needs. The moral corollary was that parent stress indexes effort and compliance with demands of this model, and thus, signals parental virtue. We found that parents of young children did enact this model and related schemas in the organization of maternal and family functioning. And findings explored how cultural models for appropriate parenting systematic niche and shape child psychobehavioral development and arousal regulation (DeCaro & Worthman, 2007).

Cultural Models of Sleep, U.S.

Similarly, sleep behavior and settings are central to the organization of daily life (DeCaro & Worthman, 2007). Concise models for appropriate sleep behavior and settings for appropriate sleep and schemas for appropriate sleep and schemas for appropriate sleep and schemas for appropriate sleep and schemas for appropriate sleep and schemas for appropriate sleep are integral to the organization of daily life (DeCaro & Worthman, 2007). Consistent findings explored how cultural models for sleep and schemas for appropriate sleep are integral to the organization of daily life (DeCaro & Worthman, 2007).

Conciseness and explicitness are the essence of cultural models and related schemas in the organization of maternal and family functioning. Similarly, sleep behavior and settings are central to the organization of daily life (DeCaro & Worthman, 2007). And findings explored how cultural models for appropriate sleep and schemas for appropriate sleep are integral to the organization of daily life (DeCaro & Worthman, 2007).
stereotypes (e.g., dads), to self (e.g., person). As range in particularity from specific personal schemas (e.g., gender) that inform merely abstractions, but also automatic, interpretation of others' behavior, out of the realm of personal experience, become tangibly "real" (Garro, 2000).

Oral force through the internalized ability to live by shared codes and do so culturally to cultural competence, and even achieve internalized cultural lifestyle and mental health status in both cans (Dressler, 2004; Dressler, Balieiro, 2004; Dressler, Balieiro, et al., 2004).

Cultural Models of Sleep, U.S.

Similarly, sleep behavior and settings are grounded in cultural accounts of sleep and schemas for appropriate sleep, and also intersect with models of development and schemas for parenting. Although not the direct target of the Atlanta family study (DeCaro & Worthman, 2008a, 2008b), sleep was integral to its round-the-clock activity monitoring and ethnographic interviews. Based on this evidence for illustrative purposes in this discussion, a rough cultural model of sleep can be delineated that includes two dimensions, restoration and regulation (see Table 8.2, left column). The restorative dimension treats sleep as a mysterious but essential and positive function, an autonomous self-maintenance behavior, an escape or withdrawal from daily care and demands, and a vulnerable state sensitive to disturbances. The dimension of regulation casts sleep as a physiologically and socially bounded state: one is either awake or asleep, and sleep should be scheduled, fitted into life demands, and consolidated into a single block in proper settings. In moral terms, sleep expresses self-regulation, autonomy, and independence: sleeping too much reflects sloth or disorganization, poor sleep reflects a failure in self-regulation, and sleep loss reflects self-control and life demands. This model of sleep relates to the notion that Western societies characteristically feature a foundational schema of the self as independent rather than interdependent (Markus & Kitayama, 1991; Oyserman, Coon, & Kemmelmeier, 2002, and comments).

The American cultural model of sleep interdigitates with schemas that shape sleep behaviors and settings (Table 8.2, middle column) (DeCaro & Worthman, 2007). Concerning restoration, sleep is treated as: 1.) essential, something of which one should "get enough" for mental and physical health (though how much is enough is uncertain); 2.) self-maintenance, permissive for demanding space to meet individual sleep model and related schemas in the organization of daily family life, but that maternal and family functioning moderated markers of child emotion and arousal regulation (DeCaro & Worthman, 2008a, 2008b). These findings explored how cultural models of child development and schemes for appropriate parenting systematically structure the developmental niche and shape child psychobehavioral outcomes.
TABLE 8.2 Cultural model and schemas of sleep in the U.S.: An outline

<table>
<thead>
<tr>
<th>Components of cultural model</th>
<th>Action schemas, scripta</th>
<th>Parenting schemas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Restoration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Essential yet mysterious</td>
<td>&quot;Get enough&quot; but amount uncertain</td>
<td>Provide adequate protected sleep</td>
</tr>
<tr>
<td>Self maintenance</td>
<td>Meet individual requirements</td>
<td>Child sleeps alone, may &quot;crash&quot;</td>
</tr>
<tr>
<td>Withdrawal, escape</td>
<td>Seek solitary, quiet, separate setting</td>
<td>Provide separate sleeping space</td>
</tr>
<tr>
<td>Vulnerable, sensitive</td>
<td>Minimize external stimuli</td>
<td>Minimize stimuli, disturbance</td>
</tr>
<tr>
<td><strong>Regulation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distinct, bounded</td>
<td>Limit to specific time, place</td>
<td>Establish/maintain bedtimes</td>
</tr>
<tr>
<td>Necessarily consolidated</td>
<td>Consolidate sleep into a block</td>
<td>Foster single nighttime blocks</td>
</tr>
<tr>
<td>Subordinate to life demands</td>
<td>Schedule, curtail as needed</td>
<td>Structure regular schedule</td>
</tr>
<tr>
<td><strong>Moral frame</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restoration: sustaining, natural, involuntary</td>
<td>good sleep = necessity, excusative</td>
<td>good sleep = good child = good parent</td>
</tr>
<tr>
<td>Regulation: self regulation, autonomy, efficiency</td>
<td>right sleep = self control, social &quot;fit&quot;</td>
<td>right sleep = good child = good parent</td>
</tr>
<tr>
<td><strong>Foundational schema</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independent self</td>
<td>Sleep an individual responsibility</td>
<td>&quot;Tough love&quot; to master sleep habits = learn independence</td>
</tr>
</tbody>
</table>

requirement; 3.) withdrawal, involving solitary, quiet, comfortable, and separate spaces; and 4.) vulnerable, requiring minimization or shielding from disruptive stimuli. The corresponding moral framework posits sleep as sustaining, natural, and involuntary. Consequently, good sleep is treated as a positive good because it is necessary; and a need for sleep can excuse taking "time out" from work and social demands.

The regulation aspect of sleep clearly stands in tension to its restorative aspect. Regulation mandates a push to sleep in a single well-timed nocturnal episode on a bed in a bedroom, to subordinate sleep to ongoing daily demands, and thus to curtail it when necessary. Moral entailments include that sleep steals time from life prior to good social adjustment produced by attending to life demands combined with the self-care. Thus, sleeping too much, at inability to sleep through the night may of physiology and, thus, as psychology. Moreover, sleep at the "wrong" time and count as real sleep. Demands related to demonstrated sleep needs, illness, or in an airport, may be invoked to excuse no damages. These tensions become part of education and parenting.

**Intersecting Models of Sleep and Child**

Consideration of cultural models and American normative practices of sleep in infancy and childhood (Table 8.2, right) directly inform parenting goals understood to have special sleep needs. For proper child development, parent by providing a separate, specified bed and maintaining bedtimes and regular schedule. Setting up and furnishing crucial preparations for parenthood to undergo a protracted period of distress and maintaining eye well-regulated sleep in their child; and maintaining bedtimes and regular solidified nighttime sleep with adjusted. Further, the child's sleep dysregulation may be invoked by invoking parents to be firm "When a baby has repeated problem need to show some tough love." (St large on-line survey of North Amer
of sleep in the U.S.: An outline

Parenting schemas

- Provide adequate protected sleep
- Child sleeps alone, may "crash"
- Provide separate sleeping space
- Minimize stimuli, disturbance
- Establish/maintain bedtimes
- Foster single nighttime blocks
- Structure regular schedule
- Good sleep = good child = good parent
- Right sleep = good child = good parent
- "Tough love" to master sleep habits = learn independence

Sleep clearly stands in tension to its restorative aspect. Consequently, good sleep is treated necessary, and a need for sleep can excuse social demands. Sleep clearly stands in tension to its restorative aspect. Consequently, good sleep is treated necessary, and a need for sleep can excuse social demands.

Sleep clearly stands in tension to its restorative aspect. Consequently, good sleep is treated necessary, and a need for sleep can excuse social demands.

Sleep clearly stands in tension to its restorative aspect. Consequently, good sleep is treated necessary, and a need for sleep can excuse social demands. Moral entailments include that sleep steals time from life priorities. Sleeping right expresses good social adjustment produced by attitudes and commitment to meeting life demands combined with the self-control to regulate sleep accordingly. Thus, sleeping too much, at inappropriate times or places, or inability to sleep through the night may be viewed as failures of will or of physiology and thus, as psychological or physical dysfunction. Moreover, sleep at the "wrong" time and place or broken sleep may not count as real sleep. Demands related to the restorative aspect, such as demonstrated sleep needs, illness, or inimical conditions (e.g., living near an airport), may be invoked to excuse nonconforming behaviors or claim damages. These tensions become particularly apparent in sleep socialization and parenting.

**Intersecting Models of Sleep and Child Development, U.S.**

Consideration of cultural models and morals provides insight into American normative practices of sleep socialization and difficulties in infancy and childhood (Table 8.2, right column). Prevailing views of sleep directly inform parenting goals for child sleep. The young are understood to have special sleep needs and undergo a developmental curve in sleep-wake regulation; it is the parents’ responsibility both to ensure that the child gets proper sleep and acquires correct sleep habits. For proper child development, parents should foster adequate safe sleep by providing a separate, specified bed and sleeping space that is buffered from disturbances (noise, light, heat/cold). And they should be indulgent of a young child’s sleep dysregulation and periodic “crashes” when over-extended. Setting up and furnishing the newborn’s sleeping space are crucial preparations for parenthood among Americans, who also expect to undergo a protracted period of disrupted sleep-wake schedules during the child’s early years. Concurrently, parents are expected to inculcate well-regulated sleep in their child as swiftly as possible, by establishing and maintaining bedtimes and regular daily schedules that promote consolidated nighttime sleep with appropriate amounts of napping. The process may require parents to be firm, as this popular source suggested: “When a baby has repeated problems falling asleep, Mom and Dad may need to show some tough love” (Staff, 2009, p. 54). Correspondingly, a large on-line survey of North American parents found that longer, more...
consolidated infant night sleep at ages 0–3 years was associated with parental behaviors fostering self-soothing and independence (Sadeh et al., 2009). Variation from the “ideal” cultural model was extensive: over a third of infants sleep in their parents’ room or bed.

Within a few months after birth, American parents routinely are asked: “Is she/he a good baby?” The question actually inquires whether the baby sleeps through the night, goes to sleep without a lot of fussing and crying, and is easy to soothe if she/he wakes up. The moral stakes are clearly expressed: “good” or correct sleep habits manifest good infant development that results from good parenting. The sleep habits and soothability of the child symbolize both the current quality of the parent-child relationship and the cumulative quality of care for the child’s appropriate mastery of self-regulatory skills. Good babies have good parents. Given these views and the intense investments of parenting, the moral—in addition to existential—distress that goes with refractory infant crying, bedtime struggles, and sleep problems can be personal and profound (Barr, Paterson, MacMartin, Lehtonen, & Young, 2003).

Notably, bedtime and sleep problems account for a 20–30% of pediatric consults (Moore, Meltzer, & Mindell, 2008).

In sum, cultural models on sleep perceptions, practices, and settings are readily tapped, as illustrated above for a well-studied population, the United States. Attention to the moral dimensions that motivate such models furthermore can yield fresh insight into social pressures and affective loading on what counts as sleep, how it should be done, and what can go wrong that influence how people behave and what sleep problems they experience.

Non-Western Cultural Models of Sleep

Our earlier survey of ethnographic accounts for the study of sleep ecology (Worthman and Melby, 2002) also provided an overview of diverse cultural cognitions and practices around sleep. Some elements of cultural models in non-Western societies overlap with those extant among Americans, but other widespread themes do not. These include dominant concerns for danger and for social integration in sleep. A corresponding foundational schema is the interdependent self, viewed in terms of relationships with others rather than in terms of separation from others (Oyserman et al., 2002). From that perspective, social integration and security.

For heuristic purposes, the prevalent of sociability and danger have been outli

t the boundary of sleep-wake as rather fuzzy alertness and social engagement. Sleep is determined by relationships and one’s perceptions. Sleep is opportunistic and accommodates social priorities. Overall, an emphasis on social priorities frame by people, also counterbalance...
growth, 0–3 years was associated with soothing and independence (Sadeh et al. cultural model was extensive: over
ent's room or bed.
birth, American parents routinely are he question actually inquires whether goes to sleep without a lot of fussing she/he wakes up. The moral stakes are rect sleep habits manifest good infant good parenting. The sleep habits and re both the current quality of the par-mutative quality of care for the child’s tory skills. Good babies have good par-intense investments of parenting, the al—distress that goes with refractory and sleep problems can be personal and rtin, Lehtonen, & Young, 2005). Notably, punt for a 20–30% of pediatric consults
8).

sleep perceptions, practices, and settings above for a well-studied population, the moral dimensions that motivate such fresh insight into social pressures and ts as sleep, how it should be done, and ace how people behave and what sleep

terms of relationships with others rather than of independent autonomy (Oyserman et al., 2002). From that perspective, sleep relates intimately to social integration and security.

For heuristic purposes, the prevalent (though not universal) themes of sociability and danger have been outlined (Table 8.3, left column) for contrast with the U.S. cultural model. The dimension of sociability poses the boundary of sleep—wake as rather fuzzy, graded along a continuum in alertness and social engagement. Sleep also constitutes a social behavior determined by relationships and one’s place in society. Correspondingly, sleeping is opportunistic and accommodating, fitted into daily life and social priorities. Overall, an emphasis on sleep as sociable, anchored and framed by people, also counterbalances the theme of danger and risk.

<table>
<thead>
<tr>
<th>Table 8.3 Other cultural models and schemas for sleep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Components of cultural Action schemas</td>
</tr>
<tr>
<td>Model</td>
</tr>
<tr>
<td><strong>Sociability</strong></td>
</tr>
<tr>
<td>Fluid, unbounded</td>
</tr>
<tr>
<td>Social behavior</td>
</tr>
<tr>
<td>Opportunistic, accommodating</td>
</tr>
<tr>
<td>Anchored by people</td>
</tr>
<tr>
<td>Danger</td>
</tr>
<tr>
<td>Not of this world</td>
</tr>
<tr>
<td>Risky necessity</td>
</tr>
<tr>
<td>Death-like, difficult to “break”</td>
</tr>
<tr>
<td>Moral logic</td>
</tr>
<tr>
<td>Sociability: social life and status</td>
</tr>
<tr>
<td>Danger: social or</td>
</tr>
<tr>
<td>spiritual conditions</td>
</tr>
<tr>
<td>Foundational schema</td>
</tr>
<tr>
<td>The “connected” self</td>
</tr>
</tbody>
</table>
Many societies ally sleep with altered states, unworldly or moribund, and regard it as a dangerous necessity and/or spiritual opportunity. Deep sleep risks encounters with incorporeal realms and malign or beneficent forces; as such, profound sleep may be difficult to break and require the presence of others for safe return.

Action schemas (Table 8.3, middle column) related to the sociability component emphasize avoidance of sleeping alone, sleeping with proper partners, and flexibility in time and place for sleep. Entailments from the danger component include measures for safety, finding security in sleeping partners, proper conditions, and cultivation of moderate sleep depths with avoidance of protracted deep sleep. From a moral perspective, sleeping "right" or properly expresses the social integration that generates security, while a "good" sleep expresses the social or spiritual alignment that generates safety. It is both boon and existential barometer. Priorities for parenting from such cultural views (Table 8.3, right column) include largely on-demand sleep schedules that fit into daily life, infant carrying and provision of sleeping partners, and rapid response to fussing and crying with expected rapid development of robust self-soothing. Danger is palliated through passive surveillance from presence of others, provision of social and spiritual security (proper sleep partners, amulets), and sensory loads involved in social sleep.

From this generalized "non-Western" cultural view, unfussy, adaptable sleep is a hallmark of the secure, properly adjusted child, while untroubled sleep reflects safety. Each, in turn, comes from "good" conditions mediated in part through parents (usually mothers) but also reflective of the social order. The resultant well-regulated interdependent child fits in.

This section has hazarded broad generalizations to explore the role of cultural models and their related behavioral, developmental and moral agendas in formation of the developmental niche for sleep. Methodologically, analysis of these factors can reveal the cultural roots of normal sleep or dysfunction, whether perceived or actual. With the exception of co-sleeping in infancy (McKenna, 2000), the analysis of cultural models and moral agendas has been largely absent from sleep science and medicine. But the large roles they play in determining behavior and health makes them promising targets for systematic study with real practical value.

Conclusion

This chapter has outlined conceptual steps toward bridging gaps in sleep science, current accounts of sleep function and dysfunction. So far, results are promising. We now reconstrue sleep as social, that it is heavily influenced and largely culturally determined, and that cultural sleep behavior, settings, and sensibilities empirically expand these insights and understanding sleep, particularly during critical periods of development, can be extended to life course analysis.

Accumulating evidence from our own and others' studies suggests sleep is important for understanding behavior and health that has been largely absent from sleep science and medicine. But the large roles they play in determining behavior and health makes them promising targets for systematic study with real practical value.

Recognition of the importance of culture matters for sleep. The challenge of tractable terms that can be related to sleep physiology, and quality. Two framework challenges, one being the ecobiocultural and the other being cultural models of cognition. The ecobiocultural model of key pathways by which culture influences developmental niche. And indeed, new findings highlight a decisive role of parent behaviors. Such work resonates with discoveries as was highlighted in our comparative recent family study in Egypt. How, reflects culturally characteristic social housing and settlement patterns, and inequity that influences sleep and global shifts.
Conclusion

This chapter has outlined conceptual approaches and surveyed first steps toward bridging gaps in sleep science and anthropology that limit current accounts of sleep function and dysfunction in the "real world." So far, results are promising. We now recognize that sleep can be construed as social, that it is heavily influenced by context, that context is largely culturally determined, and that cultural models and morals infuse sleep behavior, settings, and sensibilities. The present challenge is to empirically expand these insights and explore their implications for understanding sleep, particularly during child development. This chapter has discussed conceptual and methodological tools for that effort. Accumulating evidence from our own and others' research suggests that the contexts of sleep are important factors in sleep behavior and quality. An ecological approach has proved to be a valuable tool for studies of sleep patterns and settings, their variation within and between populations, and key variables driving sleep outcomes. The ecological perspective can be extended to life course analysis, as demonstrated in our comparative study of sleep ecology.

Recognition of the importance of context has led to another insight: culture matters for sleep. The challenge is to operationalize culture in tractable terms that can be related to outcomes such as sleep behavior, physiology, and quality. Two frameworks from anthropology address this challenge, one being the ecobiocultural model of human development and the other being cultural models and schemas that ground cultural cognition. The ecobiocultural model of human development points to key pathways by which culture influences child outcomes by shaping the developmental niche. And indeed, new cross-cultural research has identified a decisive role of parent behaviors in child sleep and sleep difficulties. Such work resonates with discovery of the social dimension of sleep, as was highlighted in our comparative study of sleep ecology and more recent family study in Egypt. How, where, and how well people sleep reflects culturally characteristic social relationships and views of the self. Equally pressing are wider issues of family and household structure, housing and settlement patterns, work and leisure activities, nutrition and inequity that influence sleep and presently are undergoing dramatic global shifts.
Sleep follows cultural models and related schemas about how to behave, how things work, and how they go wrong. As illustrated in the case of the United States, analysis of these frameworks in cultural cognition is critical for understanding sleep behavior and ecology. It also reveals the moral dimension of sleep, accounting for the distress and perceived dysfunction that erupt when behaviors or outcomes do not conform to cultural expectations. These dynamics are clearly in play in parenting and child sleep. As the generalized contrasting models from non-Western societies illustrate, there are different ways to view what sleep is, how best to do it, and how these relate to child development and parenting. Put most simply, the meanings attached to sleep can prove important for understanding sleep behavior and distress throughout the life course.

In sum, although the comparative study of sleep in human development is in its infancy, many factors converge to predict its rapid growth and capacity to yield important insights into sleep and its relationship to developmental processes. Concerns about sleep problems and their psychobehavioral sequelae alongside globalizing changes that affect sleep, lend practical urgency to a project that promises fully to engage sleep science with human diversity in everyday social life.

REFERENCES


and related schemas about how to
they go wrong. As illustrated in the
of these frameworks in cultural cogni-
ep behavior and ecology. It also reveals
ving for the distress and perceived
ics are clearly
play in parenting and
straints models from non-Western
ways to view what sleep is, how best
child development and parenting. Put
ed to sleep can prove important for
tate study of sleep in human develop-
s converge to predict its rapid growth
ights into sleep and its relationship to
s about sleep problems and their psy-
: globalizing changes that affect sleep,
ct that promises fully to engage sleep
everyday social life.

adaptation to disease? A cross-cultural exam-
artin, L. M., Lehtonen, L., & Young, S. N.,
table crying bouts in infants with and with-
ual and Behavioral Pediatrics, 26, 14–23.
1971). Infancy and early childhood: Cross-
, G. M. (2004). Nutritional status, growth and
 adolescent girls. European Journal of Clinical


Introduction

The daytime and nighttime sleep environments of industrialized nations have been studied slightly over four decades (e.g., C term “sleep environment” suggests subject, the sheer variety of sleep experiences regarding the regularity of which they are correlated make it In this chapter, we will explicate a number of propositions regarding the trans-