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[Archived] Waking States and Psychosocial / Emotional Development. Comments on the Texts of Anders , Thoman and Holditch-Davis

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Introduction

The task of critically appraising the texts of three such eminent researchers in the specialty of sleep in children as Thomas F. Anders,[a] Evelyn B. Thoman and Diane Holditch-Davis[b] was not an easy one, especially since their texts summarize the "state of the art" in the study of the development of sleep-wake states from the foetal period through the first years of life, of the relationships between the biological development of sleep-wake states and the environment and the psychosocial, emotional or cognitive development of the child, and of the relationships between the development of sleep-wake states and sleep disorders.

Research and conclusions

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The studies on preterm infants reviewed by Diane Holditch-Davis show that the organization of sleep-wake states is already highly dependent on the environment: alternating light and darkness, sound levels, mother-child relationship, pain, etc. She points out that sleep-wake states are the only way the premature infant has to communicate his or her needs and degree of well-being to others. She also notes that a very close parent-child relationship, especially a mother-child relationship, is a significant organizer both of the sleep-wake rhythm and of the structure of sleep itself. The studies she refers to show how important it is to avoid disturbing the sleep of a premature child; one study does in fact note that some mothers, doubtless very focused on their newborn, tend to adjust their interaction with the child as a function of his/her sleep-wake states. On the other hand, I have more reservations about the studies that emphasize the relationships between sleep-wake patterns in premature or even full-term infants and their long-term neurological development, and I think that the findings of some studies need to be put in perspective, as does Diane Holditch-Davis, by recognizing that they are of little clinical relevance and that only longitudinal studies can identify reliable risk factors. I also think that it is very important to avoid confusing EEG abnormalities that in preterm and full-term infants are frequently translations of neurological damage, and therefore an important predictor of the child's motor, mental and/or sensory development, on the one hand, and on the other, abnormalities in sleep-wake patterns than are usually functional in origin, related to metabolic (often temporary) or environmental causes.

Evelyn B. Thoman and Thomas F. Anders describe the phenomenology of the various sleep-wake states and their stages of development: individualization of the different stages of non-REM sleep, ontogenesis of the sleep-wake rhythm. They rightly stress the complex relationships between the biological determinants of the maturation of sleep-wake states, sleep disturbances and social, emotional and cognitive daytime behaviour of the child, the close correlations between the child's poor sleep, parental stress and parent-child relationships, and the fact that emotional and social daytime events can be organizing or disorganizing factors in nocturnal sleep patterns.

Thomas F. Anders raises several crucial questions that are yet to be answered:

- What is the role of biological factors in the postnatal development of sleep-wake rhythms?
- What is the impact of psychosocial factors on the development of sleep-wake rhythms?

- Are sleep disorders in young children related to interactions between biological and psychosocial factors?

Evelyn B. Thoman asks precisely the same questions: Do young children wake up frequently because their brains are immature, because of a relational problem or because of an abnormal fragmentation of sleep that would warrant medical investigation?

Although I was impressed by the mass of data presented in the three texts, I was somewhat disappointed that the authors did not put more emphasis on the development of circadian rhythms, on the establishment of day/night rhythms that not only depend on cerebral maturation, but also on many environmental factors and more particularly on the parent-child relationship (whether it provides time cues or not).

The circadian component is present from the neonatal and even prenatal period on, but it is masked by a predominant ultradian rhythm.[1-5] A number of studies[6-9] that looked at the development of the sleep-wake rhythm during the first few months of life (often of a single child, usually first born and feeding *ad libitum*) showed that it is only at the age of three or four months that sleep-wake rhythms evolve from a three-to-four hour ultradian rhythm in the first weeks of life to a more stabilized 24-hour rhythm around 3 or 4 months of age. More recent studies using larger samples[1,10-13] indicate that a stable 24-hour sleep-wake circadian rhythm appears much earlier, at roughly 45 weeks post-conception, with no difference between preterm and full-time infants.[11] This means that it does not take long for the longest periods of sleep and wakefulness to occur at fixed times, during the day for the periods of wakefulness, at night for sleep. The biological circadian rhythms (heart beat, temperature, cortisol, melatonin, etc.) all appear during the first months of life.[10,14-22] All of these studies point to the considerable inter-individual variability as to the rate at which a stable 24-hour sleep-wake rhythm is established and stress the importance of time cues, environmental factors that regulate all of these rhythms, including the biological ones. For the foetus, the maternal time cues are important: not only the secretion of cortisol and melatonin, but also the mother's activity/rest rhythm.[21,23] During the very first days, close correspondence between mother and infant activity[24] and also the alternance between light and darkness[25] will foster the emergence of a day/night rhythm. During the very first weeks, the social synchronizers (regular feeding times, interaction times, bedtime schedules) will play an important role in ensuring that the sleep-wake and biological rhythms oscillate on a stable 24-hour rhythm.[26,27]

Implications for policies and services

One can only agree with the three researchers' conclusions concerning:

- the great frequency of sleep disorders in young children, the likelihood of not insignificant effects of these disorders on the psychosocial, emotional and cognitive development of the children and on the sleep of their parents, with the attendant economic costs; and
- the need for more in-depth studies on the development of sleep-wake rhythms that pay more attention to the structure of sleep and the synchronization of the sleep-wake rhythm, and other circadian rhythms: in full-term and preterm infants and in children who are considered good sleepers and poor sleepers by their parents.
- the need for studies on sleep microstructure in order to formulate standards on the frequency of micro-arousals in infants and children. Such standards are essential to understanding the diminished capacity for arousal between the ages of two and six months, a period of higher risk for sudden infant death. They could also explain the tendency of children aged nine months to three years to awaken frequently and help clarify the relationships between cognitive deficits and SAS (sleep apnea syndrome) in children.

Such studies would serve to:

- identify the risk factors for persistent sleep disorders beyond the age of three-to-four months (after which newborns are supposed to "get a proper night's sleep");
- evaluate the possible physiological, psychological or intellectual consequences of sleep disorders in young children;
- come up with standards for the development of daytime and nighttime sleep duration, schedules for bedtime and rising time, and for the number of naps during infancy; and
- support behavioural, medical and/or psychological treatment for children with sleep disorders.

Sleep disorders in children are frequent enough to constitute a serious public health problem. It is therefore of the utmost importance that policy makers:

- invest in epidemiological studies of children's day/night rhythms associated, if possible, with studies of the structure of their sleep and daytime behaviour; researchers should use the least invasive tools and markers possible (sleep diary, video recordings, actigraphic

monitoring, recordings of sleep at home; saliva and urine tests for biological markers); and

- promote programs of education which could start as early as during the monitoring of pregnancy in order to prevent sleep disorders in children to be born.

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Notes:

aComments on original paper published by Thomas F. Anders in 2004. To have access to this article, contact us at cedje-ceecd@umontreal.ca.

bComments on the revised paper published by Diane Holditch-Davis in 2005. To have access to this article, contact us at cedje-ceecd@umontreal.ca.

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