

Does Assessing Sleep Inadequacy Across Its Continuum Inform Associations With Child and Family Health?

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ABSTRACT

Introduction: The purpose of this study was to examine the prevalence and characteristics of children experiencing a continuum of inadequate sleep and its associations with child, family, and environmental variables.

Method: A secondary analysis of weighted responses of 68,418 parents or caregivers of children aged 6 to 17 years participating in the 2003 National Survey of

Children's Health was conducted. Inadequate sleep was categorized as mild, moderate, or severe.

Results: Approximately one third of parents reported their child's sleep inadequacy as mild (18.6%), moderate (6.8%), or severe (5.8%). Age ($P < .001$), fair/poor health status ($P < .001$), frequent depressive symptoms ($P < .001$), and high parental stress ($P < .001$) demonstrated a progressive relationship from adequate to severe inadequate sleep. Controlling for child, family, and environment variables, parents of children with inadequate sleep were more likely to report frequent child depressive symptoms, high parental stress, and violent family conflict style.

Discussion: Sleep inadequacy affects 15 million American children, 6 million at a moderate or severe level. Identification of inadequate sleep should prompt further assessment of its associated factors—depressive symptoms, parental stress, and family conflict—for targeted clinical intervention. *J Pediatr Health Care.* (2009) 23, 394-404.

Key words: Sleep, child health, national estimates

Epidemiology of sleep patterns in children is in its infancy, yet clinical observations taken together with the growing number of empirical studies suggest that sleep inadequacy is an important health problem for children. Guidelines for optimum sleep time (Anders, Sahdeh, & Appareddy, 1995; Heussler, 2005; Howard & Wong, 2001) do not match the actual sleep reported for a significant minority (25%-40%) of school-aged and adolescent children who experience an array of sleep problems (2004 Sleep in America Poll, 2004; Adolescent Sleep Needs and Patterns, n.d.; Buckhalt, El-Sheikh, & Keller, 2007; Fallone, Seifer, Acebo, & Carskadon, 2002; Hoban, 2004; Iglowstein, Jenni, Molinari, & Largo, 2003; Lamber, 2005; Owens & Witmans,

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2004; Spilsbury et al., 2004). Methodologic issues cloud the accuracy of studies reporting inadequate sleep. Inconsistencies exist across

1996; Fallone, Acebo, Seifer, & Carskadon, 2005; Hoban & Chervin, 2001; Perez-Chada et al., 2007; Smedje, Broman, & Hetta, 2001a,

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studies using child versus parent as reporter and among the diverse sleep measures ranging from single estimates of total sleep through questionnaires, diaries, actigraphy, and polysomnography (Goodwin et al., 2007). Most studies rely on small convenience samples, although when national survey data are used, proportions of children with inadequate sleep fall within the disturbing ranges reported for local studies (2004 *Sleep in America* Poll; Adolescent Sleep Needs and Patterns; Smaldone, Honig, & Byrne, 2007).

Sleep inadequacy for otherwise healthy children is only beginning to attract the attention given to the seemingly more serious categories of primary sleep disorders or of sleep disturbances associated with acute or chronic illness. When children with chronic disorders experience uncomfortable symptoms such as anxiety, pain, or itching, sleep is disrupted; it is not surprising that emotional and mood disorders, atopic conditions, and life-threatening illnesses are most frequently associated with sleep deprivation. Evidence is accumulating that even for otherwise healthy children, sleep inadequacy may have serious outcomes that extend beyond parents' inconvenience and children's daytime sleepiness. Children who sleep less than the hours recommended for their age and developmental level have been found to have behavioral, emotional, and academic performance difficulties (Dahl,

2001b; Stein, Mendelsohn, Obermeyer, Amromin, & Benca, 2001). While there is a growing consensus that sleep inadequacy in childhood has numerous deleterious health effects, few studies have attempted to grade these effects. It remains unclear if negative health factors that have been associated with sleep inadequacies are related to progressive increases in magnitude of sleep inadequacy.

Individual child characteristics, family factors, and environmental variables are being studied as covariates to inadequate sleep during the childhood and adolescent years. This multiple domain conceptual approach is a relatively new one in sleep studies and acknowledges the complex interactions among child, family, and community that can both affect and be affected by sleep patterns and disturbances (Adam, Snell, & Pendry, 2007; Meltzer & Mindell, 2007). Disruptive family situations (Martinez & Richters, 1993; McFarlane, Groff, O'Brien, & Watson, 2003; Richters & Martinez, 1993; Sangal, Owens, & Sangal, 2005; Wells, McCann, Adams, Voris, & Ensign, 1995), lower socioeconomic status, and minority race/ethnicity (Children from Low Income Families, 2007; Roberts, Roberts, & Chen, 2000; Spilsbury et al., 2004; Stein, 1999) consistently have been associated with more frequent sleep inadequacy, yet the results for race and socioeconomic status are inconsistent with more recent studies (Smaldone et al., 2007). Culture,

race and socioeconomic factors are interrelated, making it difficult to single out the influence of any one factor. New evidence exists that interpreting these factors also may be complicated by the greater number of environmental stressors experienced by African American and Hispanic low-socioeconomic children versus their European American higher socioeconomic counterparts, as well as by intrinsically different sleep architecture associated with racial and genetic or environmental and cultural exposures (Buckhalt et al., 2007; Hale & Do, 2007; Perez-Chada et al., 2007). These contributory factors have rarely been evaluated across the continuum of weekly sleep inadequacy.

A recent study (Smaldone et al., 2007) described the prevalence and characteristics of children with inadequate sleep as reported by a sample of 68,418 parents or caregivers of children aged 6 through 17 years interviewed as part of the 2003 National Survey of Children's Health (NSCH). Dichotomizing sleep adequacy by parent report of children sleeping well 7 nights during the previous week versus any number of nights less than seven, results were consistent with previous reports associating inadequate sleep with atopic disorders, headache, depressive symptoms, parental emotional problems, family turmoil, and neighborhood safety but contradictory for race and socioeconomic factors, with non-minority, higher income families reporting less optimum sleep for their children. Using the same data source, this study addresses a new question using a gradient approach to sleep inadequacy to determine if earlier results hold and if the contradictory results are better explained when level of sleep inadequacy is considered.

METHOD

The NSCH was conducted by the Health Resources and Services Administration's Maternal and Child

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