Infant Behavior & Development 42 (2016) 111–118

Contents lists available at ScienceDirect

Infant Behavior and Development

Pediatric sleep problems and social-emotional problems. A population-based study

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ARTICLE INFO

Article history:
Received 5 June 2015
Received in revised form
15 December 2015
Accepted 19 December 2015
Available online 8 January 2016

Keywords:
Sleep problems
Toddlers
Social-emotional development
Short sleep duration
Nocturnal awakenings

ABSTRACT

Objective: To examine the association between sleep and social-emotional development in two-year-old toddlers.
Methods: The study is part of a longitudinal cohort study, the Akershus Birth Cohort Study, which targeted all women giving birth at Akershus University Hospital in Norway. The current study is from the fourth round of the study, including 2014 women two years after delivery. The Brief Infant Sleep Questionnaire (BISQ) and the Ages and Stages Questionnaire: Social Emotional (ASQ:SE) were filled out by the mothers and were used to assess toddler sleep, and social-emotional development, respectively. Other domains of development (communication problems, gross motor problems, and fine motor problems) were assessed with the Ages and Stages Questionnaire (ASQ). Confirmatory factor analysis was conducted on the ASQ:SE, and logistic regression analyses were used to examine both crude associations between sleep variables and social-emotional problems, and adjusting for potential confounders.
Results: The mean sleep duration of the toddlers was 12 h and 27 min; the majority of the children (54%) had 1–2 awakenings per night, while 10% of the children had a sleep onset latency of more than 30 min. All sleep parameters, including short sleep duration, nocturnal awakenings and sleep onset problems, were significantly associated with social-emotional problems in a dose-response manner. For example, sleeping less than 11 h per night was associated with a five-fold increase in the odds of social-emotional problems, compared to sleeping 13–14 h per night. Adjusting for potential confounders, including maternal age, maternal education, marital status, parity, gestational age, child birth-weight and other developmental problems, did not, or only slightly, attenuate the associations between any of the sleep variables and social-emotional problems.
Conclusions: Short sleep duration, nocturnal awakenings and sleep onset problems were all associated with higher odds of social-emotional problems, even after accounting for developmental problems and demographic factors. Thus, a broad assessment of sleep and social-emotional problems when toddlers present with either can be useful.

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http://dx.doi.org/10.1016/j.infbeh.2015.12.005
0163-6383/

1. Introduction

Sleep problems in toddlers such as nocturnal awakenings are commonly reported by parents (Hysing et al., 2014), and about one-third of two-year-olds have nocturnal awakening every night (Petit, Touchette, Tremblay, Boivin, & Montplaisir, 2007). The stable nature of sleep problems and short sleep duration across early childhood (Hysing et al., 2014) underscore the importance of understanding potential risk indicators and co-occurring factors.

Numerous studies across all age groups have demonstrated a close link between sleep and mental health problems, but there are indications that the specific nature and strength of the association between sleep and emotional functioning may be age-dependent across childhood (Gregory & O'Connor, 2002). However, while the associations between sleep and emotional functioning have been extensively studied in later childhood, much less is known regarding this association in younger children (Leahy & Gradisar, 2012). Some notable exceptions include three longitudinal studies recently demonstrating that sleep problems may be a precursor to the development of later emotional problems in early childhood (Jansen et al., 2011; Sivertsen, Harvey, et al., 2015; Weinraub et al., 2012).

Several possible mechanisms might explain the association between sleep problems and socio-emotional outcomes. Twin studies of preschool children have shown that both genetic and environmental factors are important, but with environmental factors accounting for most of the association (Gregory & Sadeh, 2012; Gregory, Eley, O'Connor, & Plomin, 2004). The importance of sleep on emotional regulation may be one possible factor in understanding the link between sleep and mental health, which was supported by an experimental study where toddlers with nap restriction were less able to solve difficult tasks and less mature in their self-regulation strategies compared to peers who napped without restriction (Miller, Seifer, Crossin, & Lebourgeois, 2014).

Sleep problems are more frequent in children with developmental delay (Krakowiak, Goodlin-Jones, Hertz-Picciotto, Croen, & Hansen, 2008), and children with developmental delay show more mental health problems (Squires, Bricker, & Twombly, 2004). Because developmental status may be especially important in toddlers due to the rapid development and brain maturation during the first two years of life, it is particularly important to account for developmental level when investigating the association of sleep and socio-emotional problems in early childhood, as this may partly explain the association. To the best of our knowledge this has not been done in previous studies.

Based on these considerations, the overall aim of the present study was to examine the association between several sleep parameters and social-emotional development in two-year-old toddlers. We also wanted to explore if any association could be explained by co-occurring developmental problems in the child.

2. Materials and methods

2.1. Study population and design

The Akershus Birth Cohort is a longitudinal questionnaire study targeted at all women giving birth at Akershus University Hospital in Norway. The hospital serves a population of 350,000 from urban and rural areas. All women scheduled to give birth at the hospital were approached in gestational week 17, when they underwent a routine fetal ultrasound. Women were included if they gave consent to participate and were able to complete a questionnaire in Norwegian. Recruitment lasted from November 2008 until April 2010. The current study use data from the fourth round of the study two years after delivery. Of the initial 4662 women who originally consented to participate in wave 1 (data not used here), 2041 women returned the fourth questionnaire, yielding a participation rate of 43.8%. Detailed information regarding the participation flow in the longitudinal design has been published elsewhere (Sivertsen, Hysing, Dorheim, & Eberhard-Gran, 2015).

2.2. Instruments

2.2.1. Exposure: Sleep variables

The Brief Infant Sleep Questionnaire (BISQ) (Sadeh, 2004) was developed as a screening tool of infant sleep problems to be used in pediatric settings. The BISQ assesses a range of domains of infant sleep, and the following were included in the current study: (1) time in bed (TIB) was calculated from the difference between rise time and bedtime; (2) duration of wakefulness (wake after sleep onset [WASO]) during the night hours (10 p.m. to 6 a.m.); (3) nocturnal settling time (latency to falling asleep for the night/sleep onset latency [SOL]); (4) sleep duration was defined as TIB minus (SOL + WASO); (5) number of nocturnal awakenings; and (6) whether the mother considers her child's sleep to be a problem (response options: "a very serious problem", "a small problem", "not a problem at all"). The BISQ was completed 2 years postpartum by the mothers, who were instructed to refer to their child's sleep during the past week. The BISQ has demonstrated good psychometric properties as a brief sleep screening tool for clinical and research purposes in infants and toddlers (0–30 months) (Sadeh, 2004). For purposes of the present study, the sleep duration variable was divided into to 5 categories sufficiently large for statistical analyses (<11 h, 11–12 h, 12–13 h, 13–14 h, ≥14 h). As the largest category, the 13–14 h category was chosen as the reference. The range of the continuous sleep duration variable was 7:57–14:47.