

Title: Parenting sleep practices and perceptions among infants with Down syndrome

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Introduction: A consistent bedtime routine is thought to play an important role in infant development. Increasing evidence points to a significant association between a regular sleep routine and positive sleep outcomes among mothers and their children in typically developing (TD) infants and toddlers (Mindell, Telofski, Wiegand, & Kurtz, 2009). Although some aspects of bedtime routines have been previously studied in children with developmental disabilities, including individual components of the routine along with frequency and duration of routines, the previous literature in these groups has been limited. The current study investigated whether parents of infants with and without Down syndrome (DS) executed a consistent bedtime routine and how they perceived the importance of a bedtime routine for their infant's development. Furthermore, we investigated the association between bedtime routine consistency, daytime functioning including behavior and language, and overall sleep quality in infants 6-24 months of age, relationships which have not been studied before in this population.

Methods: The present study analyzed data from the Arizona Sweet Dreams Study (AzSDS). This was a national, longitudinal study in the U.S. that examined how sleep relates to language, behavior, health, and developmental outcomes among infants with and without DS (N = 59 and N = 56, respectively) from 6-months-old to 24-months-old. Children were assessed within a 2-week window every 6 months from 6-24 months. Parents completed a battery of questionnaires evaluating sleep and development during a 2-hour phone interview. Infants wore an Actiwatch and a Language Environmental Analysis (LENA) digital language processor (DLP) at all time points for objective measures of sleep and language, respectively. Bedtime routine consistency was measured through a modified version of the Extended Brief Infant Sleep Questionnaire (BISQ) (Sadeh, Mindell, Luedtke, & Wiegand, 2009). The Infant-Toddler Social and Emotional Assessment (ITSEA) parent form was administered to measure social or emotional issues and competencies among infants and toddlers (12-35 months-old) (Carter & Briggs-Gowan, 2005).

Results: Using growth curve modelling, results suggested that parents engaged in a consistent bedtime routine with their infant, and their perception of the importance of the routine for their infant's development increased with time. Bedtime routine consistency was found to be negatively associated with infant bedtime difficulty ($p = 0.011$). There was a significant effect of bedtime routine consistency on externalizing behavior, total child vocalizations, adaptive behavior, and average sleep time. More specifically, a consistent bedtime routine was related to less externalizing behavior ($p = 0.016$), fewer vocalizations particularly in the TD group ($p = 0.040$), a 10-point difference in adaptive behavior scores with each assessed time point ($p < 0.011$) and longer sleep times regardless of group ($p = 0.019$). Significant main effects for group were found with the DS group displaying less internalizing behavior ($p = 0.002$) and poor sleep efficiency ($p < 0.001$) in comparison to the TD group. Main effects for time showed an overall increase in externalizing behavior ($p = 0.005$) and attentive behavior ($p < 0.001$) and decrease in adaptive behavior scores ($p < 0.001$).

Discussion: Findings shed light on the influence of a consistent bedtime routine during the infancy period for typical and atypical populations. We found an effect of bedtime routine consistency on externalizing behavior, average sleep time, and total child vocalizations. Future work with this dataset should investigate other factors associated with sleep and daytime functioning such as health co-morbidities and the extent that these findings may be moderated by the severity of sleep apnea.

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