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ORIGINAL RESEARCH

Child Sleep Problems Affect Mothers and Fathers Differently: How Infant and Young Child Sleep Affects Paternal and Maternal Sleep Quality, Emotion Regulation, and Sleep-Related Cognitions

Friederike Lollies[1]
Marisa Schnatschmidt[1]
Angelika A Schlarb[1]
Jon Genuneit[2]

[1]Faculty for Psychology and Sports Science, Bielefeld University, Bielefeld, North Rhine Westphalia, 33015, Germany; [2]Pediatric Epidemiology, Department of Pediatrics, Medical Faculty, Leipzig University, Leipzig, Saxony, 04103, Germany

Purpose: Problems in infant and young child sleep can represent a serious challenge to parental behavior of mother and father. However, most research about the effect of infant and young child sleep on parenting has focused on mothers. Therefore, the present study aimed to explore the perception and consequences of infant and young child sleep problems of both parents.

Participants and Methods: Participants were recruited via random sampling at, eg, kindergartens in North Rhine Westphalia. The sample includes data of heterosexual German-speaking couples with children without any medical or psychopathological problems. For this study, parents were asked to complete the test battery with regard to their youngest child. As sampling was via the kindergarten, the range of child age was 4–68 months. A survey assessed data of parents (N=196, 46% female). The test battery contained the following questionnaires: Children Sleep Habits Questionnaire (CSHQ), Pittsburgh Sleep Quality Index (PSQI), Self-Report Measure for the Assessment of Emotion Regulation Skills (SEK-27), and a German version of the Infant Sleep Vignettes Interpretation Scale (ISVIS). For the outcome variables of parental sleep as well as for parental emotional competence, the statistical tests of ANOVA were used, and for parental sleep-related cognitions with the grouping variables of infant and young child sleep as well as parental gender, a MANOVA was used. According to the analysis of group differences, the age of the child was also included additional to the grouping variable of parental gender and children's sleep.

Results: Mothers and fathers in this sample were equally aware of their children's sleep problems and reported similar sleep quality and emotion regulation themselves (all $p > 0.05$). Mothers as well as fathers of children with sleep problems had lower parental sleep quality ($F(1, 183) = 110.01$, $p < 0.001$) and emotion regulation ($F(1, 184) = 143.16$, $p < 0.001$) compared to parents of children without sleep problems. In children under 26 months of age, the child's age seemed to have less negative impact on the father's sleep quality ($F(1, 183) = 5.01$, $p < 0.001$) and emotion regulation ($F(1, 184) = 0.72$, $p < 0.05$) than on the outcomes of the mother. With regard to sleep-related cognition, there were statistically significant effects of parental gender ($F(2, 185) = 44.39$, $p < 0.001$) and interaction effects of parental gender × child sleep problems observed ($F(2, 185) = 31.91$, $p < 0.001$).

Conclusion: The conclusion from this survey refers to the role of the father. According to the results, an association between paternal emotional competence, sleep quality as well as their sleep-related cognitions and infants and toddlers sleep behavior could be assumed in addition to and independent of the results of mothers. We would highlight the urgent need of inclusion of fathers in infant and developmental sleep research. In the context of sleep

Correspondence: Friederike Lollies
Faculty for Psychology and Sports, Bielefeld University, POP 10 01 31, Bielefeld, 33015, Germany
Tel +49 151 431 70887
Email Friederike.lollies@uni-Bielefeld.de

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intervention, both parents should be provided with ongoing support to improve their sleep quality and competence in emotion regulation.

Keywords: infant and young child sleep, parental sleep, parental emotion regulation, parental cognitions

Introduction

Interrelation of Infant, Young Child and Parental Sleep

After the birth of children, fragmentation of parental night sleep and fatigue due to the nightly demands of the infant are common.[1] Indeed, there is evidence that mothers' and fathers' fatigue increase immediately following the birth of their child.[1,2] Resulting in insufficient, non-restful sleep, this poses a stress factor for parental health, daily well-being, and functioning.[3] In contrast, good children's sleep quality predicted good maternal sleep.[4] Most often, this is a temporary problem and infants develop the competence to fall asleep independently in the evening and go back to sleep after night waking during the first year of life.[5,6] However, about 20–30% of the infants and young children are affected by sleep problems during the entire first 3 years of childhood and need support by a caregiver to fall asleep.[7–10] Consequently, many parents are concerned with difficulties pertaining to their own sleep as well as handling their children's sleep problems.

Do Infant and Young Child Sleep Problems Affect Mothers and Fathers Differently?

Sleep Quality

Most research on the association between sleep in young children and parental outcomes focused primarily on maternal perspectives.[11,12] More specifically, child sleep problems increased maternal stress, moderate and severe symptoms of depression, and decreased general health.[13,14] Research and practical clinical experience show, that especially in the first 3 years of life, fathers are less involved in sleep rituals in the evening and night care of their child than mothers are.[15–17]Despite this, it is remarkable that fathers' general health was also negatively affected by infant sleep problems.[18] Earlier research has shown that fathers can also experience significant sleep disruptions and less total sleep time in the early postnatal period, which may be associated with low self-perceived sleep quality.[19] Notwithstanding the extensive work on maternal sleep, little research is done regarding paternal sleep and an answer to the question about an association between children's sleep quality and paternal sleep quality during infancy and early childhood is still outstanding.[20] Moreover, a survey including data of 133 fathers of 0–6 years old children focusing on paternal wellbeing during parenthood found a statistical association between paternal fatigue and sleep quality and wellbeing, whereas sleep problems of their children were not assessed as potential influencing factor.[21] However, there is little evidence to support the differences in how mothers and fathers perceive sleep problems in young children and their consequences.[17,22]

Parental Emotion Regulation

One example of research focusing on child sleep and parental functioning demonstrated that child sleep problems were associated with higher levels of, eg, parenting stress,[16] which might be associated with different negative parenting characteristics as, eg, insufficient parental warmth or the use of harsh discipline.[23] Another, less regarded but important domain of functional parenting is emotion regulation.[24] As parents are argued to be the emotion socialization agents of their offspring,[25,26] they should have appropriate emotion regulation competence, which is characterized by sufficient and effective emotional monitoring and evaluation, as well as modification of appropriate emotional reactions.[27] Disproportionate emotional expressions while interacting with their children may contribute to a lack in the parent and child relationship as well as to a restricted emotion development in children.[28,29] In general, high emotional competence and emotion regulation seem to be positively associated with social interactions, stress management, and effective communication.[30–32] It is known that low sleep quality, in turn, might impair the ability to regulate emotions.[33–36] In more detail, emotion regulation in mothers of children suffering from sleep problems was reduced in consequence of their low sleep quality.[4] Therefore, sleep problems in children might reduce the emotional competence of the parents and thus create the basis for ineffective and negative reactions to the demands of the children. Because sleep as well as problematic sleep of children is associated to the children's social field and their figures of attachment,[3,6] it is surprising that only mothers were

considered in this context.[11] Disregarding the facts that the infant's sleep seems to affect fathers' general health[18] and that fatherhood might negatively affect the paternal wellbeing,[21] it is unexplored whether emotion regulation is different by parental gender in the context of infant sleep problems. One reason for this gap in research might be owed to the general acceptance that fathers seem to be less involved in care of their child throughout the first years of life.[15] However, as parental reactions and consequences towards child behavior are expected to be independent of each other,[37] science should take account of these potential differences.

Parental Sleep-Related Cognitions

The importance of parenting practices for children's long-term psychological adjustment has been central in developmental and family psychology. In consequence, the proper handling of problematic child sleep may represent a serious challenge to family and parental adaptive functioning.[38,39] Research focusing on child sleep problems and the interaction between child and parents found that mothers of infants with sleep problems had lower maternal sensitivity, higher levels of maternal negative emotionality, and less maternal closeness during conflicts.[40] Additionally, infant sleep problems seem to influence the parental involvement in sleep onset and sleep maintenance for young children characterized by active interactions (eg, nursing or rocking to sleep).[41,42] Yet, the actual interaction is hard to investigate in cross-sectional studies. Thus, the focus of contributing research was on the role of parental cognitions in family functioning and increasing attention was devoted to the links between these cognitions and the actions of family members because it could be assumed that the way parents behave and react to the child is mediated by parental cognitions.[43] As research demonstrated an association between infant sleep problems and excessive parental involvement during bedtime and during periods of night awakening,[22,44] it is surprising that only a few studies have tried to explore potential factors that lead parents to be more actively involved in the night care of their children.[45,46] According to clinical experience parents find it difficult to decrease their active involvement at night because they value it as less sensitive, neglectful, or even abusive to the child.[47] This interpretation especially applies to parents who interpret their infant's demands and crying at night as a sign of distress or discomfort.[48] These annotations imply that parental cognitions related to children sleep may influence the actual parental reaction and behavior during the night.[48] Results of studies regarding the association between child sleep problems and parental cognitions also focused particularly on mothers.[49–51] There are few studies examining sleep-related cognition of both parents.[46,52] The only study analyzing data with respect to parental gender differences was conducted in Israel and found significant differences between mothers and fathers on the cognition scales, indicating that parents could hold different cognitions regarding their children's demands during the night.[53] One main result of the study related to parental cognitions about potential difficulties in limit-setting parenting behavior - eg, resisting the child's demands when it wakes up at night to help the child learn to fall asleep on its own - were found to be associated with poorer child sleep quality. Regarding parental gender differences, mothers' cognitions towards children's night demands were significantly associated to children's feeling of distress, which contribute to the need of comforting the child, whereas fathers' cognition in this context were associated to the need of limit-setting parenting.[53]

However, socio-cultural differences regarding parenting and infant sleep are probable,[42] and the debate about cultural differences regarding parenting is still ongoing.[54] According to Sadeh and Anders,[42] parental handling related to child sleep as well as the assumption what constitutes problematic sleep is influenced by distal family factors and cultural values. One prominent example might be the parental attitude that children have to sleep in the own bed, which is common in western industrialized countries[55] but not in eastern societies, where co-sleeping is quite normal.[56] As co-sleeping is associated to immediate parental intervention during night awakenings the culturally normed handling and therefore the parental child sleep-related cognitions could also be different in different cultures.

Therefore, a comparison of the findings in eastern countries[53] with parental sleep-related cognitions in western countries, like Germany, would be interesting.

Current Study

With child sleep as a familial matter, it is unavoidable to consider both maternal as well as paternal information, and take into account the independence of mother's and father's perceptions.[37] A significant limitation of the previous studies on child sleep problems and related parental outcomes is the isolated exploration of maternal data, which neglects the significant role of the father in this

context. Although data of both parents might have been assessed, differences between mothers and fathers were not investigated. Therefore, we aimed to compare child sleep-related outcomes for both mothers and fathers.

In the present study, we aimed to expand on the exploration of the relationships between infant and toddlers' sleep and several parental outcomes: 1) perception of child sleep problems, 2) sleep quality, 3) emotional competences, and 4) cognitions about sleep in children with and without parental reported sleep problems considering the gender of the parents.

The current data regarding this topic is sparse. Based on the revised literature we hypothesized that 1) mothers as well as fathers will perceive the sleep habits and problems of their children to the same extent. 2) Furthermore, mothers as well as father's outcomes of sleep quality and emotion regulation competence will be affected in case of their children's sleep problems. 3) Regarding the child sleep-related cognitions, it could be expected that mothers would have a higher tendency to emphasize infant's night demands as distress of the child, whereas fathers would emphasize the role of parental limit setting.[53]

Additionally, 4) there would be significant group differences expected on the constructs, with parents of the children with sleep problems reporting less parental sleep quality, less parental emotion regulation, and appraising infant's night demands as a signal for a distressing experience.[4,16,53]

Method

Participants

For this study, we only included a family if data for both, mother and father, and their child were available and did not contain any missing data for variables relevant for analysis. The original sample contained data for 268 families with heterosexual parent couples. We excluded observations from single parenthood (N = 17) and observations with missing data for analysis-relevant variables (N = 56). Therefore, the final sample included 196 families.

Procedures

This study was conducted in accordance with "The Code of Ethics of the World Medical Association" (Declaration of Helsinki), and the institutional ethics committee of Bielefeld University approved this cross-sectional survey (2018–027). Parents of young children (0–6 years) were recruited via random sampling by word- and mouth request for participation at oral presentations regarding child sleep development in different kindergartens and in children's gymnastics and sport associations. Additionally, all institutions agreed to distribute and collect the paper forms for the survey on behalf the researcher. Parents of more than one child were asked to complete the questionnaires only for their youngest child. The participating parents were informed about the purpose of the study, their voluntary participation and assured of the confidentiality of their answers. Parents who were concerned about their child sleep habits were offered the opportunity to participate in a sleep training program. In detail, the participation in the Mini-KiSS project addressing sleep problems for children aged 6 months to 4 years at Bielefeld University[57] was offered. Another criterion for inclusion was the comprehension of German language as well as the absence of any medical or psychopathological problems in the children. No compensation was offered for participation.

Measures

Demographics

The parents provided demographic information regarding their own and their child's age and gender via questionnaires. Additionally, the total number of children in family, parental education, relationship status, and the status of employment were assessed.

German Version of the Children's Sleep Habits Questionnaire (CSHQ-DE)

In the current study, the German version of the Children's Sleep Habits Questionnaire (CSHQ-DE) was utilized.[58] The parent-reported CSHQ-DE examines the child's sleep habits, identifies sleep problems, and has been used in a variety of studies on child sleep.[59,60] Although the CSHQ provides norms for children aged 4–10 years, it was found to be an appropriate and valid instrument to differentiate problems in sleep in toddlers and preschoolers,[61–63] as well as in samples with infants.[64–67] The CSHQ-DE includes 48 items, with 15 items giving clinically relevant information, and with 33 items pertaining to eight subscales: bedtime resistance, sleep-onset delay, sleep duration, sleep anxiety, night waking, sleep-disordered breathing, parasomnia, and daytime sleepiness. Parents rate the frequency of their child's specific sleep behaviors during the preceding week on a three-point Likert scale ranging from 0 to 2 (rarely = 0–1 night per week; sometimes = 2–4 nights per week; and usually = 5–7 nights per

week). The CSHQ-DE total score sums the scores of the items and varies between 0 and 96 points. Higher scores indicated sleep that is more problematic. The cut-off score for clinically relevant sleep problems is 41 and was used to classify children with (CSHQ-DE ≥41) and without sleep problems (CSHQ-DE <41). In previous studies, the CSHQ-DE achieved an internal consistency of $\alpha = 0.68$.[47] The CSHQ scale in the current sample showed good internal consistency ($\alpha = 0.89$).

Pittsburgh Sleep Quality Index (PSQI)

The PSQI is a 19-item self-reported measure of sleep quality in adults[68] and is commonly used in research studies assessing subjective parental sleep.[53,69,70] It evaluates the subject's sleep quality over the past month and encompasses seven subscales: sleep disturbances, sleep latency, sleep efficiency, sleep duration, daytime sleepiness, sleep medication, and the general perception of sleep quality. Each item is weighted on a four-point Likert scale ranging from 0 to 3 with varying meaning. According to the PSQI answer sheet, every component got an index ranging from 0 to 3 and these seven indices were combined to achieve a total score ranging from 0 to 21. A total score of >5 indicated a poor sleep quality. In previous studies, the PSQI achieved an internal consistency of $\alpha = 0.80$.[71] The good internal validity of the PSQI instrument was mirrored in the current sample ($\alpha = 0.86$).

Self-Reported Measure of Emotional Competencies-27-Item Version (SEK-27)

The SEK-27 was developed by Berking and Znoj.[72] According to the competence-oriented model of adaptive emotion regulation by Berking and colleagues,[72,73] it measures nine competencies that are relevant for successful emotion regulation. These are 1) attention, 2) clarity, 3) body awareness, 4) understanding, 5) acceptance, 6) resilience, 7) self-support, 8) confrontation, and 9) regulation, which are summed in a total score. All scales are rated on a five-point Likert scale ranging from 0 = "not at all", to 4 = "(almost) always", with higher scores indicating more emotion regulation competencies. According to Berking and Znoj,[72] internal consistencies ranged from $\alpha = 0.68$ to 0.81 for the subscales and $\alpha = 0.90$ for the total score. Regarding the internal validity, we found a sufficient α of 0.69 in the current sample. Due to low internal consistencies for the subscales ($\alpha = 0.46 - \alpha = 0.51$) in this sample, we focused on the total score of emotion regulation competencies.

Infant Sleep Vignettes Interpretation Scale (ISVIS)

The ISVIS measures parental sleep-related cognitions by presenting fictitious, hypothetical infants and hypothetical situations. The English version of the ISVIS[53] was translated into German via the back-translation method[74] (for the English version, see Sadeh et al.[53]). The ISVIS presents the parent 14 hypothetical case descriptions of infants who display sleep problems, eg, children who have difficulties falling asleep by themselves when going to bed or after awakenings during the night. According to the statement of a focus group discussion and the experience of the authors, the ISVIS could be applied in a sample of parents with young children, because the hypothetical case descriptions refer to children between 6 months and 2 years of age representing the same age group of the children including the sample, parents of older children are expected to carry over their prior expectation when their children were younger of age. Parents rate their agreement with possible interpretations and approaches regarding the child's sleep problem on a 6-point Likert scale (1 = strongly disagree to 6 = strongly agree). These interpretations represent three categories: distress, limits and temperament. First, the distress scale represents assertions of the parental belief that infants experience distress or anxiety upon awakening through the night and parents should therefore directly help or soothe them at night. Secondly, the limits scale represents the parental interpretation of the proposed situation as being overly demanding of the infant and emphasizes the importance of limiting parental involvement at night, focusing on promoting the infant's self-soothing skills without or with a minimum of parental assistance. The third scale rates interpretations and emphasizes the role of the child's temperament in explaining the child's sleep problem, regardless of the parent's behavior. Good internal reliability based on a Cronbach's alpha above 0.90 was found for these scales.[53] Within the current sample, we found a good internal consistency of $\alpha = 0.80$ for the ISVIS – distress and an = 0.89 for the ISVIS – limits scale. As the psychometric characteristics were low for the temperament scale, we excluded this subscale from further analysis.

Data Analysis

All analyses were conducted using IBM SPSS Statistics version 25.[75] Demographic characteristics were displayed using means (M) and standard deviations (SD). Group differences regarding the demographic variables were tested with independent t-tests or with the Mann–

Whitney *U*-test in case of nonparametric data. Differences in perception of infants and toddlers sleep between parents of children with and without sleep problems were assessed with a multivariate analysis of variance (MANOVA). This MANOVA was conducted with the independent variables parental gender and group of child sleep problems (CSHQ-DE <41 vs CSHQ-DE ≥41) and the eight subscales and the total sleep disturbance scale of the CSHQ as dependent variables. To achieve the study objectives, an 2×2×2 analysis of variance (ANOVA) for parental sleep quality (PSQI) and parental emotional competence (SEK-27) and a 2×2×2 MANOVA for sleep-related parental cognitions (ISVIS scales distress and limits) with parental gender, child sleep problems, and child age as independent variables was used. A *p*-value <0.05 was considered to indicate statistical significance.

Preliminarily Requirement Testing

Preliminary exploratory data analysis was performed to test for normal distribution (Shapiro–Wilk test) and homoscedasticity (Levene test). Violation of normal distribution was corrected with bootstrapping with 5000 iterations.[76] Data were checked for outliers (SD ≥3[77]). Regarding the MANOVA testing, we examined additional requirements. Multicollinearity was assumed not to affect the analysis if correlations between dependent variables achieved ($r < 0.80$).[78–80]

As the dependent variables were not normally distributed, we assessed the nonparametric Spearman correlation to test for multicollinearity. For the first MANOVA regarding the child sleep variables, correlations between dependent variables were low ($r < 0.80$) with highest correlation between the score on the bedtime resistance scale and the CSHQ total score ($r = 0.75$), indicating that multicollinearity was not affecting the analysis. For the second MANOVA, the distress and limit-setting scale of the ISVIS were applied, and the correlation between these dependent variables was 0.712. The Mahalanobis distance ($p > 0.001$) was used to check the data for multivariate outliers.[81] Additionally, the output of diagrams was analyzed to assess the linearity of dependent variables. According to Ateş and colleagues,[82] the MANOVA is robust for violation of these requirements, but to verify the results, the nonparametric Mann–Whitney *U*-test was applied afterwards.[83]

Results

The group of parents of children without sleep problems consisted of 94 participants (46% mothers). The group of parents with children suffering from parental reported sleep problems consisted of 102 participants (53% mothers).

Demographic Characteristics

There were statistically significant differences in the age of the children between the groups. The group of children with sleep problems was on average 10 months younger (95% confidence interval (CI) [6.34, 14.34]) than the group of children without sleep problems ($t(160.08) = 5.11$, $p < 0.001$). No group differences were found for the total number of children in the family or parental age. Distribution of percentages of parental education, relationship status, and employment are also given per group in Table 1.

Children's Age Predicted Differences in Child Sleep

According to the analysis of the demographic variables, we decided to include the children's age as an additional independent variable. We conducted the median split method to divide the sample into children younger than or being 26 months and older than 26 months.[84] Splitting the sample according to the child's age in context of children sleep problems is also supported from the developmental perspective. Around the end of the second year of life, children have developed a stable circadian sleep rhythm and the night sleep becomes more robust.[85] Results revealed significant main effects of the child's sleep problems ($F(9, 179) = 84.91$, $p < 0.001$) and age ($F(9, 179) = 5.06$, $p < 0.001$). Neither parental gender nor the interaction terms of the three independent variables had a significant impact on the CSHQ-DE scores (all $p > 0.05$).

Post-hoc univariate ANOVAs were conducted for each of the independent variables; child sleep problem group, age, and every dependent sleep variable. Results showed a statistically significant difference between the groups on all sleep subscale measures (Table 2). Finally, the CSHQ-DE total score in younger children without sleep problems was higher than for older children. In the group with sleep problems, the opposite was true and the CSHQ-DE total score was lower in younger children than in older ones.

Table 1 Demographic Variables and Group Differences Between Children without Sleep Problems (CSHQ-DE <41) and with Sleep Problems (CSHQ-DE ≥41)

Variable		CSHQ-DE <41 N= 94			CSHQ-DE ≥41 N= 102			Group Difference
	Range	M	SD	N (%♀)	M	SD	N (%♀)	
Child age (months)	4–68	33.38	16.02		23.04	11.3		***
Child gender (N/%♀)				28 (30.1)			59 (58)	
Total number of children in the family	0–3	1.0	93		0.87	0.91		n.s
Mother's age (years)	21–47	35.47	5.22		33.26	5.04		n.s
Father's age (years)	24–55	38.02	6.33		36.26	5.43		n.s
Level of Education								
• Without certificate				1 (100)			0 (0)	
• Secondary school and A-level examination				4 (75)			2 (50)	
• Completed vocational training				41 (39)			57 (56.6)	
• Graduate education				45 (51)			40 (55)	
• Missing				3 (66.6)			3 (100)	
Relationship Status								
• Unmarried				2 (50)			1 (100)	
• Unmarried/in partnership				37 (42.1)			53 (50.9)	
• In marriage				51 (55.5)			40 (55)	
• Divorced/in (new) partnership				4 (50)			5 (60)	
• Missing				0 (0)			3 (66.6)	
Status of Employment								
• Full-time				50 (20)			62 (33.9)	
• Part-time				27 (92.6)			23 (78.3)	
• Intended unemployed/parental leave				12 (50)			9 (100)	
• Unemployed				5 (60)			8 (75)	

Notes: Values are group means and standard deviations. Percentages in parental education, relation and employment refer to the cellular N. ***p < 0.001.
Abbreviations: CSHQ-DE, Children Sleep Habits Questionnaire-German; M, mean; N, number; SD, standard deviation.

The Impact of Parental Gender, Child Sleep Problems, and Child Age on Parental Sleep Quality, Emotion Regulation Competencies, and Sleep-Related Cognitions

Analysis of variance (ANOVA) was used for parental sleep quality as well as for parents' emotional competence and a MANOVA was used for parents' sleep-related cognitions Corresponding means and standard deviations are presented in Table 3. The results of the post-hoc tests of the ANOVAs and the MANOVA are displayed in Table 4.

Child Sleep Problems Affects Parental Sleep Quality

The ANOVA revealed no statistically significant effect of parental gender on the parental sleep quality ($p > 0.05$). However, a statistically significant effect of child sleep problems on parental sleep quality was found ($F(1, 183) = 110.01$, $p < 0.001$). The subjectively reported parental sleep quality was significantly lower in the group of parents with children having sleep problems. While there was no main effect of the child's age ($p > 0.05$), the interaction effects of the child's age × parental gender ($F(1, 183) = 5.01$, $p < 0.001$) achieved statistical significance: Fathers with children of all ages experienced a better sleep quality than mothers did. Additionally, the interaction effect of child age × child sleep problems ($F(1, 183) = 11.31$, $p < 0.001$) was statistically significant. Parents of children younger than 26 months reported lower sleep quality than parents of children older than 26 months. Finally, no interaction effects of parental gender × child sleep problems, or parental gender × child sleep problems × child age were reported ($p > 0.05$).

Regarding the parental sleep quality, it seems that neither parental gender nor children's age alone predict a significant difference. Differences between mothers and fathers became initially apparent through consideration of interaction effects of child's age and parental gender or child's sleep problems.

Child Sleep Problems Have Negative Impact on Parental Emotion Regulation

The ANOVA on parental emotion regulation competence displayed no main effect of parental gender or child age on

Table 2 CSHQ-DE Sleep Measures in Children without Sleep Problems (CSHQ-DE ≤41) and with Sleep Problems (CSHQ-DE >41)

	CSHQ-DE ≤41 N= 94				CSHQ-DE >41 N= 102				$F_{Child\ Sleep}$, *df*	$F_{Child\ Age}$, *df*
	Age ≤26 Months		Age >26 Months		Age ≤26 Months		Age >26 Months			
	N=38		N=55		N=68		N=34			
CSHQ Subscale	M	SD	M	SD	M	SD	M	SD	*F*(1, 191)	*F*(1, 191)
Bed. resistance	8.68	1.47	7.95	1.52	12.76	1.99	13.47	2.23	311.95***	0.00
Mann–Whitney *U*									11.08***	−3.23
Sleep ons. delay	1.61	0.59	1.38	0.49	2.21	0.72	2.23	0.72	70.03***	0.25
Mann–Whitney *U*									7.35***	−2.41
Sleep duration	3.45	0.65	3.53	0.76	6.03	1.86	6.68	1.39	200.45***	3.3
Mann–Whitney *U*									9.44***	−1.39
Sleep anxiety	4.00	0.90	3.58	0.79	5.57	1.19	5.68	1.22	135.21***	1.16
Mann–Whitney *U*									9.63***	−3.55
Night wakings,	3.16	0.37	3.11	0.31	6.56	1.84	6.62	1.65	310.70***	0.002
Mann–Whitney *U*									11.45***	−2.97
Parasomnias	7.94	0.69	6.56	0.74	7.94	0.82	7.24	1.26	28.94***	25.77***
Mann–Whitney *U*									6.10***	−6.43***
Sleep-dis. breath.	3.00	0.01	3.02	0.13	3.55	0.69	3.35	0.73	19.63***	0.09
Mann–Whitney *U*									4.57***	−1.36
Daytime sleep.	10.18	1.4	9.53	1.75	13.53	2.25	15.47	2.44	232.34***	4.31*
Mann–Whitney *U*									10.31***	−1.89
CSHQ total	38.45	2.36	36.18	2.67	53.96	6.59	56.97	5.21	632.94***	286.01**
Mann–Whitney *U*									12.06***	−3.61***

Notes: CSHQ-DE subgroups according to the median split method. Values are group means and standard deviations. *p < 0.05, **p < 0.01 ***p < 0.001.
Abbreviations: CSHQ-DE, Children Sleep Habits Questionnaire – German; bed. resistance, bedtime resistance; sleep ons. delay, sleep onset delay; sleep-dis. breath., sleep disordered breathing; daytime sleep., daytime sleepiness; N, number.

Table 3 Parental Sleep Quality, Emotional Competencies, and Sleep-Related Cognitions Clustered by Parental Gender, Child Sleep Problems, and Child Age

Parental Variables	CSHQ ≤41				CSHQ >41			
	Age ≤26 Months		Age >26 Months		Age ≤26 Months		Age >26 Months	
	M	SD	M	SD	M	SD	M	SD
PSQI								
Father	5.32	1.64	4.79	1.73	7.53	2.03	8.20	1.56
Mother	6.40	0.98	4.92	1.41	8.18	2.48	8.26	1.82
SEK-27								
Father	80.77	5.19	79.57	4.10	70.36	7.02	68.21	7.42
Mother	81.67	5.19	80.65	4.16	68.60	8.91	69.53	5.39
ISVIS-Distress								
Father	38.59	4.48	37.32	4.91	40.48	4.81	40.60	3.69
Mother	39.44	3.03	38.89	4.29	57.09	13.06	61.83	10.70
ISVIS-Limits								
Father	63.64	4.17	62.11	3.89	59.21	5.56	58.73	4.14
Mother	60.00	2.73	61.78	4.02	43.40	12.37	40.06	10.59

Notes: CSHQ-DE subgroups according to the median split method. Values are group means (M) and standard deviation (SD).
Abbreviations: CSHQ-DE, Children Sleep Habits Questionnaire – German; PSQI, Pittsburgh Sleep Quality Index; SEK-27, Self-Report Measure of Emotional Competencies-27-item version; ISVIS, Infant Sleep Vignettes Scale.

Table 4 Main Effects and Interaction Effects Between the Independent Variables Parental Gender, Child Sleep Problems, and Child Age on Parental Sleep Quality, Emotional Competencies, and Sleep-Related Cognitions

Outcome Measure (*df*)	$F_{Parental\ Gender}$	$F_{Child\ Sleep}$	$F_{Child\ Age}$	$F_{Child\_Sleep \times Parental\ Gender}$	$F_{Child\_Age \times Parental\ Gender}$	$F_{Child\_Age \times Child\ sleep}$	$F_{Parental\ Gender \times Child\ Sleep \times Child\ Age}$
ANOVA							
PSQI *(1, 191)*							
Univariate *F*	0.69	110.1***	0.51	1.82	5.01**	11.31***	0.33
Mann–Whitney *U*	1.65	8.53***	-2.49*	-	-	-	-
SEK-27 *(1, 192)*							
Univariate *F*	0.16	143.16***	0.80	0.40	**0**.72*	0.67	0.56*
Mann–Whitney *U*	-0.69	93***	2.05*	-	-	-	-
MANOVA							
ISVIS-Distress *(1, 194)*							
Univariate *F*	80.28***	100.80***	0.46	62.17***	1.42	2.21	0.75
Mann–Whitney *U*	5.08***	6.19***	-1.59	-	-	-	-
ISVIS- Limits *(1, 194)*							
Univariate *F*	78.79***	113.34***	0.68	49.65***	0.01	0.88	2.03
Mann–Whitney *U*	-5.47***	-7.06***	1.07	-	-	-	-

Notes: *p < 0.05, **p < 0.01 ***p < 0.001.
Abbreviations: ANOVA, analysis of variance; MANOVA, multivariate analysis of variance; *df*, degrees of freedom; PSQI, Pittsburgh Sleep Quality Index; SEK-27, Self-Report Measure of Emotional Competencies-27-item version; ISVIS, Infant Sleep Vignettes Scale.

parental emotion regulation competence, whereas a main effect of child sleep problems was found ($F(1, 184) = 143.16$, $p < 0.001$). Similar to the results on parental sleep quality, parents in the group of children with sleep problems found that they were less competent to regulate their emotions than parents whose children did not experience problematic sleep. In addition, the interaction effect of child age × parental gender on parental emotion regulation met statistical significance ($F(1, 184) = 0.72$, $p < 0.05$). Fathers of younger children had higher scores of emotion regulation competence than fathers of older children. Finally, the three-way interaction of parental gender × child sleep problems × child age also was statistically significant ($F(1, 184) = 0.56$, $p < 0.05$). Concerning the group of with a CSHQ score ≤ 41, fathers experience higher levels or emotion regulation competencies than mothers for younger and older children. However, fathers of children suffering from sleep problems had higher levels of emotional competence than mothers only in case of their children are younger than 26 months.

Neither the interaction effects of child sleep problems × parental gender nor interaction effect of child age × child sleep problems was statistically significant.

Regarding parental emotion regulation in our sample, parental gender and children's age alone did not induce a significant difference. As with parental sleep quality, differences between mothers and fathers are linked to the interaction effects of childhood and parental gender, as well as the interaction of parental gender, childhood sleep problems and childhood.

Parental Sleep-Related Cognitions Differ Regarding Parental Gender

The results of the MANOVA revealed main effects of parental gender ($F(2, 185) = 44.39$, $p < 0.001$) and child sleep problems ($F(2, 185) = 60.76$, $p < 0.001$) on parental sleep-related cognitions, child age had no main effect. In general, mothers interpreted the night awakenings of their children more often as an indication of their feeling of distress than fathers did. For the limits subscale, the results were reversed: Fathers interpreted nightly demands more often as an indication of limit setting behavior than mothers did. Concerning the sleep problems group differences, parents counted children's nightly demands significantly more as a sign for their distress as they belong to the group of children with sleep problems. In the group of children without sleep problems, the score for the limit setting scale was higher for mothers as well as fathers than in the sleep problem group. There was also an interaction effect of parental gender × child sleep problems ($F(2, 185) = 31.91$, $p < 0.001$) on the parental sleep-related cognitions. It seems that a difference between mothers and fathers exist regarding the perception of the child's distress. Mothers of children in the group of child sleep problems interpret children's demands more often as an indication of distress than fathers do. For the limits scale, fathers

interpreted children's night demands as evidence for the need of parental limit setting. Whereas the means between mothers and fathers in the group without sleep problems showed only small differences, the fathers' scores for the limits scale were remarkably higher than the mothers' scores in the group with child sleep problems. Overall, this supports the hypothesis that mothers and fathers interpret their child's sleep differently, especially when the child has sleep problems.

Discussion

The present study focused on assessing the differences between mothers and fathers regarding 1) perception of their children sleep problems, 2) parental sleep quality, 3) emotion regulation and 4) consequences in sleep-related cognitions in relation to their children's sleep. Regarding the first aim of the study, the findings of the current study suggest that both parents appraise the presence of sleep problems in their child similarly. Furthermore, the results linked to the study aims two to four demonstrated possible associations between children's sleep problems as well as children's age and mothers and fathers sleep quality, emotion regulation and their sleep-related cognitions. The overall group difference of child age was not surprising, as especially the first years of life are characterized by fast changes regarding, eg, emotional,[86] social,[87] cognitive[88] as well as physiological development,[89] which are also found to impacting the development of sleep-wake rhythm.[90] The detected differences between mothers and fathers, as well the interaction effects found are discussed below in detail.

Perception of Sleep Problems

As previous research reported that children's sleep problems affect maternal as well as paternal well-being,[91] this study aimed to respond to the remaining question about parental gender differences in perceiving and evaluating sleep problems of their children. In the current study, we found no statistically significant differences between mothers and fathers regarding the parental perception of their children's sleep problems. On the one hand, this may be a result of the actual involvement of fathers in nighttime care of their children's sleep problems. This possible explanation is in accordance with the assumption of progressive reduction of gender imparity in child caring, with an expanded father's involvement in family life with particular focus on childcare,[92,93] as well as handling children's sleep problems.[68] On the other hand, it might be that fathers are aware of their children's sleep problems and they experience some of the contributing consequences, but they are still not involved in the handling of problematic sleep of their offspring. According to our data in 187 parents gave the information that they share their bed with their partner (PSQI item 10). Consequently, another possible reason may be that fathers also perceive their children's sleep problems through maternal reaction towards them, because mothers and fathers might share a bed and mothers are known to be highly sensitive to their children's sleep problems.[94] As previous studies reported fathers to be less involved than mothers in evening and nocturnal interaction with their children,[15,16] future research should shed light on the association between children's sleep problems and father's handling of and reactions towards them while controlling for the listed possible influencing factors.

Parental Sleep Quality

The current finding of parental sleep quality to be lower in case of their children exceeding the cut-off score for clinically relevant sleep problems is in line with previous studies to the extent, that children's sleep problems have been associated with parental sleep quality.[4,18] Moreover, this study aimed to explore parental gender differences regarding parental sleep quality, and it seems that mere gender was not associated with a significant difference in sleep quality. This gives additional support to the importance of including both parents in developing and conducting interventions for problematic sleep in children.[17] As mentioned earlier, we additionally included the factor of the children's age and it seems that the father's sleep quality was less affected than the mother's, especially in the group of children younger than 26 months, regardless of whether the child had sleep problems. A possible explanation of this finding is that maternal sleep quality is more affected through the antecedent involvement of mothers in young children's nocturnal sleep care.[15,95,96] Regarding the interaction effect between age and children's sleep, the sleep quality of parents with children being younger than 26 months seems to be lower if their children have clinically relevant sleep problems. First years of life are critical in the development of sleep.[85] Most children achieve the superordinate goal of sleeping through the night without interruptions at the end of the first year of life.[5] However, the term "sleeping through the night" is confusing as it is known that sleep proceeds in iterative cycles, which lasts about 45 minutes in infants and toddlers.[85] After every sleep cycle, the individual becomes

nearly awake and it is possible to float to the next cycle or to wake up. Against the background of the sleep cycles, toddlers without sleep problems wake as often as toddlers suffering from sleep problems. But those toddlers with sleep problems need the support and the interaction with their parents to fall asleep again. About 20–30% of the toddlers need this parental support throughout the first years of life,[7,8] and this might explain the reduced sleep quality in the group of toddlers younger than 26 months, because every period of toddlers night sleep support is associated to interruption of parental sleep, which in turn reduces parental sleep quality. Because early sleep problems and resulting negative outcomes for children and their families tend to persist,[97] it is important to react and treat them as early as possible. Taking into account that a score of greater than five for the PSQI demonstrates a poor sleep quality, it must be mentioned that parental sleep quality of both parents is below the cut-off score only in the group of children older than 26 months without sleep problems. Unfortunately, within the present study we did not assess any information on previous sleep problems or their treatment among children or parents. This would be promising for the expanding body of research because of assessing the role of parental gender in knowledge and dissemination of sleep-focused interventions.

Hence, in the clinical context, it is of urgent importance to aim interventions on children's sleep toward mothers and fathers instead of only towards the child. Especially in case of young children, the father should be involved in the night sleep care of their children, because mothers seem to be at higher risk for negative long-term consequences such as depression due to their lower sleep quality during the first years of motherhood.[13] Furthermore, recent research postulated that an increased involvement of fathers in children's sleep care might predict a decrease of parental sleep problems.[95] In addition to this, it is suggested that higher levels of paternal involvement might support the family functioning, as well as the family emotional climate.[98]

Parental Emotion Regulation

Concerning emotion regulation as a concept of parenting,[24] our results are in line with previous findings to the extent, that the presence of parental-reported children's sleep problems predict lower experience of emotion regulation in parents.[16] These results imply that the way parents perceive and experience their child's sleep may contribute to their levels of parental emotion regulation. However, because of the design of the present study, it is impossible to forward any conclusions regarding the direction of these links. Parents perceiving themselves as less competent in regulation of their emotions are potentially also more likely to perceive their child's sleep as problematic; this should be considered in future research. As we additionally examined the interplay between child age and parental gender, our findings suggest that fathers of younger children suffering from sleep problems had higher levels of emotional competence than fathers of older children with sleep problems. One practical explanation of this finding is that, especially in young children, mothers stay in the role of the predominant caregiver.[15] Therefore, just as we found for parental sleep quality, emotion regulation of fathers seems to be less negatively affected in the consequence of children sleep problem.

As mentioned, possible consequences of low levels of emotion regulation in the context of parenting are associated with less approachability towards the child[40] which is associated with dysfunctional parental behavior.[23] This in turn increases the risk for the child's psychological and social development.[29,99] Therefore, the findings highlight the importance of addressing infant and parent sleep problems not only in the framework of pure clinical sleep interventions but in the broader context of daily mother's and father's interactions with their offspring and the emotional pressures associated with children's sleep problems.

Parental Sleep-Related Cognitions

The comparison between parents in their child-sleep-related cognitions revealed remarkable differences. In terms of distress score, mothers tended to agree more often with a distress interpretation of these hypothetical situations from ISVIS than fathers, suggesting that mothers may be more sensitive to the child's signs of distress.[94] Furthermore, congruent to earlier research,[53] mothers tended to have lower ISVIS-Limits interpretation than fathers did. Given hypothetical examples of children with sleep problems, mothers were less likely than fathers to interpret these situations as overreaching children demand and to approve a limit-setting parenting strategy. Our findings are in line with observational research, which suggests that fathers of children with sleep problems might be less sensitive during father–child interactions.[76]

Group comparison also demonstrated interesting differences. On the distress scale, the parents' ratings in the group of children with clinically relevant sleep problems were higher than those of the parents in the control group.

While confronted with hypothetical examples of children's sleep problems, both mothers and fathers of children with sleep problems were more likely than parents of children without sleep problems to interpret children's night-time demands as a sign of discomfort and to consider a comforting approach appropriate. Due to the hypothetical nature of the ISVIS instrument, we cannot make any statements about actual parent–child interactions at night. Our findings are consistent with previous research in those parents of children with sleep problems in particular who tend to use more calming behaviors before bedtime[100] and have difficulty with boundary-setting parenting approaches.[39,43] An additional finding from the analysis of parental gender differences, which indicated that a lower paternal distress, but higher paternal limit ratings were statistically associated with the group of clinical relevant sleep problems, could be considered as part of the discrepancy between mother's and father's idea to respond to their children sleep problems. This discrepancy between parental cognitions may manifest in ambivalent behavior that maintains the children sleep problem.

An important conclusion from the present study refers to the role of the father. As suggested in an observational study,[100] paternal cognitions were found to be independent of maternal cognitions and theses differences become more obvious in case of clinically relevant sleep problems in children. These results highlight the need to continue the inclusion of fathers in developmental and clinical sleep research. As most sleep interventions are based on behavioral advices and extinction of parental involvement during the night, these behavioral approaches leave out the cognitive component in the context of implementation of practical advice, thus future research as well as development of sleep interventions should focus on and include the aspect of parental cognitions.

Limitations

First, the assessment of children's and parents' sleep relied exclusively on subjective parental report, which could have led to bias. Future studies should include additional objective measures such as actigraphy to overcome this shortcoming. Another limiting factor is that children's sleep was assessed by the CSHQ asking for problems during the preceding week and the PSQI asked for the parental sleep quality during the last 4 weeks. This discrepancy may reduce the meaningfulness of the results. Third, although the families were recruited in a nonclinical setting, an additional limitation includes the specificity of the sample, which consisted of primarily highly educated families with both parents working. Regarding the sampling method of the current study, it might be an additional limitation that using sport associations as sampling locations may have led to a majority of non-first-time parents, who may have different perceptions of their child and own sleep. This potential difference was already assessed by a sleep diary study with 111 parents and results indicated that especially experienced mothers of 6-month-old infants perceived themselves to have worse sleep quality than first-time mothers. Interestingly, this association was not detectable in fathers.[101] Thus, future research should focus on potential differences between first-time and experienced parents. Furthermore, we only assessed information of parents in heterosexual relationships, thus contributing data of same-sex parents should be assessed in future research. Additionally, our requirement of participation of both parents may have biased the sample towards families with fathers outstandingly involved in the parenting processes, and therefore more willing to participate in the study. Moreover, residual confounding is possible due to other child factors that we did not capture, such as temperament, and we did not investigate and control for further psychological parental factors such as depression or the general mental health, which might influence parental and child sleep as well as the additional outcomes of emotional competence and infant sleep-related cognitions. As mentioned, an interdependence of child and parental variables can be assumed in the context of children sleep problems[22] and this association per mother and father might be influenced by the other parent. With regard to the current analysis an additional limitation of this study is not controlling for the possible moderating effect of parental pairs on the outcome variables. For example, the associations between children sleep problems and fathers' perception of children sleep or emotion regulation may be influenced by maternal factors as emotion regulation. Other transaction variables as parental workload, relationship satisfaction as well as life worries could have influenced the results of our research. Future research could help to raise awareness and improve understanding of the familial influences on children's sleep by including models controlling for the outcome variables of the other parent.

In general, we decided to publish only the findings of analyses that did not violate the statistical requirements, and we reported our results with correction for multiple testing (Bonferroni), and reported the more conservative nonparametric findings to describe the potential measures for future research. However, findings not meeting the stringent statistical tests should be considered and interpreted with caution. Another concern is that we had

a cross-sectional design, which limits the causal interpretation. Despite these limitations, this study is among the first conducted in Western industrialized countries to identify specific differences in how mothers' and fathers' emotion regulation and cognitions about their children's sleep problems are influenced by their children's sleep. Additionally, we translated the ISVIS instrument into German language in accordance with the back translation method,[74] and therefore it is available for future research regarding children sleep-related cognition in German-speaking regions. Regardless of this strength, further validation processes of the ISVIS instrument are still open for further research. In addition, the families that participated in the study represented well the average population compared to the official statistics of Germany: in 2020, the median age at becoming a parent was 31.5 years for mothers and 34.6 years for fathers, which corresponds to an age of 35.5 for mothers and 38 for fathers when their children in the study population are almost 3 years old.

Conclusion

The present study supports the assumption that children sleep problems do negatively affect mothers' and fathers' sleep quality and emotion regulation. In the current sample, the fathers' sleep quality was better than the mothers' in families with younger and older children, paternal emotion regulation seems to be slightly better in the age group of children younger than 26 months. Regarding the sleep-related cognitions especially in case of child sleep problems, mothers tend to interpret the child's night demands as feelings of distress. Findings suggest it is important to provide both parents with ongoing support to enhance their sleep quality and competence in emotion regulation, and especially mothers' comfort, with setting limits in the context of children's nightly demands. Regarding the practical implications, the results indicate a difference between mothers' and fathers' cognitions regarding their offspring's sleep. Therefore, prevention and intervention programs for children sleep problems should increase sensitivity to include both parents. Moreover, psychoeducation regarding sleep and its positive and negative consequences among mothers as well as fathers might provide faster recognition and a better opportunity for successful treatment of sleep irregularities and therefore prevent chronification and potential psychopathological consequences for children and their families.

Ethical Principles

The authors affirm having followed the ethical guidelines during preparation of this work. According to these guidelines informed consent from the participants was given. Furthermore, to maintain the ethical treatment and with respect for rights of human or animal participants for privacy of participants and their data, participants cannot be identified in reported results or from publicly original archival data.

Disclosure

Professor Schlarb holds the professorship for clinical psychology and psychotherapy for children and adolescents at the Bielefeld University. Professor Jon Genuneit has been the project manager of unrestricted research grants of Danone Nutricia Research to the institutions Ulm University and Leipzig University (both Germany, all grant periods expired) supporting research into various aspects of human milk composition and its effects on child health within two birth cohort studies (Ulm Birth Cohort Study, Ulm SPATZ Health Study). Jon Genuneit receives reimbursement for acting as Associate Editor for *Pediatric Allergy and Immunology* (European Academy of Allergy and Clinical Immunology and John Wiley & Sons). The authors report no other conflicts of interest in this work.

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