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REVIEW ARTICLE

Parental sleep-related practices and sleep in children aged 1–3 years: a systematic review

Georgia Cook[1] | Bernie Carter[2] | Luci Wiggs[1] | Shannon Southam[1]

[1]Centre for Psychological Research, Faculty of Health and Life Sciences, Oxford Brookes University, Oxford, UK

[2]Faculty of Health, Social Care and Medicine, Edge Hill University, Lancashire, UK

Correspondence
Georgia Cook, Centre for Psychological Research, Faculty of Health and Life Sciences, Oxford Brookes University, Gipsy Lane, Oxford, OX3 0BP, UK.
Email: gcook@brookes.ac.uk

Funding information
Oxford Brookes University

Summary

The current systematic review sought to identify the relationship between the range of different parental sleep-related practices that had been explored in relations to child sleep outcomes in children aged 1–3 years. A systematic literature review was carried out in CINAHL, The Cochrane Library, PsycArticles, PsycInfo, PubMed and Web of Science, as well as relevant grey literature in August 2022 using the terms; population (children, aged 1–3 years), exposure (parental sleep-related practice) and outcome (child sleep). Any quantitative study published between 2010 and 2022 that explored the relationship between parental sleep-related practices and the sleep of children aged 1–3 years were included. The Mixed Methods Appraisal Tool was employed to quality appraise included studies and results were narratively synthesised. In all, 16 longitudinal and cross-sectional quantitative studies met inclusion criteria. Parental presence or physical involvement, as well as broader parental practices including using screens or devices at bedtime and night-time breastfeeding were all related to poorer child sleep outcomes. Consistent and relaxing routines, sleeping in a cot, and spending all night in their own sleep location were associated with better child sleep outcomes. Acknowledging the plethora of diverse parental sleep-related practices, which may have varying relationships with child sleep outcomes, could be usefully considered in theoretical models and to inform clinical practice. Issues of definitional and measurement ambiguity are highlighted and discussed.

KEYWORDS
child sleep, parental behaviours, parenting, review

1 | INTRODUCTION

Having enough good quality sleep is essential to health and wellbeing at all ages. Sleep in infants and toddlers is particularly crucial as it likely plays a key role in development (Galland & Mitchell, 2010; Spruyt, 2019). It is proposed that toddlers aged 1–2 years require around 11–14 h of sleep per day with preschool children aged 3–5 years requiring 10–13 h of sleep per day (Hirshkowitz et al., 2015; Paruthi et al., 2016). There are a broad range of potential negative outcomes for children not obtaining sufficient sleep, both for themselves (Matricciani et al., 2019; Spruyt, 2019) and their parents (Bayer et al., 2007; De Stasio et al., 2020; Lam et al., 2003; Martin et al., 2007; Thorne & Skuladottir, 2005; Varma et al., 2020). Such work suggests that inadequate child sleep is associated with impaired cognitive, behavioural, emotional, and physical functioning in parents and children.

Whilst the International Classification of Sleep Disorders (ICSD; American Academy of Sleep Medicine (AASM), 2023; 2014) details

clear criteria for >80 sleep disorders, many published papers in the field of paediatric sleep refer instead to 'sleep problems' (i.e., sleeplessness symptoms that are problematic to the child and/or caregiver) rather than specific sleep disorders. Such sleep problems are commonly behavioural in nature and take the form of difficulties with sleep initiation (getting to sleep) and maintenance (staying asleep and waking too early). Although accurate prevalence data for such sleep problems is hampered by the different definitions used to characterise poor sleep, studies suggest that up to a quarter of children aged <3 years are affected (Byars et al., 2012; Sadeh et al., 2009; Wake et al., 2006).

Theory based models of child sleep (and sleep problems) have emphasised the complex and often bidirectional relationships between influences on child sleep. These factors are commonly understood to include those that are intrinsic to the child (e.g., health or temperament) and extrinsic to the child (parental factors, e.g., psychopathology, cognitions, and parenting behaviours), as well as the broader context (e.g., cultural and environmental) that may influence both parental and child sleep (Beebe, 2008; Karraker, 2008; Sadeh & Anders, 1993). Other reviews have explored broader factors, or a constellation of broader factors, related to child sleep outcomes (Covington et al., 2021; Knappe et al., 2020; Mayne et al., 2021; Newton et al., 2020).

A transactional model of young children's sleep–wake regulation intimates that both intrinsic child and extrinsic parenting factors can influence child sleep and can bi-directionally influence parental–child relationships and behaviours that can also impact child sleep. Parental sleep-related behaviours, which are the methods or strategies parents employ to settle their child to sleep at night and/or if they need to be re-settled after a night awakening, are suggested to have the most direct link to child sleep (Sadeh et al., 2010; Sadeh & Anders, 1993). In addition the model acknowledges that cultural, environmental, and familial factors can also bi-directionally influence aspect of parenting and infant factors (Sadeh & Anders, 1993). Crucially, the transactional model highlights how parenting factors can be influenced directly by the child's sleep, e.g., parents of a child who wakes frequently may be more likely to choose to co-sleep with their child. In addition, intrinsic child factors (e.g., temperament) may influence intrinsic parental factors, parental sleep-related practices, and/or the child's sleep.

Parental sleep-related behaviours employed in early childhood have been associated with both current and future child sleep outcomes (Cronin et al., 2008; Sheridan et al., 2013). A link has consistently been identified between active physical comforting methods and poorer sleep in young children and/or the presence of sleep problems (Adair et al., 1991; Johnson & McMahon, 2008; Mindell et al., 2009a; Mindell et al., 2010a; Morrell & Cortina-Borja, 2002; Sadeh et al., 2009; Tikotzky & Sadeh, 2009; Touchette et al., 2005). It is proposed that because these types of parental bedtime behaviours involve high levels of parental involvement, they do not encourage autonomy (therefore precluding children from developing the ability to self-soothe), which results in the association with poorer child sleep. Conversely, for children with 'good' sleep or no reported child sleep problems (CSPs) parents report being less involved in settling, specifically using lower levels of active physical comforting and/or adopting bedtime behaviours that encourage autonomy in their child (Morrell & Cortina-Borja, 2002; Sadeh et al., 2009; Touchette et al., 2005).

A review of literature published between 1990 and 2009 (Sadeh et al., 2010) sought to examine the empirical evidence for the relationships and mechanisms between child sleep and parenting factors (i.e., parental behaviours, cognitions, emotions, psychopathology, and family relationships) as suggested by a transactional model (Sadeh & Anders, 1993). This review found evidence of the proposed direct link between parental presence or involvement during the night-time period and CSPs; active physical parental involvement was associated with poorer child sleep in the form of sleep problems, night awakenings (frequency and duration), duration and consolidation of sleep. When considering parental sleep-related practices the Sadeh et al. (2010) review focused on parental presence at sleep initiation and settling behaviours and did not consider broader parental sleep-related practices such as bedtime routines or sleep environment. In addition, the Sadeh et al. (2010) review did not consider technological factors, such as screen time, which have become increasingly potentially relevant over recent times. Therefore, the present review seeks to identify the full range of current potential sleep-related practices that may impact children's sleep. It is worth noting that identified relationships between parenting factors and young children's sleep appear to vary across studies and cultures (Jeon et al., 2021; Mindell et al., 2010a). Further, much research in this area has identified associative relationships but causality has not been consistently demonstrated.

Assessment of parental sleep-related behaviours has tended to focus on parental settling methods and asked parents to report the strategies that they most commonly use with their child. The types of settling strategies that parents use have accounted for only 39.1% of the variance in mothers' settling behaviours (Morrell & Cortina-Borja, 2002), suggesting there are other salient factors to be considered, in addition to the types of settling strategies used. For example, use of sleep hygiene recommendations (which includes guidance about parental sleep-related practices beyond 'settling strategies'), which are a set of sleep-conducive behaviours and commonly include maintaining consistent sleep, wake and nap (where appropriate) schedules, carrying out a consistent bedtime routine of calming activities, reducing physiological arousal and a positive and sleep-conducive environment have been linked with child sleep outcomes (Hall & Nethery, 2019). An emphasis on parents' settling strategies alone therefore ignores the potential impact of broader sleep-related parental practices that may also be important in supporting the development of healthy sleep habits. However, identification of exactly what parenting practices have been explored and their relationship to child sleep is currently not clear.

Given the ongoing interest and exploration of the mechanisms underlying children's sleep, it is important to update what is known by undertaking a systematic review of the literature that considers both parental bedtime behaviours and broader parental sleep-related practices. Therefore, the present systematic review aimed to identify the

relationships between any type of parental sleep-related practice and sleep outcomes in children aged 1–3 years.

2 | METHODS

Parental sleep-related practices and CSPs: a systematic review was registered with the International Prospective Register of Systematic Reviews (PROSPERO; CRD42022358691). The original intention had been to explore sleep-related practices in children aged 1–6 years with no time limit on publication dates. However, given the huge variability in types of practices and sleep outcomes identified in eligible studies using this approach and in order to be able to meaningfully synthesise results it was decided to focus on children aged 1–3 years. In addition, given the existence of a review of similar literature up to 2009 (Sadeh et al., 2010) it was decided to focus on more recent literature (2010–2022). Finally, given the range of methodologies in identified studies our approach to risk-of-bias assessment was amended, and a flexible appraisal tool and a subjective narrative assessment method were both employed to assess study quality (full details reported in appraisal of study quality).

A systematic literature review was conducted in August 2022 by G.C. and S.S. (with support of Oxford Brookes University librarian Helen Whittaker). The search strategy was derived from PECO search strategy: Population, Exposure, (Comparator) and Outcomes. The search strategy in full is reported in the search strategy, data extraction and synthesis section below. Publications were considered eligible if they were empirical, quantitative studies (of any study design), written in English and were published during 2010 to 2022 (August). Studies were excluded if they focused on children with comorbid medical, developmental, or psychiatric conditions that could impact upon sleep. Grey literature was sought through a simple keyword search ('child' AND 'sleep' AND 'problem'). Lastly, reference list searches were conducted. The review is reported in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 (Page et al., 2021) reporting guidelines (see Appendix A in Figure A1 for flow diagram and Supplement 2 in Data S2 for reporting checklist).

2.1 | Variables assessed

As there are no widely agreed upon definitions of parental sleep-related practices or CSPs, these key variables were defined in this review as follows:

Parental sleep-related practices were defined as: (i) parental interactions, routines, and bedtime/settling behaviours with the child around the sleep period (i.e., leading up to the bedtime and during the night) and (ii) broader factors used around the sleep period that have been suggested to be associated with sleep, such as screen exposure time and sleep hygiene practices. Studies that assessed general parental practices (e.g., general level of authoritarianism), including those not temporally related to the sleep period (e.g., the amount of daily physical activity parents implemented) were not included.

Sleep outcomes were defined broadly, including CSP difficulties related to the child initiating (i.e., sleep onset latency, bedtime resistance) and maintaining (night wakings or early morning wakings) sleep. Variables such as sleep efficiency, duration and quality are commonly used as global proxy measures of sleep, sleep problems or sleep disturbance and therefore were also included in the definition.

Sleep problems occurring in the context of other clinically diagnosed sleep disorders included in the ICSD (AASM, 2023; 2014) (i.e., sleep-related breathing disorders, disorders of hypersomnolence, parasomnias, and sleep-related movement disorders) were excluded in the present review.

2.2 | Search strategy, data extraction and synthesis

A systematic literature review was conducted primarily through database searching based on the population (children aged 1–3 years), exposure (parental sleep-related practice), comparator (not applicable) and outcome (CSPs) strategy in the following databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), The Cochrane Library, PsycArticles, PsycInfo, PubMed, and Web of Science. Searches were conducted using the search terms: 'Child' AND 'Parent' AND 'Sleep-related practice' and associated relevant synonyms. In addition, Medical Subject Headings (MeSH) terms were also used with key terms referring to population (child), exposure (parent and sleep-related practice) and outcome (sleep outcome). Grey literature and reference list searching was also conducted using relevant terms. See Appendix B for full details of all the search terms and locations, all searches were conducted in August 2022. Any quantitative study published between 2010 and 2022 that explored the relationship between parental sleep-related practices and sleep in children aged 1–3 years was included.

After deduplication, 2961 publications were initially independently screened (title and abstract) by two reviewers (of G.C., B.C., L.W., and S.S.), with discussion as required, after which 2779 were excluded. Thereafter, 182 publications underwent full-text screening by three researchers (G.C., B.C., S.S.). Four full texts were unable to be retrieved. A further 162 studies that did not meet the inclusion criteria were excluded. Reasons for exclusion were wrong age group ($n = 104$), not a full paper ($n = 12$), wrong language ($n = 14$), wrong intervention ($n = 16$), wrong outcomes ($n = 8$), wrong study design ($n = 3$), wrong patient population ($n = 2$), duplicate ($n = 2$), and wrong publication date ($n = 1$). L.W. provided a final consideration of papers where consensus between G.C., B.C. and S.S. could not be achieved.

The data extraction sheet subheadings were devised by G.C. and S.S. before being agreed by the team. The subheadings included reporting on the study design, sample (including demographics), measures, results, and discussion (including recommendations and limitations). The headings were refined as needed after an initial data extraction was completed on a sample of studies by GC. Initial data

TABLE 1 Data extraction table of reviewed papers.

Lead author (year published), country	Aim	Study design	Participant recruitment, number, and inclusion/exclusion criteria	Sample: parent (gender/role, age); child (gender, age)	Parental sleep-related practices, sleep outcomes and definitions	Subjective and objective measures (parent and child)	Statistical analyses conducted for outcomes of interest to review	Statistically significant findings for outcomes of interest to review
Chindamo et al. (2019) Italy	To disentangle the association between new screen-based electronic devices and sleep problems in toddlers, adjusting for other covariates already known to be associated with sleep quality.	Cross-sectional. Questionnaire.	**Recruitment**: participants recruited via 167 primary care paediatricians who administered anonymous questionnaires to consecutively eligible parents seen at children health check-ups. **Inclusion/exclusion**: Parents of children (12–23 months) attending scheduled health check-ups. The following exclusion criteria were adopted: children who did not have at least one parent of Italian nationality; children presenting with acute disease; children with chronic diseases capable of disrupting their circadian rhythm, children being treated with drugs capable of affecting or promoting sleep, children with caregivers unable to complete the survey due to a language barrier.	**Number in sample relevant to review (whole sample)** Parents (n = 1117). **Mother's age mean** 34.3 years (SD 0.31). **Father's age** 37.5 years (SD 0.35). **Child age**: Range 12–23 months; mean 25.3 (SD 0.37). **Child gender**: Male n = 573 (51.3%); female n = 544 (48.7%) (N.B. Numbers differ in table, 572 males, 543 females).	**Parental sleep-related practice** *Falling asleep with parents* *Falling asleep with television (TV) or carton streaming* Falling asleep with milk or other liquid Falling asleep with book or fairy tale No explicit definitions: There were questions about the child's sleeping behaviour: the amount of time spent sleeping at night and during the day and the sleep onset latency. **Sleep outcome** *Total sleep time* *Sleep onset latency* No explicit definitions: a question concerning children's bedtime routines.	**Parental sleep-related practice** ***Subjective*** Question item concerning children's bedtime routines: falling asleep with milk or another liquid; falling asleep with a book or fairy tale; falling asleep with parents; falling asleep with a TV programme, or a cartoon in streaming. **Child sleep** ***Subjective*** Questionnaire (not validated) that collected: child's sleeping behaviour - amount of time sleeping at night and during the day and sleep onset latency.	Chi-square	**Falling asleep with parents** (yes/no) *Significant difference in **total sleep time** (short <11.5 h; 11.6–12 h; long >12 h), no $\chi 2$ value reported, p = 0.005. Yes >12 h = 202 (28.2%), 11.6–12 h = 158 (22.1%), <11.5 h = 356 (49.7%); No: >12 h = 147 (37.3%), 11.6-12 h = 84 (21.3%), <11.5 h = 163 (41.4%). *Significant difference in **sleep onset latency** (≤15 min, 16–30 min, >30 min), no $\chi 2$ value reported, p < 0.001. Yes ≤15 min = 236 (33.0%), 16–30 min = 344 (48.1%), >30 min = 135 (18.9%); No: ≤15 min = 200 (50.8%), 16–30 min = 132 (3.5%), >30 min = 62 (15.7%). **Falling asleep with TV of cartoon streaming** (yes/no) *Significant difference in **sleep onset latency** (≤15 min, 16–30 min, >30 min), no $\chi 2$ value reported, p < 0.001. Yes ≤15 min = 22 (23.4%), 16–30 min = 31(33.0%), >30 min = 41 (43.6%); No: ≤15 min = 414 (40.8%), 16–30 min = 445 (43.9%), >30 min = 155 (15.3%).
Cook et al. (2022) England	To examine the relationships between parental cognitions, sleep-related practices, and bedtime behaviours for parents' own, and their child's sleep in both mothers and fathers.	Cross-sectional. Questionnaire.	**Recruitment** Mothers recruited via social media (Facebook, Twitter), online parenting websites, Oxford Brookes Babylab (database of local parents) and word of mouth. **Inclusion/exclusion**	**Number in sample relevant to review (whole sample)** Parents (n = 88, x44 mother–father dyads), (Mothers (n = 44), fathers (n = 44). **Mothers' age** Range 25–44 years mean 33.34 (SD 4.24).	**Parental sleep hygiene-related practice** *Settling behaviours*: the strategies parents report using when settling and soothing their child to sleep. *Sleep hygiene-related practices*: items were	**Parental sleep-related practice** ***Subjective*** SPAQ-C (adapted Sleep Practices and Attitudes Questionnaire) to assess parental sleep hygiene-related practices.	Binary logistic regression models	**Broad sleep-related practices** **#Maternal sleep hygiene-related practices** were a significant predictor of maternal perception of a **CSP**, B = 0.185, SEB = 0.091, β = 4.09, p = 0.043, β(exp) = 1.20.

TABLE 1 (Continued)

Lead author (year published), country	Aim	Study design	Participant recruitment, number, and inclusion/exclusion criteria	Sample: parent (gender/role, age); child (gender, age)	Parental sleep-related practices, sleep outcomes and definitions	Subjective and objective measures (parent and child)	Statistical analyses conducted for outcomes of interest to review	Statistically significant findings for outcomes of interest to review
			Inclusion criteria were co-habiting heterosexual mother, father, and child triads who lived in the south of England.	**Fathers' age (n = 43 responses)** Range 24–55 years, mean 35.12 (SD 6.17). **Child gender** Male 43.2%; Female 56.8%. **Child age** Range 12–24 months, mean 18.32 (SD 3.83).	classified as representing positive or negative sleep-related behaviours (i.e., those known to be conducive or disruptive to sleep) to provide an overall indication of whether individuals endorsed overall positive or poor sleep-related practices. Any item not directly relevant to an individual's actual practices or that could have been misinterpreted were omitted. **Sleep outcome** Presence of a *child sleeplessness problem*: Do you consider your child's sleep as a problem?	Parental Interactive Bedtime Behaviour Scale (PIBBS) to assess settling and soothing behaviours. **Child sleep** ***Subjective*** Brief Infant Sleep Questionnaire (BISQ) item to assess parental report of a sleep problem.		Increased maternal use of poor sleep-related practices relating to child sleep (represented by higher SPAQ-C scores) predicted mothers perceiving that their child did not have a child sleeplessness problem. **Settling and soothing behaviours#** #Maternal bedtime behaviours were a significant predictor of maternal prediction of a **CSP**, $B = -0.145$, SEB = 0.053, $\beta = 7.48$, $p = 0.006$ β(exp) = 0.865. Increased maternal involvement in settling predicted mothers reporting that their child had a child sleeplessness problem. #Paternal bedtime behaviours were a significant predictor of paternal perception of a **CSP**, $B = 0.086$, SEB = 0.041, $\beta = 4.37$, $p = 0.037$, β(exp) = 0.918. Increased involvement in settling (represented by higher total PIBBS scores) predicted fathers perceiving that their child had a child sleeplessness problem.
Coulombe & Reid, (2014) Canada	To explore night-waking strategy use among a community-based sample of mothers of preschool-aged children.	Cross-sectional. Questionnaire.	**Recruitment** Mothers recruited from variety of community sources in the London, Ontario area (part of a larger study). **Inclusion/exclusion criteria** Having a generally healthy child (2–5 years) who had woken up during the night at least once every	**Number in sample relevant to review (part of whole sample of n = 203)** Mothers (n = 153). **Mothers' age** Mean age (of whole sample) 32 years (SD 5.1). **Child gender (of whole sample)** Male 48%: Female 52%.	**Parental sleep-related practice** *Night-waking Strategies Scale (NSS) subscales: limit setting, active comforting, rewards, punishment, and routines*: we define night-waking strategies as behaviours that parents engage in to help their children sleep through the	**Parental sleep-related practice** ***Subjective*** NSS subscales to assess parental behaviours enacted in response to children's night-waking. **Child sleep** ***Subjective*** Modified Infant Sleep Questionnaire (ISQ) items	Correlations	**Limit setting** *NSS limit-setting subscale at 2 years old significantly negatively correlated with **frequency of waking** ($r = -0.24$, $p < 0.05$). **Active comforting** *NSS active-comforting subscale at 2 years old significantly correlated with **frequency of waking**

(Continues)

TABLE 1 (Continued)

Lead author (year published), country	Aim	Study design	Participant recruitment, number, and inclusion/exclusion criteria	Sample: parent (gender/role, age); child (gender, age)	Parental sleep-related practices, sleep outcomes and definitions	Subjective and objective measures (parent and child)	Statistical analyses conducted for outcomes of interest to review	Statistically significant findings for outcomes of interest to review
			2 weeks during the month prior to study enrolment.	**Child age** Age 2 years ($n = 86$), age 3 years ($n = 67$).	night…Night-waking strategies were defined as sets of conceptually similar parental behaviours enacted in response to children's night-waking. **Sleep outcome** *Frequency of waking*: Parents reported how many nights per week their child woke and how many times per night their child woke and required comforting. *Sleep as problematic*: Mothers rated the extent to which they thought their child had 'sleeping difficulties' Frequency of co-sleeping: One item pertained to… comforting during the night (i.e. taking child into parents' bed or lying with child; 'frequency of co-sleeping').	to assess parental report of children's problems with night-waking (frequency of waking and requiring comfort).		($r = 0.35$, $p < 0.01$). NSS active comforting subscale at 3 years old significantly correlated with **frequency of waking** ($r = 0.38$, $p < 0.01$) and **sleep as problematic** ($r = 0.31$, $p < 0.05$). **Rewards** *NSS rewards subscale at 3 years significantly correlated with **frequency of waking** ($r = 0.27$, $p < 0.05$). NSS rewards subscale at 3 years significantly correlated with **sleep as problematic** ($r = 0.50$, $p < 0.01$). **Punishment** *NSS punishment subscale at 3 years significantly correlated with **frequency of wakings** ($r = 0.24$, $p < 0.05$). Routines *N.B. NSS routines reported as being negatively correlated with mothers of 2-year-olds' perceptions of their child's sleep as problematic in text but not reported as significant in the table (−0.16).
Fiese et al. (2021) USA	To determine whether establishing bedtime routines in the first year of life predicts better sleep outcomes across the first 2 years of life and whether specific adaptive bedtime activities were associated with sleep outcomes and describe changes in adaptive bedtime activities across the first 2 years of life.	Longitudinal. Questionnaire.	**Recruitment** Women recruited from healthcare facilities and birthing classes during third trimester of pregnancy. **Inclusion/exclusion criteria** Exclusion criteria included premature birth (<37 weeks), birth conditions precluding normal feeding, and low birth weight (<2.5 kg).	**Number in sample relevant to review (part of whole sample of $n = 468$)** Mothers 92.7% (12 months postpartum), 89.3% (18 months postpartum), 85.9% (24 months postpartum). **Mothers' age** Not reported. **Child gender** Not reported for specific age groups. **Child age** Range 12–24 months.	**Parental sleep-related practice** *Bedtime routine consistency*: the frequency of the bedtime routine practices, separate by weekdays and weeknights (e.g., go to bed at the same time (within 10 min), get put to bed by the same person, sleep in the same place, and perform the same activities). *Adaptive routine activities*: activities that may happen in the hour before going	**Parental sleep-related practice** ***Subjective*** Bedtime Routine Questionnaire (consistency and adaptive activities sub-scales). Bedtime: sleep items from the National Sleep Foundation Sleep in America Poll screening questionnaire regarding bedtime.	Correlations Cross-lagged models	**Bedtime (as a sleep practice)** *Significant concurrent associations between earlier bedtime and increased **sleep duration** at 12 ($r = -0.52$, $p < 0.001$), 18 ($r = -0.47$, $p < 0.001$) and 24 months ($r = -0.43$, $p < 0.001$). Significant longitudinal relationships between earlier bedtime at 12 months and increased **sleep duration** at 18 ($r = -0.34$, $p < 0.001$) and 24 months ($r = -0.32$,

TABLE 1 (Continued)

Lead author (year published), country	Aim	Study design	Participant recruitment, number, and inclusion/exclusion criteria	Sample: parent (gender/role, age); child (gender, age)	Parental sleep-related practices, sleep outcomes and definitions	Subjective and objective measures (parent and child)	Statistical analyses conducted for outcomes of interest to review	Statistically significant findings for outcomes of interest to review
					to bed (e.g., cuddle with caregiver, read/listen to a story, get tucked in, say prayers). Bedtime: a weighted average of weekday and weekend bedtime was calculated as children's bedtime. **Sleep outcome** *Sleep duration*: Mothers responded to questions about when their children went to bed at night and woke up in the morning on weekdays and weekends. As such, a weighted average of weekday and weekend sleep duration was calculated as children's sleep duration. *Bedtime*: see above 'practice' description. *Night-time waking*: mothers reported on how often their child woke up 'on a typical night in the past 2 weeks'. *Sleep problems*: thinking about your baby's sleep, do you think that he or she has any sleep problems? Sleep latency: sleep latency was measured based on the question 'On a typical night in the past 2 weeks, how many minutes did it take your child to fall asleep, from lights out to being asleep?' and coded in minutes.	**Child sleep** ***Subjective*** Sleep items from the National Sleep Foundation Sleep in America Poll screening questionnaire regarding their child's bedtime and wake time, sleep latency, sleep problem and night-time waking.		$p < 0.001$) and earlier bedtime at 18 months and increased **sleep duration** at 24 months ($r = -0.31$, $p < 0.001$). *Significant concurrent associations between later bedtime and increased **sleep onset latency** at 12 ($r = 0.33$, $p < 0.001$), 18 ($r = 0.26$, $p < 0.001$) and 24 months ($r = 0.27$, $p < 0.001$). Significant longitudinal relationships between later bedtime at 12 months and increased **sleep onset latency** at 18 ($r = 0.19$, $p < 0.001$) and 24 months ($r = 0.16$, $p < 0.05$) and earlier bedtime at 18 months and increased **sleep onset latency** at 24 months ($r = 0.18$, $p < 0.01$). *Significant concurrent associations between later bedtime and more **sleep problems** at 18 ($r = 0.15$, $p < 0.01$) and 24 months ($r = 0.11$, $p < 0.05$). Significant longitudinal relationships between later bedtime at 18 months and more **sleep problems** at 24 months ($r = 0.14$, $p < 0.05$). *Significant concurrent associations between later bedtime and more **night-waking** at 12 ($r = 0.22$, $p < 0.001$), 18 ($r = 0.24$, $p < 0.001$) and 24 months ($r = 0.30$, $p < 0.001$). Significant longitudinal relationships later bedtime at 12 months and more **night-waking** at 18 ($r = 0.19$, $p < 0.001$) and 24 months ($r = 0.20$,

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TABLE 1 (Continued)

Lead author (year published), country	Aim	Study design	Participant recruitment, number, and inclusion/exclusion criteria	Sample: parent (gender/role, age); child (gender, age)	Parental sleep-related practices, sleep outcomes and definitions	Subjective and objective measures (parent and child)	Statistical analyses conducted for outcomes of interest to review	Statistically significant findings for outcomes of interest to review
								$p < 0.001$), as well as later bedtime at 18 months and more **night-waking** at 24 months ($r = 0.25$, $p < 0.001$). **Consistency of bedtime routines** *Significant concurrent associations between consistency of bedtime routines and longer **sleep duration** at 12 ($r = 0.12$, $p < 0.05$), 18 ($r = 0.16$, $p < 0.01$) and 24 months ($r = 0.24$, $p < 0.001$). Significant longitudinal relationship between bedtime routine consistency at 18 months and increased **sleep duration** at 24 months ($r = 0.19$, $p < 0.001$). *Significant concurrent associations between consistency of bedtime routines and earlier **bedtime** at 12 ($r = -32$, $p < 0.001$), 18 ($r = -0.15$, $p < 0.01$) and 24 months ($r = -34$, $p < 0.001$). Significant longitudinal relationship between bedtime routine consistency at 12 months and earlier **bedtime** at 18 ($r = -0.22$, $p < 0.001$) and 24 months ($r = -0.30$, $p < 0.001$), as well as bedtime routine consistency at 18 months and earlier **bedtime** at 24 months ($r = -0.16$, $p < 0.01$). *Significant concurrent associations between bedtime routine consistency and reduced **sleep onset latency** at 12 ($r = -0.12$, $p < 0.05$) and 24 months ($r = -0.16$,

TABLE 1 (Continued)

Lead author (year published), country	Aim	Study design	Participant recruitment, number, and inclusion/exclusion criteria	Sample: parent (gender/role, age); child (gender, age)	Parental sleep-related practices, sleep outcomes and definitions	Subjective and objective measures (parent and child)	Statistical analyses conducted for outcomes of interest to review	Statistically significant findings for outcomes of interest to review
								$p < 0.01$). Significant longitudinal relationship between bedtime routine consistency at 12 months and reduced **sleep onset latency** at 24 months ($r = -0.17$, $p < 0.01$). Significant longitudinal relationship between bedtime routine consistency at 12 months and fewer **sleep problems** ($r = -0.14$, $p < 0.05$) and less **night-waking** ($r = -0.14$, $p < 0.05$) at 18 months. #Cross-lagged model estimates (12-month routine consistency predicting 18-month sleep outcomes): bedtime routine consistency at 12 months of age predicted less **night-time waking** ($\beta = -0.12$, $p < 0.01$) and **sleep problems** at 18 months of age ($\beta = -14$, $p < 0.01$). Within this model, concurrent associations were also identified between bedtime routine consistency and **sleep duration**, at 12 ($\beta = 0.12$, $p < 0.05$), 18 ($\beta = 0.14$, $p < 0.05$), and 24 months ($\beta = 0.16$, $p < 0.01$), as well as **earlier bedtime** at 12 ($\beta = -0.29$, $p < 0.001$) and 24 months ($\beta = -0.21$, $p < 0.001$). **Adaptive routine activities** *Concurrently, more adaptive routine activities were associated with increased **sleep duration** at 12 ($r = 0.16$, $p < 0.01$), 18 ($r = 0.17$, $p < 0.01$) and 24 months ($r = 0.25$, $p < 0.001$). Significant

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TABLE 1 (Continued)

Lead author (year published), country	Aim	Study design	Participant recruitment, number, and inclusion/exclusion criteria	Sample: parent (gender/role, age); child (gender, age)	Parental sleep-related practices, sleep outcomes and definitions	Subjective and objective measures (parent and child)	Statistical analyses conducted for outcomes of interest to review	Statistically significant findings for outcomes of interest to review
								longitudinal relationship between adaptive routine activities at 12 months and increased **sleep duration** at 18 ($r = 0.15$, $p < 0.01$) and 24 months ($r = 0.14$, $p < 0.05$), as well as adaptive activities at 18 months and increased **sleep duration** at 24 months ($r = 0.20$, $p < 0.001$). *Concurrent associations between adaptive activities and earlier **bedtime** at 12 ($r = -0.25$, $p < 0.001$), 18 ($r = -0.16$, $p < 0.01$) and 24 months ($r = -0.31$, $p < 0.001$). Significant longitudinal relationships between adaptive activities and earlier **bedtime** from 12 to 18 ($r = -0.20$, $p < 0.001$), 12 to 24 ($r = -0.24$ $p < 0.001$), and 18 to 24 months ($r = -0.20$, $p < 0.001$). *Concurrent associations between adaptive routine activities and reduced **sleep onset latency** at 18 months ($r = -0.11$, $p < 0.05$). Significant longitudinal relationships between adaptive routine activities and reduced **sleep onset latency** from 12 to 24 ($r = -0.11$, $p < 0.05$) and 18 to 24 months ($r = -0.14$, $p < 0.05$). *Concurrent associations between routine activities and less **night waking** at 12 ($r = -0.11$, $p < 0.05$), 18 ($r = -0.11$, $p < 0.05$) and 24 months ($r = -0.10$, $p < 0.05$). Significant longitudinal

TABLE 1 (Continued)

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								relationships between routine activities at 12 months and reduced **night waking** ($r = -0.11$, $p < 0.05$) and fewer **sleep problems** at 18 months ($r = -0.11$, $p < 0.05$). #Cross-lagged model estimates (12-month adaptive bedtime routine activities predicting 18-month sleep outcomes): adaptive bedtime routine activities at 12 months predicted fewer **sleep problems** at 18 months ($\beta = -0.12$, $p < 0.01$). Within this model, concurrent associations identified between adaptive routine activities and earlier **bedtime** at 12 ($\beta = -0.22$, $p < 0.001$) and 24 months ($\beta = -0.17$, $p < 0.01$), as well as increased **sleep duration** at 24 months ($\beta = 0.24$, $p < 0.001$).
Hall et al. (2012) Canada	To examine sleep and behavioural regulation in toddlers from the perspective of parents and secondary care providers, and examine associations among nap behaviour in daycare, night-time sleep, and children's behaviour.	Cross-sectional. Questionnaire.	**Recruitment** Mothers recruited via daycare facilities. **Inclusion/exclusion criteria** Inclusion required mothers to read and speak English and have a pre-schooler (12–36 months) attending a group daycare a minimum 2 days/week. Exclusion included children with no consistent care provider in a daycare facility, severe developmental delays, or medical conditions.	**Number in sample relevant to review (whole sample)** Mothers ($n = 58$) **Mothers' age** Range 24–51 years, mean 36.1 years (SD 4.5). **Child gender** Male 43%; Female 57%. **Child age** Range 12–36 months, mean 24.7 months (SD 7.04).	**Parental sleep-related practice** *Settling, autonomy*: settling techniques that supported infant autonomy, e.g., leaving the child to cry. *Settling, active*: settling techniques that required active support by parents (cuddling, carrying, stroking, lie with child, settle in parents' bed). **Sleep outcome** *Night wakings*: the number of interrupted nights, the number of awakenings per night, and the average time spent awake, and the duration of waking difficulties. Settling difficulties: the length of time to settle,	**Parental sleep-related practice** **Subjective** PIBBS subscales to assess settling and soothing behaviours (specifically encourage autonomy and active physical). **Child sleep** ***Subjective*** ISQ to determine sleeping behaviour (settling, frequency of night waking, average re-settling time, duration of waking problem, co-sleeping, perception of sleeping difficulties).	Correlations	**Encourage autonomy** *PIBBS autonomy was negatively associated with **night wakings** ($r = -0.29$, $p < 0.05$). **Active physical** *PIBBS active was positively associated with **night wakings** ($r = 0.27$, $p < 0.05$).

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					frequency of settling problems over 1 week and length of time settling problems have occurred.			
Messayke et al. (2020) France	To describe infant sleep characteristics and identify their relationships with sleep habits in a French representative sample of infants aged 1 year.	Cross-sectional. Questionnaire.	**Recruitment** Mothers recruited via random sample of 349 maternity units. **Inclusion/exclusion criteria** Inclusion criteria were infants born after 33 weeks' gestation to mothers aged ≥18 years and who were not planning to move outside of Metropolitan France in the following 3 years and were able to read French, Arabic, Turkish, or English.	**Number in sample relevant to review (whole sample)** Mothers (n = 11,783) **Mothers' age** Mothers' age (at delivery): <25 years (15.2%), 25–29 years (25.6%), 30–34 years (35.1%), >34 years (24.1%). **Child gender** Male 51%; Female 49%. **Child age** 13 months (weighted mean).	**Parental sleep-related practice** *Parental presence when falling asleep* *Feeding to fall asleep* *Non-nutritive sucking (none, pacifier, thumb/finger, or both)* *Sleeping with a blankie* *Sleep arrangement (falls asleep and ends sleep in own bed/crib, falls asleep in own bed/crib but ends it in parent's bed, falls asleep and ends sleep elsewhere than in own bed/crib, sleeping in parents' room)* No explicit definitions: information on sleep environment and habits were collected. **Sleep outcome** *Total sleep duration* (per 24 h): Calculated based on the answers (in hours and minutes) to the following questions: 'On average, what is his/her total sleep time during night?' and 'On average, what is the total duration of his/her day sleep. Add up all his/her naps in 1 day'. *Night waking*: 'on this week, how many nights did your baby wake up (if the infant was sick this week, answer for a week without illness)?' *Sleep onset difficulties*: 'When you put your infant to bed, does he/she have trouble falling asleep; for example, he/she calls or cries for a long time?'	**Parental sleep-related practice** **Subjective** Item questions regarding sleep environment and habits asked are reported (non-validated scales). **Child sleep** ***Subjective*** Item questions regarding sleep onset difficulties, night waking and total sleep duration/24 h (non-validated scales).	Multinomial logistic regression models	**Parental presence when falling asleep** #Parental presence when falling asleep was predictive of **sleep duration**, p = <0.001. Parental presence when falling asleep was more likely with short **sleep duration** (≤12/24 h): OR 1.55 (95% CI 1.35–1.79); and less likely with long **sleep duration** (>14/24 h): OR 0.63 (95% CI 0.55–0.72) when compared with reference group of 13–14/24 h duration. #Parental presence was predictive of **night wakings**, p < 0.001. Parental presence was associated with increased **night wakings**: 1–2 nights per week, OR 1.36 (95% CI 1.19–1.56) and >2 nights/week: OR 1.73, (95% CI 1.49–2.01) when never night waking was the reference group. #Parental presence was predictive of **sleep onset difficulties**, p < 0.001. Parental presence was associated with **sleep onset difficulties** with significant differences between sleep onset difficulties 'sometimes': OR 2.10, (95% CI 1.84–2.39) and 'often': OR 12.02 (95% CI 10.17–14.21) when never having sleep onset difficulties was the reference group.

TABLE 1 (Continued)

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								Feeding to fall asleep #Feeding to fall asleep was predictive of **sleep duration**, $p < 0.001$. Feeding to fall asleep was more likely with short **sleep duration**: OR 1.52, (95% CI 1.27–1.81), when compared with the reference group of 13–14 h sleep duration. #Feeding to fall asleep was predictive of **night wakings**, $p < 0.001$. Being fed to fall asleep was associated with increased **night wakings**. Specifically, 1–2 nights/week: OR 1.50, (95% CI 1.24–1.81) and >2 nights/week: OR 2.04, (95% CI 1.67–2.49) when compared with reference group 'never' night waking. #Feeding to fall asleep was also associated with frequent **sleep onset difficulties**, 'sometimes': OR 1.12 (95% CI 0.93–1.34) or 'often': OR 1.27 (95% CI 1.01–1.590), $p = 0.16$, as compared with never having sleep onset difficulties when compared with reference group 'never' having sleep onset difficulties. **Infant sleep arrangement** #Infant sleep arrangement was predictive of **sleep duration**, $p < 0.001$. Falling asleep in bed/crib and ending the night in their parents' bed was more likely with short **sleep duration**: OR 1.33, (95% CI 1.14–1.54) and less long **sleep duration**: OR 0.78, (95% CI 0.68–

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								0.91) when compared with the reference group 13–14 h. Ending the night elsewhere than in their own bed/crib were more likely with short **sleep duration** (≤ 12 h): OR 1.64 (95% CI 1.35–1.99) and less likely with long **sleep duration** (>14 h): OR 0.68 (95% CI 0.52–0.88) as compared with 13–14 hr sleep duration. **#**Infant sleep arrangement was predictive of **night waking**, $p < 0.001$. Falling asleep in bed/crib and ending it in parents' bed was more frequent with both few (1–2 nights/week): OR 2.02, (95% CI 1.7–2.35) and frequent (>2 nights/week) **night waking**: OR 3.41, (95% CI 2.92–3.99) compared to no night wakes as the reference group. Falling asleep and ending it elsewhere than the infant's cot/bed was associated with only frequent night waking as compared with not waking >2 nights/week: OR 2.22, (95% CI 1.78–2.77). **#**Infant sleep arrangement was predictive of **sleep onset difficulties**, $p < 0.001$. Falling asleep in bed/crib but ending it in the parents' bed was associated with increased risk of **sleep onset difficulties** 'sometimes': OR 1.66, (95% CI 1.44–1.91) and 'often': OR 2.16 (95% CI 1.79–2.60) when compared with the reference group of no sleep onset difficulties.

TABLE 1 (Continued)

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								Falling asleep and ending sleep elsewhere than in the infant's own bed/crib was associated with reduced risk of 'few' **sleep onset difficulties** but increased risk of 'frequent' **sleep onset difficulties** ('sometimes': OR 0.50, [95% CI 0.39–0.64] versus 'often': OR 1.56 [95% CI (1.24–1.97]). **Sleeping in parents' room** #Sleeping in the parents' room was predictive of **night waking**, $p = 0.01$. Sleeping in their parents' room was more likely with frequent (>2 nights/week) **night waking**: OR 1.33 (95% CI 1.13–1.58) when compared with never night waking. **Sleeping with a blankie** #Sleeping with a blankie as predictive of sleep duration, $p = <0.001$. Sleeping with a blankie was less likely with short **sleep duration**: OR 0.73 (95% CI 0.62–0.86) when compared to the reference group '13–14 h' sleep duration. #Sleeping with a blankie was associated with only a 'few' **night wakings** 1–2 nights/week: OR 1.20, (95% CI 1.04–1.38) when compared with >2 nights/week: OR 1.09 (95% CI 0.92–1.29) with the reference group is 'never' night waking, $p = 0.05$. #Sleeping with a blankie was predictive of **sleep onset difficulties**, $p = 0.03$. **Non-nutritive sucking** #Non-nutritive sucking was predictive of **sleep**

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								duration, $p < 0.001$. All non-nutritive sucking before sleep was more likely with long **sleep duration** (pacifier: OR 1.31 [95% CI 1.09–1.58], thumb/finger: OR 1.51 [95% CI 1.25–1.81] or both pacifier and thumb/finger: OR 1.38 [95% CI 1.13–1.68]) with the reference 13–14 h duration. #Non-nutritive sucking was predictive of **night waking**, $p < 0.001$. Sucking a pacifier before sleep were more likely with **night waking** as compared with reference never night waking, 1–2 nights/week: OR 1.32, (95% CI 1.10–1.59) and >2 nights/week: OR 1.39 (95% CI 1.12–1.71). Sucking a pacifier with or without the thumb/finger were more likely with **night waking** with the reference never night waking: 1–2 nights/week: OR 1.48 (95% CI 1.22–1.80) versus >2 nights/week: OR 1.46 (95% CI 1.16–1.83). #Non-nutritive sucking before sleep was predictive of **sleep onset difficulties**, $p < 0.001$. Sucking a pacifier and thumb/finger before sleep was more likely associated with sleep onset difficulties 'sometimes': OR 1.22, (95% CI 1.01–1.47) when compared to the reference group of never having sleep onset difficulties.

TABLE 1 (Continued)

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Miller et al. (2022) USA	To examine whether use of TV at bedtime at 18 months was associated with toddlers' concurrent night-time sleep duration and sleep problems.	Cross-sectional Questionnaire	**Recruitment** Secondary data analysis of the larger Smart Beginnings randomised controlled trial (RCT) with 403 families. Initial recruitment from two postpartum units. **Inclusion/exclusion criteria** The sample was entirely composed of Medicaid-eligible, low-income mothers at both sites, with about a third primiparous (first-time birth).	**Number in sample relevant to review (whole sample)** Mothers ($n = 403$). **Mothers' age** Not reported. **Child gender** Male 50%; Female 50%. **Child age** Mean (at 18 months) 18.97 (SD 1.43).	**Parental sleep-related practice (at 18 months)** *Bedtime TV behaviours*: how many nights each week they used TV as part of getting their child ready for bed (0–7) and dichotomous variable indicating whether TV was used any night as part of getting their child ready for bed (1 = Yes, 0 = No). Parents were also asked additional questions on other forms of media consumption at bedtime, such as tablets or smartphones. **Sleep outcome** *Sleep duration*: primary caregiver reported the total number of hours their child typically slept at night. *Child sleep problems*: Child Behaviour Checklist (CBCL, pre-school) sleep problems subscale (seven items). Parents asked to report how true each item (list of sleep issues) was of their particular child from 0 ('Not True') to 2 ('Very True/Often True').	**Parental sleep-related practice** **Subjective** Questionnaire items regarding bedtime TV watching (not validated scales) **Child sleep** ***Subjective*** Questionnaire items regarding sleep duration (not validated scales). CBCL, pre-school sleep problems subscale (validated) provides parental report of sleep problems.	Correlations Ordinary least squares (OLS) regressions Path analysis	**TV use at bedtime** *At 18 months, significant negative correlation between TV use at bedtime and **total hours of night-time sleep** ($r = -0.22$, $p < 0.001$). Significant positive correlation between TV at bedtime and **sleep problems** ($r = 0.21$, $p < 0.001$). #TV use at bedtime was associated with fewer concurrent **total hours of night-time sleep** ($b = -0.50$, $\beta = -0.15$, $p < 0.01$) and increased **sleep problems** ($b = 1.05$, $\beta = 0.23$, $p < 0.001$) at 18 months. #TV use at bedtime (18 months) related to **sleep problems** (24 months), $\alpha = 1.09$, $p < 0.001$ (in path analysis to determine if TV at bedtime was associated with toddlers' later aggressive behaviour and attention problems at 24 months via total night-time sleep duration and sleep problems at 18 months).
Murthy et al. (2015) India	To describe the sleep patterns and problems in children (12–36 months).	Cross sectional. Questionnaire.	**Recruitment**: Parents recruited via outpatient department and from crèches. 338 children were enrolled from outpatient clinic and 30 children were enrolled from crèches. **Inclusion/exclusion criteria** Inclusion criterion was children (12–36 months). Exclusion criteria were children with chronic illness, developmental	**Number in sample relevant to review (whole sample)** Parents ($n = 368$) **Parents' age** Not reported. **Child gender** Male/female 2:1 (~Male = 67%; Female = 33%). **Child age** Mean age 24.02 months (SD 8.14)	**Parental sleep-related practice** *Presence of a bedtime ritual* *Presence of co-sleeping* No explicit definitions: the questionnaire covered two broad areas of investigation (clinical history and sleep characteristics). **Sleep outcome** Presence of a *sleep problem*: sleep problem for the purpose of study was	**Parental sleep-related practice** ***Subjective*** Child sleep behaviour survey (modified for Indian children). **Child sleep** ***Subjective*** Child sleep behaviour survey (modified for Indian children).	Chi-square Logistic regression model	**Bedtime ritual** *Presence of bedtime ritual was significantly associated with parentally reported CSP, $\chi 2 = 6.833$, $p = 0.009$. N.B. p value inconsistently reported as also reported as $p = 0.005$ elsewhere in the paper: ritual yes/CSP yes = 43 (91.5%), ritual yes/CSP no = 238 (74.1%), ritual no/CSP yes = 4 (8.5%),

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			delay, seizure disorder, and lack of consent.		defined subjectively as parental perception of their child's sleep as problem or not.			ritual no/CSP no = 83 (25.9%). **Co-sleeping** *Significant difference in perception of a CSP based on co-sleeping, $\chi2 = 4.443$, $p = 0.035$: co-sleeping yes/CSP yes = 35 (74.5%), co-sleeping yes/CSP no = 277 (86.3%), co-sleeping no/CSP yes = 12 (25.5%), Co-sleeping no/CSP no = 44 (13.7%). #The odds of **CSP** were increased by almost three times in children who were not co-sleeping, OR 2.98 (95% CI 1.29–6.89), $p = 0.01$. **Same individual puts the child to bed** #There were marginally higher odds of **CSP** if the same caretaker was putting the child to sleep, OR 2.37 (95% CI 0.88–6.37), $p = 0.09$.
Netsi et al. (2017) Brazil	To investigate population-based sleep parameters from infancy to 4 years of life and identify associated sociodemographic factors.	Longitudinal. Questionnaire.	**Recruitment** Mothers recruited via five maternity hospitals. **Inclusion/exclusion criteria** Inclusion criterion was mothers of live births in city of Pelotas. No exclusion criteria noted.	**Number in sample relevant to review (part of whole sample of *n* = 4231)** Mothers ($n = 3842$) **Mothers' age** Not reported. **Child gender** Not reported in paper **Child age** Not reported in paper.	**Parental sleep-related practice** *TV watching at night-time* Sleep arrangement (alone yes/no) No explicit definitions: time spent watching TV at night-time. The top 15% of values were categorised as watching more TV. For TV at night-time this was ≥90 min at 24 months. **Sleep outcome** *Bedtime: parents were asked for the bedtime (hh:min, 'In the last 2 weeks, what time did the child go to bed?').* Wake time: parents were asked for the wake time	**Parental sleep-related practice** **Subjective** Questionnaire items addressing co-sleeping, sleep location, night-time TV watching (not validated). **Child sleep** ***Subjective*** Questionnaire items addressing bed and wake time, naps night waking and sleep disturbances (not validated).	Hierarchical linear regression model	**TV watching at night-time** *TV watching at night-time was associated with later **bedtime** at 24 months ($B = 0.07$, 95% CI 0.01–0.13). N.B. This relationship is reported as $B = 0.05$ (95% CI 0.01–0.10), not significant elsewhere in the paper.

TABLE 1 (Continued)

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					(hh.min, 'What time did the child wake up?'). Night-time sleep duration: these (bedtime and wake time) were used to calculate nighttime sleep duration. Day-time sleep duration: parents were also asked 'In the last 2 weeks, more or less how many times did the child sleep during the day?' and 'How long, more or less did the child sleep each time'. These two variables were used to calculate daytime sleep duration. Total sleep duration: sleep duration over the 24-h period (total sleep duration) was calculated by adding the nighttime and daytime sleep duration variables. Night-time awakenings: parents were asked whether 'in the last 2 weeks the child woke up in the night?', 'How many nights in the last 2 weeks?', and 'How often per night?' (night-time awakenings). Sleep disturbances: sleep disturbances were calculated for 24 months and were intended to indicate behaviours that may increase the risk of future sleep problems. We used the following variables as indicators of potential sleep disturbances (sum of yes/no answers): the child has nightmares/night terrors, the child has restless sleep, child experiences difficulty			

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					going to sleep, child wakes up at night, and child woke up early (bottom 10% of early wakers) (potential total score of 5). Co-sleeping: parents were also asked to report whether the child sleeps in the same bed with someone else.			
Plancoulaine (2015) France	To describe sleep duration in preschool-aged children from a French pre-birth cohort and to investigate gender-specific factors associated with shorter sleep duration.	Longitudinal. Questionnaire.	**Recruitment** Pregnant women with <24 weeks of amenorrhoea were recruited via the university hospitals of Poitiers and Nancy. **Inclusion/exclusion criteria** Inclusion criteria as noted above. Exclusion criteria were multiple pregnancies, known diabetes before pregnancy, illiteracy, and intention to move outside selected regions in the next 3 years.	**Number in sample relevant to review (whole sample at 3 years)** Mothers ($n = 1028$) **Mothers' age** Mothers' age (at birth, 3 years previously) 30 years (SD 4.6). **Child gender** Male ($n = 546$), 53%; Female ($n = 482$), 47%. **Child age** 3 years	**Parental sleep-related practice** *Parental presence when falling asleep* No explicit definition: parental presence when falling asleep was collected through questions on sleeping habits (place, e.g. living room). **Sleep outcome** *Sleep duration*: sleep durations were calculated based on the answers to the following questions: 'Usually, at what time does your child go to bed?', 'Usually, at what time does your child wake up?' and 'Does your child regularly take naps?'; 'If yes, what is their average daily duration of napping?'. Night awakenings: 'Did your child wake up during the night in the last month?'	**Parental sleep-related practice** **Subjective** Questionnaire addressing sleep habit variables (not validated). **Child sleep** ***Subjective*** Questionnaire items addressing sleep duration and night awakenings (not validated).	Logistic regression model	**Parental presence when falling asleep** #Among boys, parental presence when falling asleep (yes = 40% of short sleepers [$n = 10$], No = 18% of short sleepers [$n = 94$]) was a risk factor associated with short **sleep duration** ($n = 104$ short sleepers/ $n = 546$ all sleep lengths): OR 2.84, (95% CI 1.08–7.47), $p = 0.03$. #Among girls, parental presence when falling asleep (yes = 45% of short sleepers [$n = 9$], No = 15.8% [$n = 73$] was a risk factor associated with short **sleep duration** ($n = 82$ short sleepers/ $n = 482$ all sleep lengths): OR 3.89, (95% CI 1.42–10.67), $p = 0.008$.
Prokasky et al. (2019) USA	To examine relations between nightly bedtime routines and sleep outcome measures in toddlers aged 30 months.	Cross-sectional. Questionnaire; Objective.	**Recruitment** Parents recruited from local childcare centres and paediatrician offices, through personal contacts, and the distribution of flyers at child-friendly events and locations.	**Number in sample relevant to review (whole sample)** Parents ($n = 185$), mothers 94.6% **Parents (not reported separately)** **Parents' age** Parents' age 21–46 years, mean 32.13 years (SD 4.67).	**Parental sleep-related practice** *Routine length*: measured in minutes, was calculated as the difference between the parents' reported routine start time and time in bed. *Routine length variability*: measured in minutes, was	**Parental sleep-related practice** **Subjective** Questionnaire addressing bedtime routines (not validated). **Child sleep** **Subjective**	Correlations Regression models Multilevel models	**Routine length** **Subjective sleep measures** *Across weekdays and weekends: longer routines were related to less parent-reported **sleep duration** ($r = -0.15$, $p = 0.04$). On weeknights: Longer routines related to less parent-reported **sleep**

TABLE 1 (Continued)

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			Inclusion/exclusion criteria Inclusion criteria were parents of toddlers (<30 months) and who lived within 1 h of testing site.	**Child gender** Male (n = 99, 54%); Female (n = 86, 46%). **Child age** 30 months.	calculated as the absolute difference between the average routine length across the 14 nights and the routine length for each individual night *Number of total routine activity components*: the total number of bedtime routine activities performed each night. *Deviation from normal bedtime routine*: first a 'normal' routine was identified for each child which included all activities that occurred on at least 10 of the 14 nights. Next, for each night, deviation from the 'normal' routine was calculated such that a score of 1 was added for each bedtime routine activity that occurred and was not part of the normal routine, and for each bedtime routine activity that did not occur and was part of the normal routine. **Sleep outcome** *Sleep duration*: parents recorded their toddler's bedtime each night of the 2-week protocol, as well as the time their toddler woke up the next morning…night wakings the toddler experienced during the 14-day testing period. This information was used to compute a parent-reported measure of nightly sleep duration measured in hours. *Sleep duration (actigraphy)*: the amount of time spent sleeping during the sleep period (measured in	Questionnaire items about bedtime and wake time (not validated). **Objective** Actigraphy.		**duration** (r = −0.18, p = 0.01). #Individual nights: increases in routine length predicted less parent-reported **sleep duration** that night, controlling for all other variables (B = −0.34, SE = 0.06, p < 0.001). **Number of total routine activity components subjective sleep measures** *Across weekdays and weekends: more routine activities were related to more parent-reported **sleep duration** (r = 0.18, p = 0.02). On weeknights: more routine activities related to more parent-reported **sleep duration** (r = 0.19, p = 0.01). #On an individual night: higher total number of routine activities predicted more parent reported **sleep duration** (B = 0.07, SE = 0.02, p < 0.01). **Objective sleep measures** #On an individual night: higher number of total routine activities was related to longer actigraphy **sleep latency** (B = 1.27, SE = 0.41, p < 0.01). N.B. Reported in text that the number of routine activities related to actigraph recorded sleep duration, but significance value not reported in Table. **Routine length variability** **Subjective sleep measures** *Across weekdays and weekends: more variable routine lengths was related to less parent-reported **sleep duration**

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TABLE 1 (Continued)

Lead author (year published), country	Aim	Study design	Participant recruitment, number, and inclusion/exclusion criteria	Sample: parent (gender/role, age); child (gender, age)	Parental sleep-related practices, sleep outcomes and definitions	Subjective and objective measures (parent and child)	Statistical analyses conducted for outcomes of interest to review	Statistically significant findings for outcomes of interest to review
					minutes by the actigraph), spanning from sleep onset (the time the toddler fell asleep as determined by the actigraph algorithm) to sleep offset (the time the toddler woke up as determined by the actigraph algorithm). *Sleep efficiency (actigraphy)*: the percentage of time spent sleeping during the sleep period (from sleep onset to sleep offset as determined by the actigraph algorithm). *Wake minutes (actigraphy)*: the number of minutes spent awake during the sleep period. *Sleep latency (actigraphy)*: the amount of time in minutes from when the parent reported the child in bed to the toddler's sleep onset as determined by the actigraph.			($r = -0.18$, $p = 0.01$). On weeknights: more variable routine lengths related to less parent-reported **sleep duration** ($r = -0.23$, $p = 0.002$). #On an individual night: more variable routine lengths predicted less parent-reported **sleep duration** ($B = -0.46$, SE = 0.08, $p < 0.001$). **Deviation from normal bedtime routine** **Subjective sleep measures** *Across weeknights and weekends: more deviation from the normal bedtime routine was related to less parent-reported **sleep duration** ($r = -0.23$, $p = 0.002$). On weeknights: more deviation from the normal bedtime routine related to less parent-reported **sleep duration** ($r = -0.21$, $p = 0.005$). More deviation from the normal bedtime routine was related to less parent-reported **wake minutes** on weeknights ($r = -0.16$, $p = 0.03$). #On an individual night: normal routine deviation was an individual predictor of parent-reported **sleep duration**, $B = 0.09$, SE = 0.04, $p < 0.05$. **#**An interaction was identified between deviation from the normal routine and time of the week for parent-reported **sleep duration**, NRD × weeknight interaction: $B = -0.09$, SE = 0.03, $p < 0.01$. A

TABLE 1 (Continued)

Lead author (year published), country	Aim	Study design	Participant recruitment, number, and inclusion/exclusion criteria	Sample: parent (gender/role, age); child (gender, age)	Parental sleep-related practices, sleep outcomes and definitions	Subjective and objective measures (parent and child)	Statistical analyses conducted for outcomes of interest to review	Statistically significant findings for outcomes of interest to review
								higher routine deviation on an individual night predicted higher parent-reported **sleep duration** on that night if that night were a weekend ($B = 0.09$, $p < 0.05$). **Objective child sleep measures** #On weeknights: greater deviation from the normal routine predicted greater actigraph-recorded **sleep efficiency** ($B = 1.44$, SE $= 0.71$, $p < 0.05$) and fewer actigraph-recorded **wake minutes** ($B = -9.26$, SE $= 3.99$, $p < 0.05$). **Multiple routine variables (length, variability, routine activity components, and deviation)** **Subjective child sleep measures** #On weeknights, regression model: the four bedtime routine variables were all significant predictors and explained 5%–8% of the variance in parent-reported **sleep duration**. Specifically, longer routines ($B = -0.41$, SE $= 0.18$, $p < 0.05$), more variable routine lengths ($B = -1.00$, SE $= 0.34$, $p < 0.01$), fewer bedtime routine activities ($B = 0.11$, SE $= 0.05$, $p < 0.05$.), and greater deviation from the normal routine ($B = -0.13$, SE $= 0.06$, $p < 0.05$) predicted less parent-reported sleep duration.

(Continues)

TABLE 1 (Continued)

Lead author (year published), country	Aim	Study design	Participant recruitment, number, and inclusion/exclusion criteria	Sample: parent (gender/role, age); child (gender, age)	Parental sleep-related practices, sleep outcomes and definitions	Subjective and objective measures (parent and child)	Statistical analyses conducted for outcomes of interest to review	Statistically significant findings for outcomes of interest to review
Schlarb et al. (2020) Germany	To examine modern strategies to settle infants to sleep, especially the use of apps and other media.	Cross-sectional. Questionnaire.	**Recruitment** Parents recruited via flyers placed in child-related shops and kindergartens; at gymnastics courses for mothers and children; via parenting groups on Facebook and on internet forums and in an article in two local newspapers. **Inclusion/exclusion criteria** Inclusion criterion was infants (aged 12–18 months).	**Number in sample relevant to review (whole sample)** Parents (n = 182), mothers (n = 179, 98.4%); fathers (n = 3, 1.6%). **Parents' age range** Parents' age range 18–54 years Mothers' age range, 68.2% aged 25–34 years. **Child gender** Not reported. **Child age** Range 12–18 months.	**Parental sleep-related practice** *Settling strategies (using broader range of practices than original PIBBS scale and new subscales)*: To assess the strategies parents use to settle their infants to sleep at bedtime and during the night. PIBBS revised to explore a broader range of strategies that parents might use in the evening and during the night to get their child to sleep. Specifically: *Active physical comforting*: e.g., stroke or pat part of child *Encourage autonomy*: e.g., leave to cry. *Use of sleep related apps*: the following new scale were added: apps (e.g., music app). Settle by movement: e.g., walks in pram or buggy. Social comforting: e.g., singing a lullaby. Sounds: e.g., white noise. Passive physical comforting: e.g., stand near cot without picking baby up. **Sleep outcome** *Presence of asleep problem (applying ISQ cut-offs)*: ISQ-R part two asks the parent whether he or she thinks that the child has a sleeping problem. The ISQ-R allows diagnosis of potential sleep problems according to the Richman criteria. According to the Richman criteria, a sleep problem can be diagnosed if its duration is ≥2 months and it occurs ≥5 nights/week.	**Parental sleep-related practice** ***Subjective*** PIBBS-revised (PIBBS-R) – revised and expanded (translated into German) to assess settling strategies. **Child sleep** ***Subjective*** ISQ-revised (ISQ-R) – revised (translated into German) to assess parental report sleep problems. One additional item to assess if the child needed help to fall back to sleep after night waking.	Independent t tests	**Active physical comforting** +Parentally reported **CSP and No CSP** groups differed significantly in terms of active physical comforting at bedtime and at night. The CSP group used more strategies that include active physical comforting such the child, holding the child's hand, and stroking the child, than the No CSP group at bedtime: $t(172) = -3.056$, $p = 0.002$ with a Cohen's d of 0.452; and during the night: $t(146) = -4.811$, $p < 0.001$, $d = 0.737$. **Encourage autonomy** +Parentally reported **CSP and No CSP** groups also differed significantly regarding the use of strategies that encourage the infant's autonomy during the evening and at night, such as giving the child a toy or soother. No CSP group parents used more strategies that encourage autonomy than CSP parents at bedtime, $t(172) = 3.939$, $p < 0.001$, with a Cohen's d of 0.574; and during the night, $t(146) = 2.157$, $p = 0.017$, $d = 0.350$. **Sleep related apps** +Parentally reported **CSP and No CSP** groups differed significantly regarding the use of sleep-related apps at bedtime. Thus, parents of infants with CSP used less apps at bedtime than parents with No CSP infants. Parents of children without sleep problems use more sleep-

TABLE 1 (Continued)

Lead author (year published), country	Aim	Study design	Participant recruitment, number, and inclusion/exclusion criteria	Sample: parent (gender/role, age); child (gender, age)	Parental sleep-related practices, sleep outcomes and definitions	Subjective and objective measures (parent and child)	Statistical analyses conducted for outcomes of interest to review	Statistically significant findings for outcomes of interest to review
					Furthermore, one of the following criteria must be fulfilled: infant needs >30 min to settle, infant wakes ≥3 times/night, duration of night waking is >20 min, and infant sleeps in bed of parents ≥3 times/week because it will not sleep			related apps to settle the infant to sleep. Use of apps at bedtime/sleep problem group, mean = 2.09 (SD 0.362), use of apps at bedtime/no sleep problem group, mean = 2.41 (SD 1.419), t (97.145) = 2.050, $p = 0.043$, $d = 0.306$.
Staples et al. (2015) USA	To examine the role of a regular bedtime routine on the development of sleep in a community sample of young children.	Longitudinal. Questionnaire; Objective.	**Recruitment**: Unclear how the recruitment occurred. **Inclusion/exclusion criteria** Not stated.	**Number in sample relevant to review (whole sample)** Mothers ($n = 87$) at 30 months and ($n = 77$) at 36 months (N.B. number of mothers differ $n = 87$ and $n = 85$ mothers in Table 1) **Mothers' age** Not reported. **Child gender** Male ($n = 37$, 43%); Female ($n = 50$, 57%). **Child age** Range 12–18 months.	**Parental sleep-related practice** *Bedtime routine (adherence)*: before beginning the study, mothers were asked to describe what typically happened prior to their child going to bed. The specific steps were used to create a checklist for each night of the sleep diary, with space for additional steps. The checklist allowed for the distinction between what mothers stated their child's bedtime routine was compared to how that bedtime routine was actually implemented. For the purpose of this study, adherence to a bedtime routine was defined as the average proportion of steps completed over 7 nights. **Sleep outcome** *Night-time sleep (actigraphy)*: the number of night-time sleep minutes, which was the average total number of minutes asleep between night-time sleep onset and morning rise time. *Sleep minutes (actigraphy)*: sleep min/24 h period, defined as the average total number of minutes	**Parental sleep-related practice** ***Subjective*** Sleep diary about bedtime routines (not validated). **Child sleep** ***Objective*** Actigraphy.	Correlation Multiple regression model	**Bedtime routine adherence** *Greater adherence to a bedtime routine was concurrently associated with more actigraphy **nightly sleep** minutes at 36 months ($r = 0.30$, $p < 0.05$). #R1 model: at 36 months, adherence to bedtime routine predicted actigraphy **nightly sleep** minutes ($b = 0.24$, $p < 0.05$, SE = 0.11). #R2 model (controlling longitudinal stability): At 36 months adherence to bedtime routine ($b = 0.33$, $p < 0.01$, SE = 0.11) predicted actigraphy **nightly sleep** minutes.

(Continues)

TABLE 1 (Continued)

Lead author (year published), country	Aim	Study design	Participant recruitment, number, and inclusion/exclusion criteria	Sample: parent (gender/role, age); child (gender, age)	Parental sleep-related practices, sleep outcomes and definitions	Subjective and objective measures (parent and child)	Statistical analyses conducted for outcomes of interest to review	Statistically significant findings for outcomes of interest to review
					asleep between sleep onset and sleep offset for both night and naps. *Number of night-time awakenings*: mothers recorded their child's bedtime routine, bedtime, night-time awakenings, and rise time for 7 consecutive nights at each assessment….Signalled awakenings, the average numbers of awakenings/week.			
Staples et al. (2021) USA	To examine observed measures of screen use during the pre-bedtime period in relation to both actigraphic and parent-reported night-time sleep in young children.	Cross-sectional. Observational; Questionnaire; Objective.	**Recruitment**: Data obtained from a larger study. Original recruitment from two mid-sized Midwestern cities through county birth records, community organisations, and public advertisements. Children included in this study if they participated in a pre-bedtime observation and had actigraphic sleep data. **Inclusion/exclusion criteria** Exclusion (from original sample): if the child had severe developmental delays.	**Number in sample relevant to review (whole sample)** Parents ($n = 474$). **Parents age** Not reported. **Child gender** Male ($n = 257$, 54%; Female ($n = 217$, 46%). **Child age** 30 months of age (within 2 weeks).	**Parental sleep-related practice** *Observed screen use during the pre-bedtime period (observational)*: narrative-style notes supported with a 'screen use dictionary' *Parent-reported screen use during the bedtime routine*: sleep diaries were used to record bedtime routine activities; the exact content of diaries differed between the sites. For the purposes of this study, screen use was coded as 'present' if it was reported on at least 1 night (pre-filled or added). Otherwise, it was coded as 'not present'. **Sleep outcome** *Sleep duration (actigraphy)*: the average of the actigraph variables sleep period (duration from sleep onset to sleep offset) *Sleep timing (actigraphy)*: the average of bedtime (diary), sleep onset (actigraph), and midsleep (actigraph). *Sleep variability (actigraphy)*: the average of night-	**Parental sleep-related practice** **Subjective** Sleep diary (not validated), nightly bedtime routine activities (focus on screen use). **Objective** Researcher observed screen use during the bedtime routine. **Child sleep** **Subjective** Sleep diary (not validated). Children's Sleep Habits Questionnaire (CSHQ; validated), sleep problem item. **Objective** Actigraphy.	Correlation Independent and Welch's *t* tests	**Observed screen use in pre-bedtime routine** *Observed pre-bedtime screen use significantly positively correlated with sleep timing ($r = 0.16$, $p < 0.01$). *Observed pre-bedtime screen use significantly positively correlated with CSHQ sleep problems ($r = 0.13$, $p < 0.05$). +Children observed to use screens during the pre-bedtime period had later sleep timing ($p < 0.001$), and less sleep consolidation ($p < 0.01$) compared to children not observed to use screens during the pre-bedtime period. **Parent-reported screen use in pre-bedtime routine** *Parent-reported pre-bedtime screen use significantly negatively correlated with sleep duration ($r = -0.11$, $p < 0.05$). *Parent-reported pre-bedtime screen use significantly positively correlated with sleep timing ($r = 0.10$, $p < 0.05$).

TABLE 1 (Continued)

Lead author (year published), country	Aim	Study design	Participant recruitment, number, and inclusion/exclusion criteria	Sample: parent (gender/role, age); child (gender, age)	Parental sleep-related practices, sleep outcomes and definitions	Subjective and objective measures (parent and child)	Statistical analyses conducted for outcomes of interest to review	Statistically significant findings for outcomes of interest to review
					to-night standard deviations of sleep onset, bedtime (diary), midsleep, sleep opportunity, sleep period, and total minutes asleep. Sleep activity (actigraphy): the average of (all actigraph) average time awake, variability in minute-to-minute activity level, average number of awakenings lasting ≥5 min, average duration of longest wake episode, and average percentage of active epochs. *Sleep onset latency (actigraphy)*: the average time to fall asleep from caregiver reported bedtime to actigraph-determined sleep onset. *Sleep consolidation (actigraphy)*: the average percentage of sleep/24 -h period that occurred at night. *CSHQ sleep problems*: parent-reported sleep problems were obtained from a modified version of the CSHQ where higher scores reflect more sleep problems			*Parent-reported pre-bedtime screen use significantly positively correlated with sleep variability ($r = 0.12$, $p < 0.05$). *Parent-reported pre-bedtime screen use significantly negatively correlated with sleep onset latency ($r = -0.10$, $p < 0.05$). *Parent-reported pre-bedtime screen use significantly positively correlated with CSHQ sleep problems ($r = 0.15$, $p < 0.01$). +Children whose parents reported screens being used during the child's bedtime routine had shorter sleep duration ($p = 0.04$) and more sleep variability ($p < 0.01$) compared to children without reported screen use during the bedtime routine.
Tikotzky et al. (2022) Israel	To examine the longitudinal links between maternal and infant nocturnal wakefulness by employing a trajectory-based approach, and to assess whether the strength of these links differs as a function of sleep assessment method (actigraphy versus self-report) and sleeping arrangements.	Longitudinal. Questionnaire; Objective.	**Recruitment** Parents via prenatal courses and announcements on internet forums for expectant parents. **Inclusion/exclusion** Inclusion criteria included two-parent families with a singleton pregnancy and a healthy infant born at term (>37 weeks). Exclusion criteria (post hoc) included infant or maternal	**Number in sample relevant to review (part of whole sample of $n = 216$)** Parents at 12 months ($n = 155$, at 18 months ($n = 135$). **Mothers' age (at start of study)** Mothers' age: 28.98 years (SD 3.23). **Fathers' age (at start of study)** Fathers' age 31.94 years (SD 7.23).	**Parental sleep-related practice** *Night-time breastfeeding*: mother indicates how often she breastfeeds during the night. *Infant sleep arrangement (room sharing/solitary sleeping)*: mothers were asked to indicate where their infant sleeps during the night; (a) Infant crib in a separate room (solitary-sleeping); (b) Infant crib in	**Parental sleep-related practice** **Subjective** BISQ, sleep location and night-time breastfeeding items. **Child sleep** ***Subjective*** Sleep diary to assess night wakings and wake after sleep onset. ***Objective*** Actigraphy	Correlations	**Night-time breastfeeding** **Subjective child sleep measures** *Night-time breastfeeding was significantly associated with parent-reported **night wakings** at 12 months ($r = 0.37$, $p < 0.001$) and parent-reported **wake after sleep onset** at 12 months ($r = 0.21$, $p < 0.05$).

(Continues)

TABLE 1 (Continued)

Lead author (year published), country	Aim	Study design	Participant recruitment, number, and inclusion/exclusion criteria	Sample: parent (gender/role, age); child (gender, age)	Parental sleep-related practices, sleep outcomes and definitions	Subjective and objective measures (parent and child)	Statistical analyses conducted for outcomes of interest to review	Statistically significant findings for outcomes of interest to review
			breathing-related problems.	**Child gender** Male, 50.5%; Female, 49.5%. **Child age** Range 12–18 months	the parent's room (room-sharing); (c) Parents' bed. **Sleep outcome** *Night waking (actigraphy)*: number of night-wakings that last for ≥5 min (5 min is a frequently used interval to identify meaningful awakenings and reduce recording false-positive awakenings, which are more likely with shorter intervals. *Night waking*: number of night-wakings of any length. *Wake after sleep onset (actigraphy)*: minutes awake during the night after sleep onset. *Wake after sleep onset*: minutes awake during the night after sleep onset.			**Objective child sleep measures** *Night-time breastfeeding was significantly associated with actigraphy **night wakings** at 12 ($r = 0.23$, $p < 0.005$) and 18 months ($r = 0.20$, $p < 0.005$).
Williamson et al. (2019) Australia, Canada, New Zealand, UK, USA.	To examine whether sleeping in a crib or a bed (in a separate room) was associated with variation in caregiver-perceived sleep outcomes in toddlers (aged 18–36 months) from Western countries.	Cross-sectional. Questionnaire.	**Recruitment** Caregivers of toddlers (aged 18.0–35.9 months) recruited via a prompt in the Bedtime® app. **Inclusion/exclusion** Inclusion criteria as above and whose child was sleeping in a separate room from the caregivers, in either a crib or a bed.	**Number in sample relevant to review (whole sample)** Caregivers ($n = 1983$). **Caregivers** Mothers (85.0%), other caregivers (9.5%), fathers (3.0%), grandparents (1.4%), and guardians, babysitters, or nannies (1.1%). **Caregivers' age** Not reported. **Child gender** Male, 51.7%; Female, 48.3%. **Child age** Range 18.0–35.9 months; mean 25.3 years (SD 4.98).	**Parental sleep-related practice** *Sleep location (Crib/bed sleeping)* *Parental presence* No explicit definitions: items related to bedtime practices and caregiver behaviours. Toddler and caregiver behaviours at bedtime and during night awakenings, and aspects of the sleep environment (e.g., sleep location and space). **Sleep outcome** *Bedtime* *Sleep onset latency* *Stretches of time asleep* *Night-time sleep duration* *Number of night wakings*	**Parental sleep-related practice** ***Subjective*** BISQ – expanded; bedtime practices and caregiver behaviours items. **Child sleep** ***Subjective*** BISQ - expanded; night-time sleep and problematic sleep items.	Analysis of covariance (ANCOVA) Logistic regression model	**Sleep location** #Toddlers sleeping in a crib as opposed to a bed were significantly more likely to have earlier **bedtimes** ($F = 16.13$, $p < 0.001$, $n^2 = 0.009$), by ~12 min overall ($p < 0.001$). When considered by age group, sleeping in a cot resulted in an earlier bedtime of 16 min for 18.0–23.9 month olds, 11 min for 24.0–29.9 month olds, and 13 min for 30.0–35.9 month olds. #Toddlers sleeping in a crib were also more likely to have a shorter **sleep onset latency** ($F = 18.21$, $p < 0.001$, $n^2 = 0.009$) compared to those sleeping in a bed across

TABLE 1 (Continued)

Lead author (year published), country	Aim	Study design	Participant recruitment, number, and inclusion/exclusion criteria	Sample: parent (gender/role, age); child (gender, age)	Parental sleep-related practices, sleep outcomes and definitions	Subjective and objective measures (parent and child)	Statistical analyses conducted for outcomes of interest to review	Statistically significant findings for outcomes of interest to review
					No explicit definitions: questions related to night-time sleep patterns *Bedtime resistance*: Caregivers also rated the extent of toddler resistance at bedtime (bedtime difficulty, rated from very easy to very difficult). Dichotomised, so that bedtime resistance reflected a somewhat to very difficult bedtime. *Presence of sleep problems*: Caregivers also rated toddler sleep problems (rated from no problem to severe problem). Dichotomised, so that sleep problems reflected a small to severe sleep problem.			age groups, by ∼9 min overall ($p < 0.001$). The difference in sleep onset latency for cot versus bed sleeping children was 10 min for 18.0–23.9 months olds, 8 min for 24.0–29.9 month olds, and 7 min for 30.0–35.9 months olds. #Across age groups, toddlers sleeping in a crib had significantly fewer **night awakenings** compared to those sleeping in a bed ($F = 9.26$, $p = 0.002$, $n^2 = 0.005$). Compared to bed sleeping toddlers those sleeping in cribs had reduced number of night wakings: 0.19 fewer at age 18–23.9 months, 0.13 fewer at age 24–29.9 months, and 0.32 fewer at age 30–35.9 months. #Crib sleeping toddlers had longer **stretches of time asleep** overnight ($F = 20.54$, $p < 0.001$, $n^2 = 0.011$), by ∼43 min overall ($p < 0.001$). By age group, cot-sleeping 18.0–23.9 month olds had longer stretches of time asleep by ∼58 min, whilst 24.0–29.9 month olds had longer stretches of overnight sleep by 38 min, and 30.0–35.9 month olds had 55 min longer stretches of sleep than bed-sleeping toddlers. #Toddlers sleeping in a crib had a longer **night-time sleep duration** overall ($F = 30.22$, $p < 0.001$, $n^2 = 0.016$), by ∼29 min ($p < 0.001$). By age, night-

(Continues)

TABLE 1 (Continued)

Lead author (year published), country	Aim	Study design	Participant recruitment, number, and inclusion/exclusion criteria	Sample: parent (gender/role, age); child (gender, age)	Parental sleep-related practices, sleep outcomes and definitions	Subjective and objective measures (parent and child)	Statistical analyses conducted for outcomes of interest to review	Statistically significant findings for outcomes of interest to review
								time sleep duration was longer for cot than bed sleeping toddlers by; 37 min (18.0–23.9 month olds), 25 min (24.0–29.9 month olds), and 32 min (30.0–35.9 month olds). **Parental presence** *Across sleep spaces, parental presence was associated as expected with sleep outcomes, $p < 0.001$. N.B. No detail reported in paper relating to what sleep outcomes these were. **Sleep location** #Caregivers of toddlers sleeping in a crib were significantly less likely to report **bedtime resistance**: OR 0.42 (95% CI 0.31–0.56), $p < 0.001$ and **sleep problems**: OR 0.65 (95% CI (0.49–0.87), $p = 0.004$.

Note: Variables in italics are those with significant results. Unless otherwise reported variables are parent report. Child sleep problem (CSP). Relationship type between parental sleep-related practice and sleep outcome: *associations, # predictions, + Group differences. Statistical test abbreviations: Mean (*M*), standard deviation (SD), correlations (*r*), chi-square (*χ2*), Wald chi-square (Wald *χ*2), *t* test (*t*), analysis of variance (ANOVA; *F*), eta-squared (n^2), regression (*F*), degrees of freedom (df), unstandardised coefficient (*B* and standard error [SE] *B*), standardised coefficients (β and β exp), magnitude of relationship between independent variable in mediator in path analysis (α), odds ratio (OR), confidence interval (CI), Cohen's *d* (*d*), significance value (*p*).

extraction from the 16 studies was conducted by one of the three researchers (G.C., B.C., and S.S.). The extracted data were then independently checked by another researcher (G.C., B.C., and S.S.), final checks were made by L.W. Data are reported in the review as they were presented in the original paper, where there was missing data or a discrepancy identified, corresponding authors were emailed for further information or clarification (full details are noted in the data extraction sheet). The data were then condensed by B.C. and further collated and summarised by G.C., with discussion among all members of the team to produce a final summary (see Table 1 for final data extraction and Supplementary Material for additional supporting material about individual paper limitations and recommendations). Narrative synthesis was adopted to report the results, this approach allowed data on a diverse range of studies (including wide range of sleep-related practices and sleep outcomes) to be summarised and explained.

2.3 | Appraisal of study quality

Given the final sample of included papers represented a range of study designs and methodologies there was no ideal single risk of bias or quality assessment tool that allowed adequate assessment of all study designs. However, the team felt it crucial to provide an appraisal of study quality. The Mixed Methods Appraisal Tool (MMAT) version 2018 (Hong et al., 2018) is a flexible appraisal tool that allows quality appraisal of empirical studies that have used a variety of methodologies (qualitative, quantitative randomised controlled trials [RCTs], quantitative non-randomised, quantitative descriptive and mixed methods). The standardised MMAT guidelines were employed to review and appraise the methodological quality of the studies (Table 2). As there is no agreed cut-off value for acceptable complete outcome set, for Question 3 of the MMAT the team agreed if 75%+ of outcome data were reported this represented a complete outcome data set. All studies were reviewed using the quantitative non-randomised studies category.

Given the wide variety of variables (practices and sleep outcomes), study designs and analysis methods it was not appropriate to formally quantify the quality of individual studies. However, the authors felt it important to provide an overview of the quality of studies and especially to highlight areas where evidence should perhaps be viewed with caution. Therefore, the authors conducted a subjective narrative assessment of the body of evidence reported according to the type of sleep-related practice taking broadly into account the sample, definitions of key constructs, measures, analysis method and reporting (Table 3). This allows the following narrative synthesis to be read taking into account both the MMAT and the subjective quality appraisal.

3 | RESULTS

The results section firstly presents an overview of the characteristics of the included studies followed by the relationship between parental sleep-related practices and child sleep. The findings are organised by parental sleep-related practice type.

3.1 | Overview of included studies

In total, 16 papers were included in the review (Chindamo et al., 2019; Cook et al., 2022; Coulombe & Reid, 2014; Fiese et al., 2021; Hall et al., 2012; Messayke et al., 2020; Miller et al., 2022; Murthy et al., 2015; Netsi et al., 2017; Plancoulaine et al., 2015; Prokasky et al., 2019; Schlarb et al., 2020; Staples et al., 2015; Staples et al., 2021; Tikotzky et al., 2022; Williamson et al., 2019). The range of publication dates spans 2012 (Hall et al., 2012) to 2022 (Cook et al., 2022; Tikotzky et al., 2022); 10 papers were published 2019–2022 (Chindamo et al., 2019; Cook et al., 2022; Fiese et al., 2021; Messayke et al., 2020; Miller et al., 2022; Prokasky et al., 2019; Schlarb et al., 2020; Staples et al., 2021; Tikotzky et al., 2022; Williamson et al., 2019).

Data are reported for studies undertaken in USA (five studies) (Fiese et al., 2021; Miller et al., 2022; Prokasky et al., 2019; Staples et al., 2015; Staples et al., 2021), Canada (two) (Coulombe & Reid, 2014; Hall et al., 2012), France (two) (Messayke et al., 2020; Plancoulaine et al., 2015), and one each in Brazil (Netsi et al., 2017), England (Cook et al., 2022), Germany (Schlarb et al., 2020), India (Murthy et al., 2015), Israel (Tikotzky et al., 2022), and Italy (Chindamo et al., 2019). One study was undertaken in multiple countries (Williamson et al., 2019).

3.2 | Study quality

It should be noted that the quality review focused solely on those aspects of the studies that were relevant to our review question. In all, 10 studies (62.5%) were limited by incomplete or poor reporting of the representativeness of the population (Cook et al., 2022; Fiese et al., 2021; Hall et al., 2012; Miller et al., 2022; Plancoulaine et al., 2015; Prokasky et al., 2019; Schlarb et al., 2020; Staples et al., 2021; Staples et al., 2015; Williamson et al., 2019) and six (37.5%) by incomplete or poor reporting relating to the extent of complete outcome data (Chindamo et al., 2019; Cook et al., 2022; Fiese et al., 2021; Prokasky et al., 2019; Schlarb et al., 2020; Williamson et al., 2019). In all but one case (6.2%) (Murthy et al., 2015), measures used were clearly appropriate and in 10 (62.5%) of the studies confounders of some type were accounted for (Chindamo et al., 2019; Fiese et al., 2021; Messayke et al., 2020; Miller et al., 2022; Murthy et al., 2015; Netsi et al., 2017; Plancoulaine et al., 2015; Prokasky et al., 2019; Staples et al., 2015; Tikotzky et al., 2022). In all studies, the exposure occurred as intended across the study. Full details of the individual papers and their quality based on the MMAT is reported in Table 2. However, the complexity of the area and extent of possible confounders may explain some poor reporting. It is important to note that whilst the MMAT quality criteria for quantitative non-randomised studies could be applied to the studies included in the present review, many were not intervention based studies designed to assess specific interventions but were exploring impact

TABLE 2 Mixed Methods Appraisal Tool (MMAT) summary of reviewed papers.

	Screening questions		3. Non-randomised studies					
Reference	S1. Are there clear research questions/ aims/purpose/ hypothesis?	S2. Do the collected data allow to address the research questions?	3.1. Are the participants representative of the target population?	3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?	3.3. Are there complete outcome data?	3.4. Are the confounders accounted for in the design and analysis?	3.5. During the study period, is the intervention administered (or exposure occurred) as intended?	Comments
Chindamo et al., 2019	Yes	Yes	Yes	Yes	Cannot tell	Yes	Yes	
Cook et al., 2022	Yes	Yes	Cannot tell	Yes	Cannot tell	No	Yes	
Coulombe & Reid, 2014	Yes	Yes	Yes	Yes	Yes	No	Yes	
Fiese et al., 2021	Yes	Yes	Cannot tell	Yes	Cannot tell	Yes	Yes	
Hall et al., 2012	Yes	Yes	Cannot tell	Yes	Yes	No	Yes	
Messayke et al., 2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Miller et al., 2022	Yes	Yes	Cannot tell	Yes	Yes	Yes	Yes	
Murthy et al., 2015	Yes	Yes	Yes	Cannot tell	Yes	Yes	Yes	
Netsi et al., 2017	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Plancoulaine et al., 2015	Yes	Yes	Cannot tell	Yes	Yes	Yes	Yes	
Prokasky et al., 2019	Yes	Yes	Cannot tell	Yes	Cannot tell	Yes	Yes	
Schlarb et al., 2020	Yes	Yes	Cannot tell	Yes	Cannot tell	No	Yes	
Staples et al., 2015	Yes	Yes	Cannot tell	Yes	Yes	Yes	Yes	
Staples et al., 2021	Yes	Yes	Cannot tell	Yes	Yes	No	Yes	
Tikotzky et al., 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Williamson et al., 2019	Yes	Yes	Cannot tell	Yes	Cannot tell	No	Yes	

TABLE 3 Subjective quality assessment of reviewed papers.

Practice	Relevant papers	Assessment of evidence base	Summary rationale (for why findings should be interpreted with caution)
Settling behaviour			
Parental presence at sleep onset	Chindamo et al., 2019 Messayke et al., 2020 Plancoulaine et al., 2015	Overall sound	• All studies only used subjective measures and provided limited definitions relating to practices (Messayke et al., 2020; Plancoulaine et al., 2015) or all of the practice and sleep outcome constructs employed (Chindamo et al., 2019). • Most studies were cross-sectional design (Chindamo et al., 2019; Messayke et al., 2020) and one only statistically explored associative relationships (Chindamo et al., 2019). • All evidence is based on data collected from European samples only (Chindamo et al., 2019; Messayke et al., 2020; Plancoulaine et al., 2015).
Parental presence at sleep onset	Chindamo et al., 2019 Messayke et al., 2020 Plancoulaine et al., 2015	Overall sound	• All studies only using subjective measures and providing limited definitions relating to practices (Messayke et al., 2020; Plancoulaine et al., 2015) or all of the practice and sleep outcome constructs employed (Chindamo et al., 2019). • The majority of studies were cross-sectional in design (Chindamo et al., 2019; Messayke et al., 2020) and one only statistically explored associative relationships (Chindamo et al., 2019). • All evidence is based on data collected from European samples only (Chindamo et al., 2019; Messayke et al., 2020; Plancoulaine et al., 2015).
Parental involvement (bedtime and night waking)	Cook et al., 2022 Coulombe & Reid, 2014 Hall et al., 2012 Schlarb et al., 2020	Overall sound	• All studies employed a cross-sectional design and used only subjective measures (Cook et al., 2022; Coulombe & Reid, 2014; Hall et al., 2012; Schlarb et al., 2020). • One study also only exploratory (Cook et al., 2022). • Two studies only statistically explored associative relationships (Coulombe & Reid, 2014; Hall et al., 2012). • All evidence is based on data collected from Western samples only (UK, Canada x2 and Germany).
Feeding to sleep	Messayke et al., 2020	Limited	• Evidence comes from only one study. • Study used only subjective measures and provided limited definitions relating to practices. • All evidence is based on data collected from a French sample of children aged 13 months.
Use of non-parental aids	Chindamo et al., 2019 Messayke et al., 2020	Overall sound	• All studies used only subjective measures and provided limited definitions relating to practices (Messayke et al., 2020) or all of the practice and sleep outcome constructs employed (Chindamo et al., 2019). • All studies employed a cross sectional design (Chindamo et al., 2019; Messayke et al., 2020) • One study only statistically explored associative relationships (Chindamo et al., 2019). • All evidence is based on data collected from European samples only (Chindamo et al., 2019; Messayke et al., 2020).
Bedtime routines			
Presence of routine	Murthy et al., 2015	Limited	• Evidence comes from only one study with a cross-sectional design. • Study used only subjective measures and provided limited definitions relating to practices. • It is not clear if measures used are appropriate. • All evidence is based on data collected from an Indian sample and the children were predominantly male.
Consistency of routine use	Fiese et al., 2021 Prokasky et al., 2019 Staples et al., 2015	Overall sound	• One study using only subjective measures (Fiese et al., 2021). • One study employed a cross sectional design (Prokasky et al., 2019).
Type of bedtime routine activities	Fiese et al., 2021	Limited	• Evidence comes from only one study. • Study used only subjective measures • All evidence is based on data collected from a USA sample and in the context of this review is only representative of children aged 1–2 years.

(Continues)

TABLE 3 (Continued)

Practice	Relevant papers	Assessment of evidence base	Summary rationale (for why findings should be interpreted with caution)
Routine length and consistency of routine length	Prokasky et al., 2019	Limited	• Evidence comes from only one study. • Study employed a cross sectional design. • All evidence is based on data from a USA sample and is only representative of children aged 2.5 years (30 months).
Routine variables (multiple)	Prokasky et al., 2019	Limited	• Evidence comes from only one study. • Study employed a cross sectional design. • All evidence is based on data from a USA sample and is only representative of children aged 2.5 years.
Bedtime	Fiese et al., 2021	Limited	• Evidence comes from only one study. • Study used only subjective measures. • All evidence is based on data collected from a USA sample and in the context of this review is only representative of children aged 1–2 years.
Sleep location			
Sleeping in a bet or cot	Williamson et al., 2019	Limited	• Evidence comes from only one study. • Study used only subjective measures and provided limited definitions of some practice and sleep outcome constructs. • All evidence is based on data collected from Western countries only (although parents from multiple countries included) and data are only representative of children aged 1.5–3 years.
Change in sleep location overnight	Messayke et al., 2020	Limited	• Evidence comes from only one study. • Study used only subjective measures and provided limited definitions relating to practices. • All evidence is based on data collected from a French sample of children aged 13 months.
Sleeping in parents' room	Messayke et al., 2020	Limited	• Evidence comes from only one study. • Study used only subjective measures and provided limited definitions relating to practices. • All evidence is based on data collected from a French sample of children aged 13 months.
Independent sleeping	Murthy et al., 2015	Limited	• Evidence comes from only one study. • Study used only subjective measures and provided limited definitions relating to practices. • It is not clear if measures used are appropriate. • All evidence is based on data collected from an Indian sample and the children were predominantly male.
Screen time	Miller et al., 2022 Staples et al., 2021 Netsi et al., 2017	Overall sound	• Two studies used only subjective measures and one provided limited clarity in definitions relating to practices. • Lack of detail reported about parental demographics
Breastfeeding	Tikotzky et al., 2022	Limited	• Evidence comes from only one study. • Study only statistically explored associative relationships. • All evidence is based on data collected from an Israeli sample of children aged 1–1.5 years.
Sleep hygiene practices	Cook et al., 2022	Limited	• Evidence comes from only one study. • Study was an exploratory cross-sectional design. • Study used only subjective measures. • Evidence is based on data collected from a UK sample of children aged 1–2 years.
Sleep-related apps	Schlarb et al., 2020	Limited	• Evidence comes from only one study. • Study was cross sectional design. • Study used only subjective measures.

of exposure to various different parental sleep-related practices, which again may account for some of the apparent incomplete or poor reporting highlighted.

As indicated in MMAT three studies (Messayke et al., 2020; Netsi et al., 2017; Tikotzky et al., 2022) met all quality criteria in the current review. However, it is important to consider the evidence based

across the different practices in context. Based on the subjective narrative assessment of the evidence quality, whilst many of the areas of the review had a solid evidence base there are some areas that need to be reviewed with caution, as presented in Table 3. The different types of sleep-related practices explored were hugely varied and means the comparability of studies is limited. Because of the small body evidence for some types of practices findings relating to feeding to sleep, presence of a routine, type of bedtime routine activities, routine length and consistency of routine length, multiple routine variables, bedtime, screen time, breastfeeding, sleep hygiene practices and use of sleep-related applications (apps) should be interpreted with caution. In addition, parental presence at sleep onset and the use of non-parental aids evidence is limited by only coming from European samples, whilst parental involvement (bedtime and night waking) only represents data collected from Western countries.

3.3 | Design and analytical method

The design of most studies (11 studies) was cross-sectional (Chindamo et al., 2019; Cook et al., 2022; Coulombe & Reid, 2014; Hall et al., 2012; Messayke et al., 2020; Miller et al., 2022; Murthy et al., 2015; Prokasky et al., 2019; Schlarb et al., 2020; Staples et al., 2021; Williamson et al., 2019) and the remaining studies were longitudinal (five) (Fiese et al., 2021; Netsi et al., 2017; Plancoulaine et al., 2015; Staples et al., 2015; Tikotzky et al., 2022).

Multiple analytical methods were utilised. For simplicity of reporting, analytical approaches are presented in line with the authors' expressed intention, as either predictive (seven studies) (Cook et al., 2022; Fiese et al., 2021; Miller et al., 2022; Murthy et al., 2015; Netsi et al., 2017; Prokasky et al., 2019; Staples et al., 2015) or correlational (nine studies) (Chindamo et al., 2019; Coulombe & Reid, 2014; Hall et al., 2012; Messayke et al., 2020; Plancoulaine et al., 2015; Schlarb et al., 2020; Staples et al., 2021; Tikotzky et al., 2022; Williamson et al., 2019).

3.4 | Target population/participants and recruitment

All studies recruited parents/caregivers as participants. Eight studies targeted mothers (Coulombe & Reid, 2014; Fiese et al., 2021; Hall et al., 2012; Messayke et al., 2020; Miller et al., 2022; Netsi et al., 2017; Plancoulaine et al., 2015; Staples et al., 2015) and eight studies targeted parents (Chindamo et al., 2019; Cook et al., 2022; Murthy et al., 2015; Prokasky et al., 2019; Schlarb et al., 2020; Staples et al., 2021; Tikotzky et al., 2022; Williamson et al., 2019). In studies that reported parent participation, equal numbers were reported in two studies as they recruited couples (Cook et al., 2022; Tikotzky et al., 2022) and in three studies mothers were the majority of respondents; 85% (Williamson et al., 2019), 94.6% (Prokasky et al., 2019), and 98.4% (Schlarb et al., 2020). In three studies (Chindamo et al., 2019; Murthy et al., 2015; Staples et al., 2021) the ratio of mothers and fathers was not reported although it is likely that, based on the stated recruitment methods, most respondents would be mothers.

3.5 | Characteristics of parent/caregiver participants; number participating, mother/fathers

The number of participants ranged from 58 (Hall et al., 2012) to 11,783 (Messayke et al., 2020) with a total of 22,772 'family' caregivers (parents/caregivers, foster parents, grandparents, others) recruited across all studies. Only 10 studies (Cook et al., 2022; Coulombe & Reid, 2014; Fiese et al., 2021; Hall et al., 2012; Messayke et al., 2020; Miller et al., 2022; Netsi et al., 2017; Plancoulaine et al., 2015; Schlarb et al., 2020; Staples et al., 2015) present clear figures to allow the total number of mothers ($n = 17, 577$) and fathers ($n = 47$) to be reported. Four studies fail to report these specific data and simply report 'parents' (Chindamo et al., 2019; Murthy et al., 2015; Staples et al., 2021; Tikotzky et al., 2022) and two studies just report percentages of mothers and fathers (Prokasky et al., 2019; Williamson et al., 2019).

Seven studies either did not report age of parents or the age of parents relevant to the specific child sample included in our review (Fiese et al., 2021; Miller et al., 2022; Murthy et al., 2015; Netsi et al., 2017; Staples et al., 2015; Staples et al., 2021; Williamson et al., 2019). In those studies reporting parental age, two studies simply reported the range (Messayke et al., 2020; Schlarb et al., 2020), four reported the mean (Chindamo et al., 2019; Coulombe & Reid, 2014; Plancoulaine et al., 2015; Tikotzky et al., 2022), and the remaining three studies reported both range and mean (Cook et al., 2022; Hall et al., 2012; Prokasky et al., 2019). In the six studies reporting the mean age of mothers (Chindamo et al., 2019; Cook et al., 2022; Coulombe & Reid, 2014; Hall et al., 2012; Plancoulaine et al., 2015; Tikotzky et al., 2022), the mean ranged from 29.0 (Tikotzky et al., 2022) to 36.1 years (Hall et al., 2012); the (unweighted) average across all six studies was 32.5 years. In the three studies reporting mean age of fathers (Chindamo et al., 2019;Cook et al., 2022; Tikotzky et al., 2022), the mean age ranged from 31.9 (Tikotzky et al., 2022) to 35.7 years (Chindamo et al., 2019); the (unweighted) average across all three studies was 34.3 years. For the two studies only reporting on 'parents' (Prokasky et al., 2019; Schlarb et al., 2020), the age range was 18–54 years with the mean (32.1 years) reported in only one of these studies (Prokasky et al., 2019).

3.6 | Characteristics of the parents'/caregivers' children

In 12 studies the age range of the children was reported (Chindamo et al., 2019; Cook et al., 2022; Coulombe & Reid, 2014; Fiese et al., 2021; Hall et al., 2012; Miller et al., 2022; Netsi et al., 2017; Schlarb et al., 2020; Staples et al., 2015; Staples et al., 2021;

Tikotzky et al., 2022; Williamson et al., 2019); it ranged between 1 and 3 years (12 and 36 months). In seven studies the mean age was reported (Chindamo et al., 2019; Cook et al., 2022; Hall et al., 2012; Messayke et al., 2020; Miller et al., 2022; Murthy et al., 2015; Williamson et al., 2019) and in one study all children were aged 2.5 years (30 months) (Staples et al., 2021). The range was from 1.08 years (13 months) (Messayke et al., 2020) to 2.5 years (Staples et al., 2021); the (unweighted) mean age across these seven studies was 1.87 years (22.4 months). In one study (Staples et al., 2021) all the children were aged 2.5 years.

Three studies either did not report the gender of children or not specifically for the child sample included in this review (Fiese et al., 2021; Netsi et al., 2017; Schlarb et al., 2020). One study (Murthy et al., 2015) only reported male/female 2:1 (~67% male; 33% female). In all, 13 studies either reported gender as percentages or allowed calculation of percentages (Chindamo et al., 2019; Cook et al., 2022; Coulombe & Reid, 2014; Hall et al., 2012; Messayke et al., 2020; Miller et al., 2022; Staples et al., 2021; Tikotzky et al., 2022; Williamson et al., 2019); the range being 43% (Hall et al., 2012) to 67% male (Murthy et al., 2015); the (unweighted) average across these studies was 50.7% male.

3.7 | Measures used in the studies

All 16 studies used sleep measures, with 15 studies using subjective methods (Chindamo et al., 2019; Cook et al., 2022; Coulombe & Reid, 2014; Fiese et al., 2021; Hall et al., 2012; Messayke et al., 2020; Miller et al., 2022; Murthy et al., 2015; Netsi et al., 2017; Plancoulaine et al., 2015; Prokasky et al., 2019; Schlarb et al., 2020; Staples et al., 2021; Tikotzky et al., 2022; Williamson et al., 2019). Of those studies using subjective methods, seven studies used standardised and validated questionnaires: the Brief Infant Sleep Questionnaire (BISQ) (Sadeh, 2004)/BISQ-expanded (Sadeh et al., 2009) was used in three studies (Cook et al., 2022; Tikotzky et al., 2022; Williamson et al., 2019); the Infant Sleep Questionnaire (ISQ) (Morrell, 1999a)/ISQ-R (DiLeo et al., 2005) was used in three studies (Coulombe & Reid, 2014; Hall et al., 2012; Schlarb et al., 2020); one study (Staples et al., 2021) used a modified version of the Children's Sleep Habits Questionnaire (Owens et al., 2000), although they did not note what modifications had been made; and one used a standardised, non-validated measure (Murthy et al., 2015). The remaining seven studies used either a non-standardised questionnaire (Chindamo et al., 2019; Miller et al., 2022; Netsi et al., 2017) or individual items/questions (Fiese et al., 2021; Messayke et al., 2020; Plancoulaine et al., 2015; Prokasky et al., 2019).

Actigraphy (the only objective measure reported) was used to measure child sleep in four studies (Prokasky et al., 2019; Staples et al., 2015; Staples et al., 2021; Tikotzky et al., 2022).

All 16 studies assessed parental sleep-related practices. Six studies used standardised and validated measures (Cook et al., 2022; Fiese et al., 2021; Hall et al., 2012; Schlarb et al., 2020; Tikotzky et al., 2022; Williamson et al., 2019) and 12 studies used non-standardised/validated measures (Chindamo et al., 2019; Cook et al., 2022; Coulombe & Reid, 2014; Messayke et al., 2020; Miller et al., 2022; Murthy et al., 2015; Netsi et al., 2017; Plancoulaine et al., 2015; Prokasky et al., 2019; Staples et al., 2015; Staples et al., 2021; Tikotzky et al., 2022). Of those studies using standardised and validated measures, three studies (Cook et al., 2022; Schlarb et al., 2020; Hall et al., 2012) used the Parental Interactive Bedtime Behaviour Scale (PIBBS) (Morrell & Cortina-Borja, 2002)/PIBBS-revised (Morell & Steele, 2003), two studies (Tikotzky et al., 2022; Williamson et al., 2019) used the BISQ/BISQ-expanded (Sadeh, 2004; Sadeh et al., 2009) and one (Fiese et al., 2021) used the Bedtime Routine Questionnaire (BRQ) (Henderson & Jordan, 2010). Of those studies using non-standardised/validated measures, six used questionnaire/diary/narrative (Cook et al., 2022; Coulombe & Reid, 2014; Prokasky et al., 2019; Staples et al., 2015; Staples et al., 2021; Tikotzky et al., 2022), five used individual items/questions (Chindamo et al., 2019; Messayke et al., 2020; Miller et al., 2022; Netsi et al., 2017; Plancoulaine et al., 2015), and in one study the method was unclear (Murthy et al., 2015). Two studies (Cook et al., 2022; Tikotzky et al., 2022) used both standardised/validated and non-standardised/non-validated measures.

3.8 | Relationship between parental sleep-related practices and child sleep

Eight types of parental sleep-related practices were reported. Practices are presented in descending order of the number of studies exploring this practice. These included broad types of settling behaviour (Chindamo et al., 2019; Cook et al., 2022; Coulombe & Reid, 2014; Fiese et al., 2021; Hall et al., 2012; Messayke et al., 2020; Plancoulaine et al., 2015; Schlarb et al., 2020; Williamson et al., 2019), bedtime routine-related variables (Fiese et al., 2021; Murthy et al., 2015; Prokasky et al., 2019; Staples et al., 2015), sleep location-related variables (Messayke et al., 2020; Murthy et al., 2015; Tikotzky et al., 2022; Williamson et al., 2019), pre-bedtime screen time (Miller et al., 2022; Netsi et al., 2017; Staples et al., 2021), bedtime (Fiese et al., 2021), night-time breastfeeding (Tikotzky et al., 2022), sleep hygiene practices (Cook et al., 2022), and use of sleep-related apps (Schlarb et al., 2020).

The relationship between parental sleep-related practices were reported in relation to 10 different sleep outcomes: sleep duration (Chindamo et al., 2019; Fiese et al., 2021; Messayke et al., 2020; Miller et al., 2022; Plancoulaine et al., 2015; Prokasky et al., 2019; Staples et al., 2015; Staples et al., 2021; Williamson et al., 2019), sleep onset latency (Chindamo et al., 2019; Fiese et al., 2021; Messayke et al., 2020; Prokasky et al., 2019; Staples et al., 2021; Williamson et al., 2019), night wakings (Coulombe & Reid, 2014; Fiese et al., 2021; Hall et al., 2012; Messayke et al., 2020; Plancoulaine et al., 2015; Prokasky et al., 2019; Tikotzky et al., 2022), sleep problems (Cook et al., 2022; Coulombe & Reid, 2014; Fiese et al., 2021; Miller et al., 2022; Murthy et al., 2015; Schlarb et al., 2020; Staples et al., 2021; Williamson et al., 2019), bedtime (Fiese et al., 2021; Netsi et al., 2017; Staples et al., 2021; Williamson et al., 2019), wake after sleep onset (Prokasky et al., 2019; Tikotzky et al., 2022), sleep efficiency (Prokasky et al., 2019), duration of stretches of time asleep (Williamson

et al., 2019), sleep consolidation (Staples et al., 2021), and sleep variability (Staples et al., 2021).

The following results will present the findings about the relationships between parental sleep-related practices and child sleep. Given the number of studies and range of sleep outcomes and parental sleep-related practices only significant results will be reported. As the majority of findings are based on parentally reported outcomes, unless otherwise stated, all of the sleep parameters are subjective and based on parental report information. Test statistics (where reported in the original paper) and significance level (p value) are reported throughout the results section (additional detail, from the original paper, is provided in the data extraction sheet). Where appropriate, odds ratios (ORs) and 95% confidence intervals (CIs) are reported below. Where studies report longitudinal findings on children at discrete ages, the specific age of the group are reported below; other age-related details of participants are available in the data extraction sheet. For each parental practice, the studies investigating this aspect are listed and details of relevant results are presented. For practices where there are subtypes of that practice, details are presented under relevant subheadings. At the end of each section a summary of the key findings relevant to that overall parent practice is presented.

3.8.1 | Settling behaviour

The relationship between settling behaviour and child sleep outcomes was explored in eight studies (Chindamo et al., 2019; Cook et al., 2022; Coulombe & Reid, 2014; Hall et al., 2012; Messayke et al., 2020; Plancoulaine et al., 2015; Schlarb et al., 2020; Williamson et al., 2019). Results are presented according to the different subtypes of settling behaviour practices; parental presence at sleep onset, parental involvement (bedtime and night waking), feeding to sleep, and the use of non-parental aids.

Parental presence at sleep onset

Parental presence when falling asleep was associated with short sleep duration in boys (OR 2.84, 95% CI 1.08–7.47; $p = 0.03$) and girls (OR 3.89, 95% CI 1.42–10.67; $p = 0.008$) (Plancoulaine et al., 2015). Parental presence when the child fell asleep was predictive of sleep duration ($p =$ <0.001) being more likely associated with short sleep duration (≤12 h) (OR 1.55, 95% CI 1.35–1.79), and less likely with long sleep duration (>14 h) (OR 0.63, 95% CI 0.55–0.72), when '13–14 h' sleep duration was used as the reference (Messayke et al., 2020). Falling asleep with a parent present also significantly differentiated sleep duration (short <11.5; 11.6–12; long >12 h; $p = 0.005$), whereby parental presence was associated with shorter sleep (Chindamo et al., 2019).

Falling asleep with parental presence significantly differentiated sleep onset latency (≤15, 16–30, >30 min; $p =$ <0.001), with parental presence associated with increased sleep onset latency (Chindamo et al., 2019). Parental presence was predictive of sleep onset difficulties ($p < 0.001$). Parental presence when falling asleep was also more likely with sleep onset difficulties 'sometimes' (OR 2.10, 95% CI 1.84–2.39) and much more likely 'often' (OR 12.02, 95% CI 10.17–14.21) when 'never' having sleep onset difficulties was used as the reference group (Messayke et al., 2020).

Parental presence was predictive of night wakings ($p < 0.001$). Parental presence when falling asleep was also associated with increased night wakings, being more likely with 'waking 1–2 nights/week' (OR 1.36, 95% CI 1.19–1.56) and '>2 nights/week' (OR 1.73, 95% CI 1.49–2.01), when 'never night waking' was used as the reference group (Messayke et al., 2020).

Parental involvement (bedtime and night waking)

More endorsement of encouraging autonomy-based settling strategies was associated with reduced night wakings ($r = -0.29$, $p < 0.05$), whilst increased endorsement of active physical comforting methods was associated with more night wakings ($r = 0.27$, $p < 0.05$) (Hall et al., 2012). At 2 years of age, increased endorsement of active-comforting strategies was associated with increased frequency of waking ($r = 0.35$, $p < 0.01$), whilst, conversely, endorsement of limit-setting strategies were associated with reduced number of wakings ($r = -0.24$, $p < 0.05$). A year later (aged 3 years), the relationship between endorsement of active comforting strategies and increased frequency of wakings was maintained ($r = 0.38$, $p < 0.01$). At 3 years of age, endorsement of reward and punishment-based strategies correlated with increased frequency of waking ($r = 0.27$, $p < 0.05$ and $r = 0.24$, $p < 0.05$, respectively). Endorsing active comforting strategies at 3 years of age and rewards at 3 years of age were also associated with increased reports of sleep as problematic ($r = 0.31$, $p < 0.05$ and $r = 0.50$, $p < 0.01$, respectively) (Coulombe & Reid, 2014).

Parents of children with sleep problems reported more use of active physical comforting strategies at bedtime and overnight than parents of children with no sleep problems ($t[172] = -3.056$, $p = 0.002$; $t[146] = -4.811$, $p < 0.001$, respectively). Children with no sleep problems had parents who employed more strategies that encourage infant autonomy at bedtime and overnight compared to parents of children with sleep problems ($t[172] = 3.939$, $p < 0.001$; $t[146] = 2.157$, $p = 0.017$, respectively) (Schlarb et al., 2020).

More maternal involvement in settling was an individual predictor of mothers perceiving their child had a sleep problem ($B = -0.145$, standard error [SE] B = 0.053, $\beta = 7.48$, $p = 0.006$, β(exp) = 0.865) (Cook et al., 2022). Similarly, more paternal involvement in settling was an individual predictor of paternal perception of a sleep problem ($B = 0.086$, SE B = 0.041, $\beta = 4.37$, $p = 0.037$, β(exp) = 0.918) (Cook et al., 2022).

Feeding to sleep

Feeding to fall asleep was predictive of sleep duration ($p < 0.001$). Specifically, feeding to sleep was associated with being more likely to obtain 'short' sleep (<12 h) (OR 1.52, 95% CI 1.27–1.81), when compared with the reference group of '13–14 h' sleep duration. Feeding to fall asleep was also predictive of night wakings ($p < 0.001$), with both '1–2 nights/week' (OR 1.50, 95% CI 1.24–1.81) and '>2 nights/week' (OR 2.04, 95% CI 1.67–2.49) being more likely when compared with the reference group of 'never' night waking. Finally, feeding to sleep was associated with more frequent sleep onset difficulties both 'sometimes' (OR 1.12, 95% CI 0.93–1.34) or 'often' (OR 1.27, 95% CI 1.01–1.59), when compared with the reference group 'never' having sleep onset difficulties (Messayke et al., 2020).

Use of non-parental aids

Children who fell asleep with a television (TV) or cartoon playing had significantly longer sleep onset latencies than children who did not fall asleep with TV or cartoons streaming ($p < 0.001$) (Chindamo et al., 2019).

Sleeping with a 'blankie' (a blanket, usually used as a security blanket) was predictive of sleep duration ($p < 0.001$). Specifically, sleeping with a blankie was associated with being less likely to have short (<12 h) sleep duration (OR 0.73, 95% CI 0.62–0.86), when compared to the reference group of '13–14 h' sleep duration. Sleeping with a blankie was also associated with night wakings ($p = 0.05$). Sleeping with a blankie was more likely associated with having only a few night wakings, '1–2 nights/week' (OR 1.20, 95% CI 1.04–1.38) than frequent wakings '>2 nights/week' (OR 1.09, 95% CI 0.92–1.29), compared with the reference group of 'never' night waking. Sleeping with a blankie was also predictive of sleep onset difficulties ($p = 0.03$) (Messayke et al., 2020).

Non-nutritive sucking before sleep was predictive of sleep duration ($p < 0.001$). Specifically, all types were more likely predictive of long (>14 h) sleep duration, when using the '13–14 h' sleep duration group as reference. These included thumb/finger (OR 1.51 95% CI 1.25–1.81), pacifier only (OR 1.31 95% CI 1.09–1.59), and pacifier and thumb/finger (OR 1.38 95% CI 1.13–1.68) (Messayke et al., 2020). Non-nutritive sucking before sleep was also predictive of night waking ($p < 0.001$). Sucking a pacifier was more likely associated with night waking '1–2 nights/week' (OR 1.32, 95% CI 1.10–1.59) and '>2 nights/week' (OR 1.39, 95% CI 0.12–1.71) when compared with the reference group of 'never' night waking. Sucking a pacifier with or without thumb/finger before sleep was more likely with night waking '1–2 nights/week' (OR 1.48, 95% CI 1.22–1.80) and '>2 nights/week' (OR 1.46, 95% CI 1.16–1.83), compared with the reference group of 'never' night waking. Non-nutritive sucking was also predictive of sleep onset difficulties ($p < 0.001$). Sucking a pacifier and thumb/finger before sleep was more likely associated with sleep onset difficulties 'sometimes' (OR 1.22, 95% CI 1.01–1.47) when compared to the reference group of 'never' having sleep onset difficulties (Messayke et al., 2020).

Settling behaviour summary: increased levels of parental presence at sleep onset were related to poorer child sleep (i.e., short sleep duration and increased frequency of night wakings). Increased levels of parental involvement in child sleep (settling and overnight) were also related to poorer child sleep (i.e., longer sleep onset latency and increased parental perception of CSPs). Feeding to sleep was also associated with poorer child sleep (i.e., reduced sleep duration, more sleep onset difficulties, and increased frequency of night wakings). Falling asleep with technology present at sleep onset was associated with increased sleep onset latency.

3.8.2 | Bedtime routines

Four studies explored the relationship between bedtime routines and child sleep outcomes (Fiese et al., 2021; Murthy et al., 2015; Prokasky et al., 2019; Staples et al., 2015). Results are presented according to the different subtypes of bedtime routine practices; the presence of a routine, the consistency of routine use, type of bedtime routine activities, routine length and consistency of bedtime routine length, and multiple routine variables combined.

Presence of routine

The presence of a parent-reported bedtime ritual ('usually involving some combination of parental presence, lullabies, music etc') in children aged 1–3 years was associated with parental perception of a sleep problem ($\chi 2 = 6.83$, $p = 0.009$) (Murthy et al., 2015).

Consistency of routine use

Bedtime routine consistency was concurrently associated with increased concurrent sleep duration at the age of 1 ($r = 0.12$, $p < 0.05$), 1.5 ($r = 0.16$, $p < 0.01$) and 3 years ($r = 0.24$, $p < 0.001$) and longitudinally from 1.5–3 years ($r = 0.19$, $p < 0.001$) (Fiese et al., 2021).

Concurrent associations were found between bedtime routine consistency and earlier bedtime at the age of 1 ($r = -0.32$, $p < 0.001$), 1.5 ($r = -0.15$, $p < 0.01$) and 2 years ($r = -0.34$, $p < 0.001$). Longitudinally, bedtime routine consistency at the age of 1 year was also associated with earlier bedtime at 1.5 ($r = -0.22$, $p < 0.001$) and 2 years ($r = -0.30$, $p < 0.001$). Bedtime routine consistency at 1.5 years was also similarly associated with earlier bedtime at 2 years ($r = -0.16$, $p < 0.01$) (Fiese et al., 2021).

Bedtime routine consistency was concurrently associated with reduced sleep onset latency at the age of 1 ($r = -0.12$, $p < 0.05$) and 2 years ($r = -0.16$, $p < 0.01$) and longitudinally from 1–2 years ($r = -0.17$, $p < 0.01$) (Fiese et al., 2021).

Bedtime routine consistency at the age of 1 year was longitudinally associated with fewer sleep problems ($r = -0.14$, $p < 0.05$) and less night waking ($r = -0.14$, $p < 0.05$) at 1.5 years (Fiese et al., 2021).

Cross-lagged estimate modelling findings of bedtime routine consistency at the age of 1 year and sleep outcomes at 1.5 years highlighted that bedtime routine consistency at 1 year of age predicted less night-time waking ($\beta = -0.12$, $p < 0.01$) and fewer sleep problems at 1.5 years ($\beta = -0.14$, $p < 0.01$) (Fiese et al., 2021). Within this model concurrent associations were identified between bedtime routine consistency and increased sleep duration, at the age of 1 ($\beta = 0.12$, $p < 0.05$), 1.5 ($\beta = 0.14$, $p < 0.05$), and 2 years ($\beta = 0.16$, $p < 0.01$), as well as earlier bedtime at 1 ($\beta = -0.29$, $p < 0.001$) and 2 years ($\beta = -0.21$, $p < 0.001$) (Fiese et al., 2021).

Greater adherence to a bedtime routine at the age of 3 years was concurrently associated with more objectively assessed nightly sleep minutes ($r = 0.30$, $p < 0.05$). Routine adherence at the age of 3 years predicted a concurrent increase in night-time sleep minutes ($\beta = 0.24$, $p < 0.05$, SE = 0.11) including when controlling for longitudinal stability ($\beta = 0.33$, $p < 0.01$, SE = 0.11) (Staples et al., 2015).

Across weeknights and weekends collectively and specifically for weeknights only, more deviation from the normal bedtime routine was associated with reduced sleep duration ($r = -0.23$, $p = 0.002$ and $r = -0.21$, $p = 0.005$ respectively). On an individual night, normal

routine deviation was an individual predictor of parent reported sleep duration ($B = 0.09$, SE $= 0.04$, $p < 0.05$). On weeknights, more deviation from the normal bedtime routine was also related to fewer wake minutes ($r = -0.16$, $p = 0.03$). An interaction was identified between deviation from the normal routine and time of the week for sleep duration ($B = -0.09$, SE $= 0.03$, $p < 0.01$). Higher routine deviation on an individual night, predicted increased parent-reported sleep duration on that night, if that night fell on a weekend ($B = 0.09$, $p < 0.05$) (Prokasky et al., 2019).

On weeknights, greater deviation from the normal routine predicted higher actigraphically assessed sleep efficiency ($B = 1.44$, SE $= 0.71$, $p < 0.05$) and greater deviation from the normal routine predicted fewer actigraph recorded wake minutes ($B = -9.26$, SE $= 3.99$, $p < 0.05$) (Prokasky et al., 2019).

Type of bedtime routine activities

More adaptive routine activities (typically calming activities to support a child's transition to a relaxed state that promotes sleep (e.g., book reading, hug/kiss caregiver, say goodnight to family) were concurrently associated with increased sleep duration at the age of 1 ($r = 0.16$, $p < 0.01$), 1.5 ($r = 0.17$, $p < 0.01$) and 2 years ($r = 0.25$, $p < 0.001$). More adaptive routine activities at the age of 1 year were also longitudinally associated with increased sleep duration at 1.5 ($r = 0.15$, $p < 0.01$) and 2 years ($r = 0.14$, $p < 0.05$), as well as from 1.5 to 2 years ($r = 0.20$, $p < 0.001$) (Fiese et al., 2021).

There were also significant concurrent associations between more adaptive activities and earlier bedtimes at the age of 1 ($r = -0.25$, $p < 0.001$), 1.5 ($r = -0.16$, $p < 0.01$) and 2 years ($r = -0.31$, $p < 0.001$). Longitudinally, more adaptive activities were associated with earlier bedtimes from the age of 1–1.5 ($r = -0.20$, $p < 0.001$), 1–2 ($r = -0.24$ $p < 0.001$), and 1.5–2 years ($r = -0.20$, $p < 0.001$) (Fiese et al., 2021).

More adaptive routine activities were concurrently associated with reduced sleep onset latency at the age of 1.5 years ($r = -0.11$, $p < 0.05$) and longitudinally from 1 to 2 years ($r = -0.11$, $p < 0.05$) and 1.5–2 years ($r = -0.14$, $p < 0.05$) (Fiese et al., 2021).

More adaptive routine activities were concurrently associated with less night waking at the age of 1 ($r = -0.11$, $p < 0.05$), 1.5 ($r = -0.11$, $p < 0.05$) and 2 years ($r = -0.10$, $p < 0.05$) and longitudinally at 1 year with both less night waking ($r = -0.11$, $p < 0.05$) and also fewer sleep problems at 1.5 years ($r = -0.11$, $p < 0.05$) (Fiese et al., 2021).

Cross-lagged estimate modelling findings highlighted adaptive bedtime routine activities at the age of 1 year predicted fewer sleep problems at 1.5 years ($\beta = -0.12$, $p < 0.01$). Within this model concurrent associations were identified between adaptive routine activities and earlier bedtime at the age of 1 ($\beta = -0.22$, $p < 0.001$) and 2 years ($\beta = -0.17$, $p < 0.01$), as well as increased sleep duration at 2 years ($\beta = 0.24$, $p < 0.001$) (Fiese et al., 2021).

Routine length and consistency of routine length

Increased routine length on an individual night predicted reduced child sleep duration on that specific night ($B = -0.34$, SE $= 0.06$, $p < 0.001$). More routine length variation predicted less sleep duration on an individual night ($B = -0.46$, SE $= 0.08$, $p < 0.001$) (Prokasky et al., 2019).

Across weeknights and weekends collectively, as well as for weeknights specifically, longer routines were related to less sleep duration ($r = -0.15$, $p = 0.04$ and $r = -0.18$, $p = 0.01$, respectively). Across weeknights and weekends and on weeknights specifically, more routine activities were associated with increased child sleep duration ($r = 0.18$, $p = 0.02$ and $r = 0.19$, $p = 0.01$, respectively). On average across weeknights and weekends collectively, more variable routine lengths were related to less sleep duration ($r = -0.18$, $p = 0.01$), as well as on weeknights specifically ($r = -0.23$, $p = 0.002$) (Prokasky et al., 2019).

Higher total number of routine activities on an individual night predicted increased sleep duration on that night ($B = 0.07$, SE $= 0.02$, $p < 0.01$). Higher number of total routine activities on an individual night was related to longer actigraphically assessed sleep latency on that night ($B = 1.27$, SE $= 0.41$, $p < 0.01$) (Prokasky et al., 2019).

Multiple routine variables

In an overall regression model predicting child sleep duration on weeknights, longer routines ($B = -0.41$, SE $= 0.18$, $p < 0.05$), more variable routine lengths ($B = -1.00$, SE $= 0.34$, $p < 0.01$), fewer bedtime routine activities ($B = 0.11$, SE $= 0.05$, $p < 0.05$), and greater deviation from the normal routine ($B = -0.13$, SE $= 0.06$, $p < 0.05$) predicted reduced sleep duration. The four bedtime routine variables explained 5%–8% of the variance in parent-reported child sleep (Prokasky et al., 2019).

Bedtime routines summary: although one study found routine use to be associated with increased reports of sleep problems, findings generally suggested that more consistent use of a bedtime routine was associated with concurrently and longitudinally improved child sleep (increased sleep duration, reduced sleep onset latency and earlier bedtime, as well as concurrently longer actigraphically-assessed sleep duration). Routine consistency alone also predicted better child sleep (less night-time waking and fewer sleep problems longitudinally, as well as concurrent increased sleep duration and earlier bedtime). Adaptive routine activities (typically calming activities to support a child's transition to a relaxed state that promotes sleep) were associated with better child sleep (concurrently and longitudinally with increased sleep duration, earlier bedtimes, reduced sleep onset and night waking, as well as longitudinally with fewer sleep problems). Longer and more variable routine lengths related to poorer child sleep (reduced sleep duration and longer actigraphically-assessed sleep onset latency). Contradictorily, increased number of routine activities related to better child sleep (duration).

3.8.3 | Bedtime

Bedtime and the relationship to child sleep outcomes was explored in one study (Fiese et al., 2021). Results are presented according to the subtypes of earlier and later bedtime practices.

Earlier bedtime was concurrently associated with increased sleep duration at the age of 1 ($r = -0.52$, $p < 0.001$), 1.5 ($r = -0.47$, $p < 0.001$) and 2 years ($r = -0.43$, $p < 0.001$). Longitudinally, earlier bedtime at the age of 1 year was associated with increased sleep duration at 1.5 ($r = -0.34$, $p < 0.001$) and 2 years ($r = -0.32$, $p < 0.001$). Earlier bedtime at the age of 1.5 years was associated with increased sleep duration at 2 years ($r = -0.31$, $p < 0.001$) (Fiese et al., 2021).

Later bedtime was concurrently associated with increased sleep onset latency at the age of 1 ($r = 0.33$, $p < 0.001$), 1.5 ($r = 0.26$, $p < 0.001$) and 2 years ($r = 0.27$, $p < 0.001$). Longitudinally, later bedtime at the age of 1 year was associated with increased sleep onset latency at 1.5 ($r = 0.19$, $p < 0.001$) and 2 years ($r = 0.16$, $p < 0.05$). Later bedtime at the age of 1.5 years was also associated with increased sleep onset latency at 2 years ($r = 0.18$, $p < 0.01$) (Fiese et al., 2021).

Later bedtime was concurrently associated with more sleep problems at the age of 1.5 ($r = 0.15$, $p < 0.01$) and 2 years ($r = 0.11$, $p < 0.05$). Longitudinally, later bedtime at the age of 1.5 years was associated with more sleep problems at 2 years ($r = 0.14$, $p < 0.05$) (Fiese et al., 2021).

Later bedtime was concurrently associated with more night waking at the age of 1 ($r = 0.22$, $p < 0.001$), 1.5 ($r = 0.24$, $p < 0.001$) and 2 years ($r = 0.30$, $p < 0.001$). Longitudinally, later bedtime at the age of 1 year was associated with more night waking at 1.5 ($r = 0.19$, $p < 0.001$) and 2 years ($r = 0.20$, $p < 0.001$). Later bedtime at the age of 1.5 years was associated with more night waking at 2 years ($r = 0.25$, $p < 0.001$) (Fiese et al., 2021).

Bedtime summary: concurrently and longitudinally, an earlier bedtime was associated with improved child sleep (longer duration). Later bedtime was also concurrently and longitudinally associated with poorer child sleep outcomes (longer sleep onset latency, more sleep problems, and more night waking).

3.8.4 | Sleep location

Child sleep location and the relationship with child sleep outcomes was explored in three studies (Messayke et al., 2020; Murthy et al., 2015; Williamson et al., 2019). Results are presented according to the different subtypes of sleep location; sleeping in a bed or cot, change in sleep location overnight, sleeping in parental room and sleeping independently.

Sleeping in a bed or cot

Sleeping in a cot (versus a bed) resulted in longer night-time sleep duration ($F = 30.22$, $p < 0.001$, $n^2 = 0.016$), by ~29 min ($p < 0.001$) and was also linked to earlier bedtime ($F = 16.13$, $p < 0.001$, $n^2 = 0.009$), by ~12 min ($p < 0.001$) (Williamson et al., 2019). Cot sleeping toddlers were also more likely to have a shorter sleep onset latency when compared with those sleeping in a bed ($F = 18.21$, $n^2 = 0.009$, $p < 0.001$), by ~9 min overall ($p < 0.001$) and also had longer stretches of time asleep overnight ($F = 20.54$, $p < 0.001$, $n^2 = 0.011$), by ~43 min than bed sleeping children ($p < 0.001$) (Williamson et al., 2019). Sleeping in a cot was associated with fewer night wakings versus those who slept in a bed ($F = 9.26$, $p = 0.002$, $n^2 = 0.005$) (Williamson et al., 2019). Further, toddlers sleeping in a cot was predictive of parents being less likely to report bedtime resistance (OR 0.42, 95% CI 0.31–0.56; $p < 0.001$) and sleep problems (OR 0.65; 95% CI 0.49–0.87; $p = 0.004$) (Williamson et al., 2019).

Change in sleep location overnight

Infant sleep arrangement was predictive of sleep duration ($p < 0.001$). Falling asleep in their own cot/bed and ending the night in their parents' bed was more likely with short (≤12 h) sleep duration (OR 1.33, 95% CI 1.14–1.54) and less likely with long (>14 h) sleep duration (OR 0.78, 95% CI 0.68–0.91) when compared with the reference group of '13–14 h'. Children falling asleep and ending the night elsewhere (i.e., not in their own bed/cot) were more likely associated with short (≤12 h) sleep duration (OR 1.64, 95% CI 1.35–1.99) and less likely with long (>14 h) sleep duration (OR 0.68, 95% CI 0.52–0.88) when compared with the reference group of '13–14 h' (Messayke et al., 2020).

Infant sleep arrangement was predictive of night waking ($p < 0.001$). Falling asleep in their own bed/cot and ending sleep in their parents' bed was more likely with few '1–2 nights/week' (OR 2.02, 95% CI 1.7–2.35) and frequent '>2 nights/week' night waking (OR 3.41, 95% CI 2.92–3.99) compared to 'no night wakings' as the reference group. Falling asleep and ending it elsewhere other than their own cot/bed was associated with frequent (>2 nights/week) night waking compared with 'not waking' (OR 2.22, 95% CI 1.78–2.77) (Messayke et al., 2020).

Infant sleep arrangement was also predictive of sleep onset difficulties ($p < 0.001$). Falling asleep in the infant's own bed/cot but ending it in the parents' bed was associated with increased risk of sleep onset difficulties 'sometimes' (OR 1.66, 95% CI 1.44–1.91) and 'often' (OR 2.16, 95% CI 1.79–2.60) when compared with the reference group of 'never' having sleep onset difficulties. Falling asleep and ending sleep elsewhere than in the infant's own bed/cot was associated with fewer sleep onset difficulties 'sometimes' (OR 0.50, 95% CI 0.39–0.64) but increased risk of sleep onset difficulties 'often' (OR 1.56, 95% CI 1.24–1.97) when compared with the reference group of 'never' having sleep onset difficulties (Messayke et al., 2020).

Sleeping in parents' room

Sleeping in their parents' room at the age of 1.08 years (13 months) was predictive of night waking ($p = 0.01$), being more likely with 'frequent' (>2 nights/week) night waking (OR 1.33, 95% CI 1.13–1.58) when compared with 'never' night waking (Messayke et al., 2020).

Independent sleeping

Lack of co-sleeping was associated with increased perception of sleep problems ($\chi 2 = 4.443$, $p = 0.035$). The odds of a sleep problem were increased by almost three times in children who were not co-sleeping (OR 2.98, 95% CI 1.29–6.89; $p = 0.01$) (Murthy et al., 2015). If the same caregiver consistently put the child to sleep, sleep problems

were more likely (OR 2.37, 95% CI 0.88–6.37; $p = 0.09$) (Murthy et al., 2015).

Sleep location summary: sleeping in a cot (versus a bed) was associated with improved child sleep (longer duration, reduced sleep onset latency, earlier bedtime, longer stretches of time asleep overnight, fewer night wakings, less bedtime resistance, and fewer sleep problems). Ending the night outside of their own cot/bed was associated with poorer child sleep outcomes (reduced sleep duration) and, if the end of the night location was a parents' bed, with even poorer child sleep outcomes (short and long sleep duration, sleep onset difficulties, and night waking). Not co-sleeping and the same caregiver putting the child to sleep were associated with a parentally perceived sleep problem.

3.8.5 | Screen time

Screen time and the relationship with child sleep outcomes was explored in three studies (Miller et al., 2022; Netsi et al., 2017; Staples et al., 2021).

Pre-bedtime TV watching was found to be associated with later bedtime at the age of 2 years ($B = 0.07$, 95% CI 0.01–0.13) (Netsi et al., 2017). Later bedtime was also associated at the age of 2.5 years with more parent-reported pre-bedtime screen use ($r = 0.10$, $p < 0.05$) and observed pre-bedtime screen use ($r = 0.16$, $p < 0.01$) (Staples et al., 2021).

Parent-reported TV use at bedtime was concurrently associated with reduced night-time sleep duration at the age of 1.5 years ($r = -0.22$, $p < 0.001$; b $= -0.50$, $\beta = -0.15$, $p < 0.01$) (Miller et al., 2022). Increased observed pre-bedtime screen use at the age of 2.5 years was also associated with reduced sleep duration ($r = -0.11$, $p < 0.05$) (Staples et al., 2021).

Increased observed pre-bedtime screen use at the age of 2.5 years was also associated with increased sleep variability ($r = 0.12$, $p < 0.05$) and unexpectedly with reduced sleep onset latency ($r = -0.10$, $p < 0.05$) (Staples et al., 2021).

Children observed to use screens during the pre-bedtime period had later sleep timing (bedtime) ($p < 0.001$), and less consolidated sleep ($p < 0.01$) compared to children not observed to use screens during the pre-bedtime period. Children whose parents reported to use screens during the pre-bedtime period had reduced sleep duration ($p = 0.04$) and increased sleep variability ($p < 0.01$) compared to children without reported screen use during the bedtime routine (Staples et al., 2021).

The use of a TV at bedtime was associated with more concurrent parent-reported sleep problems in children aged 1.5 years ($r = 0.21$, $p < 0.001$; b $= 1.05$, $\beta = 0.23$, $p < 0.001$) (Miller et al., 2022). TV use at bedtime at the age of 1.5 years was also found to be longitudinally related to sleep problems at 2 years ($\alpha = 1.09$, $p < 0.001$) in a path analysis to determine if TV at bedtime was associated with toddlers' later aggressive behaviour and attention problems at 2 years via total night-time sleep duration and sleep problems at 1.5 years. Increased parent-report and observed pre-bedtime screen use was associated with more parent-reported CSPs ($r = 0.15$, $p < 0.01$ and $r = 0.13$, $p < 0.05$ respectively) (Staples et al., 2021).

Screen time summary: screen time around or during the bedtime period was associated with poorer child sleep outcomes (later bedtime, reduced sleep duration, increased sleep variability, reduced sleep onset latency, reduced sleep consolidation, and more parent-reported sleep problems).

3.8.6 | Breastfeeding

One study explored the relationship between breastfeeding and child sleep (Tikotzky et al., 2022).

At the age of 1 year, night-time breastfeeding was associated with increased, subjectively and objectively assessed, night wakings ($r = 0.37$, $p < 0.001$ and $r = 0.23$, $p < 0.005$ respectively) and at 1.5 years also associated with increased objectively assessed night wakings ($r = 0.20$, $p < 0.005$). Night-time breastfeeding was also associated with increased subjectively reported wake after sleep onset at the age of 1 year ($r = 0.21$, $p < 0.05$) (Tikotzky et al., 2022).

Breastfeeding summary: night-time breastfeeding was associated with poorer child sleep (both subjectively and objectively assessed), increased night wakings, and wake after sleep onset.

3.8.7 | Sleep hygiene practices

One study explored sleep hygiene-related practices (common practices considered to be conducive or disruptive to sleep such as sleep environment, sleep schedules, and sleep associations) (Cook et al., 2022). More maternal use of sleep hygiene-related practices that could be considered detrimental to child sleep predicted mothers perceiving that their child did not have a sleep problem ($B = 0.185$, SE B 0.091, $\beta = 4.09$, $p = 0.043$, $\beta(\text{exp}) = 1.20$) (Cook et al., 2022).

Sleep hygiene summary: maternal use of sleep hygiene-related practices that could be considered detrimental to child sleep were associated with better child sleep outcomes (i.e., child sleep not being perceived as a problem).

3.8.8 | Sleep-related apps

One study explored the use of sleep-related apps (reported to be music or night-time story apps) and CSPs (Schlarb et al., 2020). Parents of children with sleep problems used fewer apps at bedtime than parents of children with no sleep problems ($t[97.145] = 2.050$, $p = 0.043$) (Schlarb et al., 2020).

Sleep-related apps summary: the use of sleep-related apps was associated with improved child sleep outcomes (sleep problem perception).

3.9 | Limitations reported by authors of papers

The key study limitations reported by authors related to the lack of ability to establish causality, sample characteristics, and the measures used.

Seven studies indicated that causality could not be inferred due to the cross-sectional design and/or intervening variables (Chindamo et al., 2019; Hall et al., 2012; Messayke et al., 2020; Miller et al., 2022; Plancoulaine et al., 2015; Staples et al., 2015; Staples et al., 2021).

In all, 11 studies reported limitations relating to the lack of diversity of parents (e.g., under-representation of fathers, over-representation of better educated parents, lack of racial or ethnic diversity) thus reducing the generalisability of findings (Chindamo et al., 2019; Cook et al., 2022; Coulombe & Reid, 2014; Fiese et al., 2021; Hall et al., 2012; Netsi et al., 2017; Schlarb et al., 2020; Staples et al., 2015; Staples et al., 2021; Tikotzky et al., 2022; Williamson et al., 2019). Other sample-related limitations included potential for non-response bias (Chindamo et al., 2019) and use of a convenience sample (Murthy et al., 2015). Two studies reported limitations related to the sample of children reflecting the general population rather than meeting specific sleep disturbance criteria (Cook et al., 2022; Coulombe & Reid, 2014). The sample size was reported to limit analysis in three studies (Hall et al., 2012; Staples et al., 2015; Tikotzky et al., 2022).

The main limitation related to the measures used was that findings were based on subjective and proxy reports of children's habits and behaviours; this was reported in 11 studies (Chindamo et al., 2019; Coulombe & Reid, 2014; Fiese et al., 2021; Hall et al., 2012; Messayke et al., 2020; Miller et al., 2022; Netsi et al., 2017; Plancoulaine et al., 2015; Prokasky et al., 2019; Schlarb et al., 2020; Staples et al., 2015). Other measure-related limitations included the absence of useful data such as duration of screentime (Chindamo et al., 2019), the fact that screen activities were not separated into active or passive engagement (Staples et al., 2021), the measure used not being validated for the specific population (Cook et al., 2022), and caution raised about reliability of findings (Schlarb et al., 2020).

4 | DISCUSSION

The present systematic review findings identified a broad range of parental sleep-related practices that have been explored in relation to child sleep outcomes. The largest number of studies explored parental settling behaviours and, similar to the results of a previous review with a wider age range of infant and toddlers (Sadeh et al., 2010), the present review findings (based on children aged 1–3 years) indicate that settling practices that involve increased levels of parental presence or involvement are linked to poorer child sleep outcomes (Chindamo et al., 2019; Cook et al., 2022; Coulombe & Reid, 2014; Hall et al., 2012; Messayke et al., 2020; Plancoulaine et al., 2015; Schlarb et al., 2020; Williamson et al., 2019). Other general findings were that having and consistently using a bedtime routine comprising suitable relaxing activities was also associated with better child sleep outcomes (Fiese et al., 2021; Prokasky et al., 2019; Staples et al., 2015). For toddlers, sleeping in a cot (versus a bed) was associated with better child sleep (Williamson et al., 2019), whilst children who moved sleep location during the night from their own cot or bed to their parents' bed or another location had poorer sleep outcomes (Messayke et al., 2020). The use of some types of technology-based sleep-related practices implemented by parents, including night-time screen time (Miller et al., 2022; Netsi et al., 2017; Staples et al., 2021) and using technology to settle children to sleep (Chindamo et al., 2019) were also linked to poorer child sleep. Conversely, increased use of sleep-related apps was associated with better child sleep outcomes (Schlarb et al., 2020).

Compared to other reviews, a wider range of parental sleep-related practices (e.g., use of technology, sleep hygiene related practices, sleep-related routines, and child sleep outcomes e.g., duration, night wakings, sleep onset, presence of CSPs, including both subjective and objective measures) have been explored and are reported in the present review. Previous literature exploring the relationship between parenting practices and child sleep has predominantly focused on parental settling or soothing practices (Mindell et al., 2010a; Tikotzky & Sadeh, 2009). However, more recent research has begun to highlight that broader parental practices may also be important (Cook et al., 2022; Cook, 2018; Jeon et al., 2021; Mindell et al., 2009a; Mindell et al., 2009b). The findings of the present review also support the view that to understand the links between parenting and child sleep, there is a need to consider broader aspects of parenting and parental sleep-related practices, which go beyond the settling methods employed at bedtime.

It was clear from the studies included in the review that there was variety, and often ambiguity, in both the definitions of key constructs and the measures used. Perhaps more fundamentally, there is currently a lack of agreement about exactly what type of practices should or should not be considered to constitute a parental sleep-related practice. For the purposes of this review a broad definition of a parental sleep-related practice was adopted to be 'any practice implemented or enacted by the parent with the child (e.g., settling practices) or broader sleep hygiene related practice (e.g., providing a screen, TV or apps for the child's use) and used around the bedtime or night-time period'. However, it is important to note that this definition could have had a narrower (e.g., 'only practices that involve parental interaction with the child') or an even broader focus (e.g., 'any behaviour or practice which a parent implements or allows, across a 24-h period that could conceivably influence child sleep such as napping, light exposure, diet, or exercise amongst many others'). The focus of the definition naturally influences the findings and there remains a need to consider other aspects of the child's daytime routines, behaviours, and functioning to obtain a holistic view of their sleep. However, this would necessitate a substantial (and potentially unmanageable) review and would likely limit the ability to identify and interpret individual findings. Therefore, in the present review a pragmatic conceptualisation of a very complex domain was adopted as this

was manageable yet allowed expansion of what was previously known about how parents may be influencing their child's sleep-related outcomes.

Whilst it is clearly valuable to identify how any parental practices that are used by parents are related to child sleep, one of the challenges in synthesising these findings is the variability and ambiguity of definitions, conceptualisations, and measures applied to both parental sleep-related practices and child sleep outcomes. When considering parental sleep-related practices, some studies employed standardised and widely used measures of complex 'types' of behaviours, characterised by a constellation of practices, such as parental settling strategies as assessed by the PIBBS (Morrell & Cortina-Borja, 2002) or sought to develop measures of 'types' of strategies used overnight, e.g., the Night Waking Strategies Scale (Coulombe & Reid, 2014). Other studies used non-standardised approaches to explore the use of individual behaviours or activities, e.g., sleep location (Messayke et al., 2020; Tikotzky et al., 2022; Williamson et al., 2019), night-time breastfeeding (Tikotzky et al., 2022), screen time (Chindamo et al., 2019; Miller et al., 2022; Netsi et al., 2017) or use of sleep-related apps at bedtime (Schlarb et al., 2020). The lack of a standardised approach to assessment of many constructs meant that outcome variables were difficult to synthesise, as definitions varied. For example, what constituted 'sleep location' varied between where a child started the night versus where they ended the night (Messayke et al., 2020), whether they were solitary sleeping versus co-sleeping (Murthy et al., 2015), and whether they were cot or bed sleeping (Williamson et al., 2019).

There was also variation in the tools used to assess such variables. For example, in some studies practices were assessed in a standardised or systematic way (e.g., Prokasky et al., 2019) whilst in others, assessment of practices was based on parent response to a single question or item (e.g., Tikotzky et al., 2022). Variability remained even when the same construct was assessed, and the same measure was used. For example, a common measure used to ascertain parental settling behaviours is the standardised and validated PIBBS. However, even when this was used some studies reported the questionnaire total (Cook et al., 2022), and some used specific subscales, commonly 'active physical comforting' and/or 'encourage autonomy' (Hall et al., 2012); other studies used modified versions and expanded the subscales (Schlarb et al., 2020). Clearly, these different uses produce very different outcomes, which limits synthesis and generalisability of the findings (both in the present review and across the broader literature), even when the same specific measures are used.

Further, a broad range of sleep outcomes, which assess very different domains of child sleep, were investigated across the studies in the present review (e.g., bedtime, sleep onset latency, sleep duration, night wakings). This makes comparisons between studies difficult and means that it is not possible to undertake statistical exploration of the impact of different practices on sleep outcomes (e.g., using meta-analysis). The definitions used in relation to child sleep outcomes were also variable. It was clear that what constituted 'bedtime', 'night-time' or 'the night-time period' differed across the included studies (and in some cases was crucial to defining key variables but were not necessarily clearly specified) and it is likely that some agreed definitions of these terms would be beneficial, facilitating exploration of the same construct within the same time frame, as well comparison of the findings across studies. The BISQ was widely used as a measure for sleep outcomes but even this standardised and validated measure was used in different ways. In some studies a single item was used (Cook et al., 2022) whereas others employed revised or expanded versions to capture a range of sleep outcome variables (Williamson et al., 2019). In some instances, although standardised measures were used, explicit definitions of the domains assessed were not presented (Williamson et al., 2019). Some studies made use of the BISQ to ascertain sleep arrangements (Tikotzky et al., 2022) or parental sleep-related practices (Williamson et al., 2019). The present review findings suggest that providing clear definitions and conceptualisations of key variables, even if using an established measure, would create useful clarification in the reporting of studies and allow more accurate comparison across samples (as well as potential aggregation of data).

There were also some variables, such as 'bedtime', which were considered in some studies to be a practice (likely because it is conceivable that a parent can mediate their child's bedtime), whilst in other studies 'bedtime' was treated as a sleep outcome. In two studies, bedtime was considered in analysis as both a parenting practice and a sleep outcome (Fiese et al., 2021). Based on the current literature it is not possible to identify which of these conceptualisations is most accurate or appropriate. Even the transactional model, a widely used model of infant and toddler sleep (Sadeh et al., 2010; Sadeh & Anders, 1993), whilst making reference to the significance of parent/child bedtime interactions, fails to clearly suggest whether the time of going to bed should be considered as part of this. Such ambiguity clearly has implications for how this common domain of children's sleep is defined and understood, especially in studies that seek to identify causal relationships. Perhaps future work could helpfully more explicitly explore the extent to which children's bedtimes are driven by the parent or by other factors. However, because of the variability in bedtime and also wake times (either due to intrinsic child factors or external influences such as parental work or childcare schedules), it may be that other measures such as 24-h sleep time (which would also capture napping) may be more appropriate and relevant to consider.

Many findings in the present review confirm relationships between parental sleep-related practices and child sleep that have been previously established (e.g., Sadeh et al., 2010). New areas not included in the transactional model such as screen time were also identified as having a negative relationship to child sleep outcomes. Given the young age range of the present sample it is perhaps surprising that screens are being actively used in the bedtime period and/or to settle children to sleep. The negative impact of screen time on a range of poorer sleep outcomes has been identified in the present and other reviews (Newton et al., 2020). But it appears parents are engaging in screen use in the hour preceding bed, which is at odds with general national guidelines (RCPCH, 2019; Council on Communication and Media, et al., 2016).

There were a few unexpected findings in four studies in the present review that require further discussion. One paper reported increased maternal use of sleep hygiene-related practices, which could be considered detrimental to child sleep, was predictive of mothers perceiving that their child did not have a sleeplessness problem (Cook et al., 2022). This appears at odds with literature that has linked good sleep hygiene practices to improved child sleep outcomes (Mindell et al., 2009a), especially in infants and toddlers (Hall & Nethery, 2019). However, the paper by Cook et al. (2022) was an exploratory study which involved development of a broad measure of parental sleep-related practices, and it is possible that the measure of maternal sleep hygiene may not have accurately captured the intended practices. In addition, reports of CSPs which are based solely on maternal perceptions (as they were in this study) may not actually be associated with child sleep parameters; e.g., Morrell (1999b) found a lack of correspondence between mothers' reports of a 'sleep problem' and mothers' reports of the frequency and duration of child sleep behaviours, which might be expected to reflect a sleep problem (e.g., frequency and duration of settling and night waking difficulties).

Another study reported two unexpected findings. The first was that not co-sleeping was associated with an increased incidence of parents perceiving their child to have a sleep problem (Murthy et al., 2015). This is unexpected in the sense that co-sleeping itself can commonly, particularly in Western cultures, be considered an indicator of a sleep problem (Mileva-Seitz et al., 2017). It is worthwhile noting that co-sleeping is considerably more common in Asian cultures (Mindell et al., 2010b) and that the Murthy et al. (2015) paper was based on a sample of parents from India (where co-sleeping is a common and accepted practice). For example, co-sleeping prevalence has been estimated at ~88% for Indian cohorts (Bharath et al., 2021) versus an estimated 12% in predominantly Caucasian populations (Mindell et al., 2010b). These results may therefore highlight the significance of cultural norms when interpreting parents' perceptions of what is considered 'problematic'. The second unexpected finding in this study was that having a bedtime ritual was associated with parental perception of CSPs (Murthy et al., 2015). This appears to contradict other studies in the present review (Fiese et al., 2021; Prokasky et al., 2019; Staples et al., 2015) and wider literature (Mindell et al., 2006; Mindell, Telofski, et al., 2009) that bedtime routines are beneficial to child sleep outcomes. Like the other unexpected findings from this study, these results may also reflect differences in cultural norms or might be explained by the fact that the reported bedtime rituals, although not clearly defined, did appear to include significant parental involvement at bedtime (e.g., parental presence, rocking in bed), which has been repeatedly found to be associated with sleep difficulties (Mindell et al., 2009a; Mindell et al., 2010a; Sadeh et al., 2009; Tikotzky & Sadeh, 2009).

Another study reported that more deviation from the normal routine was associated with improved objectively assessed sleep efficiency (and reduced objectively assessed wake minutes) (Prokasky et al., 2019). This is perhaps surprising given the literature (including papers included in the present review) that suggest using a suitable relaxing routine consistently is associated with improved child sleep outcomes. But it may be that more deviation resulted in later child bedtimes, with the child being particularly tired and so settling quickly and sleeping well after the routine. It could also be that deviation from the normal routine reflected parents responding to their child's needs and adapting their routine due to specific circumstances, which again may result in the child falling asleep faster and staying asleep, thus improving the sleep efficiency and reducing the wake minutes. A related unexpected finding from a different paper was that increased pre-bedtime screen time at the age of 2.5 years was associated with reduced sleep onset latency (Staples et al., 2021). This is surprising given a previous relationship has been established between increased screen use and delayed sleep onset in pre-school aged children (Lund et al., 2021). However, as acknowledged by the original authors, it is possible that children who are viewing screens during their pre-bedtime routine are in fact going to bed later and are more tired, therefore they are falling asleep faster (Staples et al., 2021).

The present review findings have theoretical implications. Existing theoretical models of children's sleep, such as the transactional model (Sadeh et al., 2010), acknowledge a wide range of factors that are likely to interrelate and contribute to children's sleep/wake. These include 'parenting factors' (personality, psychopathology, stress, cognitions, emotions, and memories), which can be influenced by intrinsic child factors and/or child's sleep and interactive parent–child behaviours (bedtime interactions and routines, soothing methods, limit setting, co-sleeping, and nursing), which can also be influenced by intrinsic child factors, parenting factors, and/or the child's sleep (Sadeh et al., 2010; Sadeh & Anders, 1993). However, the present findings appear to indicate that an even broader range of parenting practices may need to be more explicitly included within such models. For example, the increasing use of technology in all aspects of human life (Hoehe & Thibaut, 2020), also may need to be explicitly acknowledged for any contemporary model of child sleep, especially given the relationship between poorer child sleep and various technology-based sleep-related parenting practices in toddlers, found both in the present review and other work (McDonald et al., 2014; Miller et al., 2022). This systematic review adopted transparent and robust practices throughout and involved collaboration between a range of experts in the subject matter, which were strengths of our approach. However, some key limitations should be kept in mind when interpreting the findings. Firstly, it should be noted that this review deliberately focused on recent literature (since 2010) and selected a tight age range of children (1–3 years) with the hope that this would aid the production of a meaningful synthesis of findings. However, it is possible that different inclusion criteria may have altered the papers identified and overall findings of the review. Synthesising the data included in this review was problematic because of the wide range of parental sleep-related practices and child sleep outcomes explored in the studies, as well as the definitional/measurement ambiguity used for the various constructs. In addition, due to the focus of our review, search terms were directed at parental sleep-related practices. However, it is possible that if screen time was not conceptualised as an activity under parental influence (i.e., it was not considered as a parental practice) in the original paper some relevant papers may not have

been identified by our searches. Further, we chose intentionally to focus on parental practices in the bedtime period, but this also means that we did not capture parental practices that may occur at other times of the day (such as screen time) that could be related to children's night-time sleep.

Second, because of the lack of standardised definition of parental sleep-related practices we had to produce a definition for the purpose of the review. Whilst this was carefully considered, our pragmatically-derived definition could certainly have been defined in other ways, with implications for which studies would be included in any review. It must also be acknowledged that in the review results report child sleep outcomes that do not necessarily explain the cause of any difficulties and that what is considered 'problematic' is likely to be highly individualised to each family's beliefs and circumstances.

Third, all but two studies were conducted solely in Western countries (Murthy et al., 2015; Netsi et al., 2017) and only English language publications were included. Cultural influences on children's sleep and sleep practices are well-established (Jenni & O'Connor, 2005), so it is likely the practices and perceptions of sleep outcomes (i.e., if a child's sleep is deemed problematic or not) would vary across geographical locations and cultures. The impact of socioeconomic status may also be relevant to understanding practical challenges associated with various child sleep patterns/practices (Cameron et al., 2022). Future work exploring the links between parenting practices and child sleep would ideally include consideration of the influence of cultural norms and socioeconomic status.

Fourth, our sample did not include any sleep intervention studies. Although one study (Miller et al., 2022) did include an intervention aimed at increasing responsive parenting. It would be helpful for RCTs of interventions for CSPs to include assessment of changes in parenting practices in relation to intervention to better understand causal directions of any associations with child sleep and the underlying mechanisms of change. Careful consideration of how best to evaluate such complex interventions, including the potential need for the inclusion of process evaluations, may also be beneficial (Moore et al., 2015).

Fifth and relatedly, in this review, analyses were presented as associative or predictive, based on the study authors' intention and/or reporting of their results. Any methodological aspects of the studies are captured as part of the overall quality assessment of each study. It is also perhaps worth noting that none of the studies included metrics of predictive statistics that would allow individual risks to be estimated (Varga et al., 2020). Greater understanding of the predictive value of parenting practices for child sleep outcomes would be helpful to guide clinical decisions.

Lastly, the methodological quality of studies was broad. A number of included studies were limited by poor or incomplete reporting (47%), especially as relating to the representativeness of the samples (60%) and the extent of complete outcome data sets (47%) in relation to our population and review question. Further, two thirds of the studies did account for confounders or some type. However, accurately accounting for all possible confounders in this area of study is impractical. One of the challenges when seeking to evaluate the quality of studies was the lack of a suitable assessment tool, given that none of the studies were RCTs. The MMAT provided us with an adaptable tool to be able to reach a judgement on quality. The included papers were most appropriately categorised as quantitative non-randomised studies (and not quantitative descriptive studies), but none were traditional intervention studies. This meant some of the MMAT items may not have been entirely appropriate for all papers. Included papers also represented a range of designs and using the same criteria to assess the quality of longitudinal designs, with multiple assessment timepoints, and less complex cross-sectional studies may not have always adequately provide an account of the quality of all of the studies. The subjective narrative assessment of quality also highlighted the limited evidence base for some of the sleep-related practices explored. This meant that some practices only had evidence from an individual or small number of studies, which suggests that results should be interpreted with caution. In addition, the evidence base for some sleep-related practices was limited by a lack of representative samples, lack of clarity in the definitions of key constructs, wide use of only subjective measures, and that some studies only explored associations between variables of interest. However, the results of the quality appraisals suggest there is a need for well-designed and representative studies to be conducted to allow us to make clearer assertions about the link between different parental sleep-related practices and child sleep outcomes.

5 | CONCLUSION

The findings of this review have provided an update on the evidence exploring the relationship between parental sleep-related practices and child sleep in infants and toddlers. Results confirm that a broad range of sleep-related parenting practices are associated with child sleep outcomes and therefore consideration of these broad parenting practices should both inform clinical formulations when devising management plans, as well as be fully incorporated into our theoretical models of child sleep. The review has also highlighted some of the methodological challenges hampering clarity in this field—especially the lack of standardised definitions of many key constructs—and suggests that consensus guidelines about operationalised definitions would help further research, and understanding, in the field.

AUTHOR CONTRIBUTIONS

Georgia Cook: Conceptualization; methodology; writing – original draft; funding acquisition; writing – review and editing; project administration; formal analysis; data curation; supervision; investigation; resources; visualization; validation. **Bernie Carter:** Investigation; formal analysis; writing – original draft; methodology; data curation; validation; writing – review and editing; conceptualization; resources; supervision; visualization. **Luci Wiggs:** Conceptualization; investigation; formal analysis; writing – original draft; methodology; data curation; validation; visualization; resources; writing – review and editing; supervision. **Shannon Southam:** Investigation; formal analysis; writing – original draft; methodology; validation; writing – review and editing; conceptualization; data curation; resources; visualization.

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CONFLICT OF INTEREST STATEMENT

All authors declare that this research was conducted in the absence of any commercial or financial interests that could be a potential conflict of interest.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

ORCID

Georgia Cook https://orcid.org/0000-0002-1651-866X

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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APPENDIX A

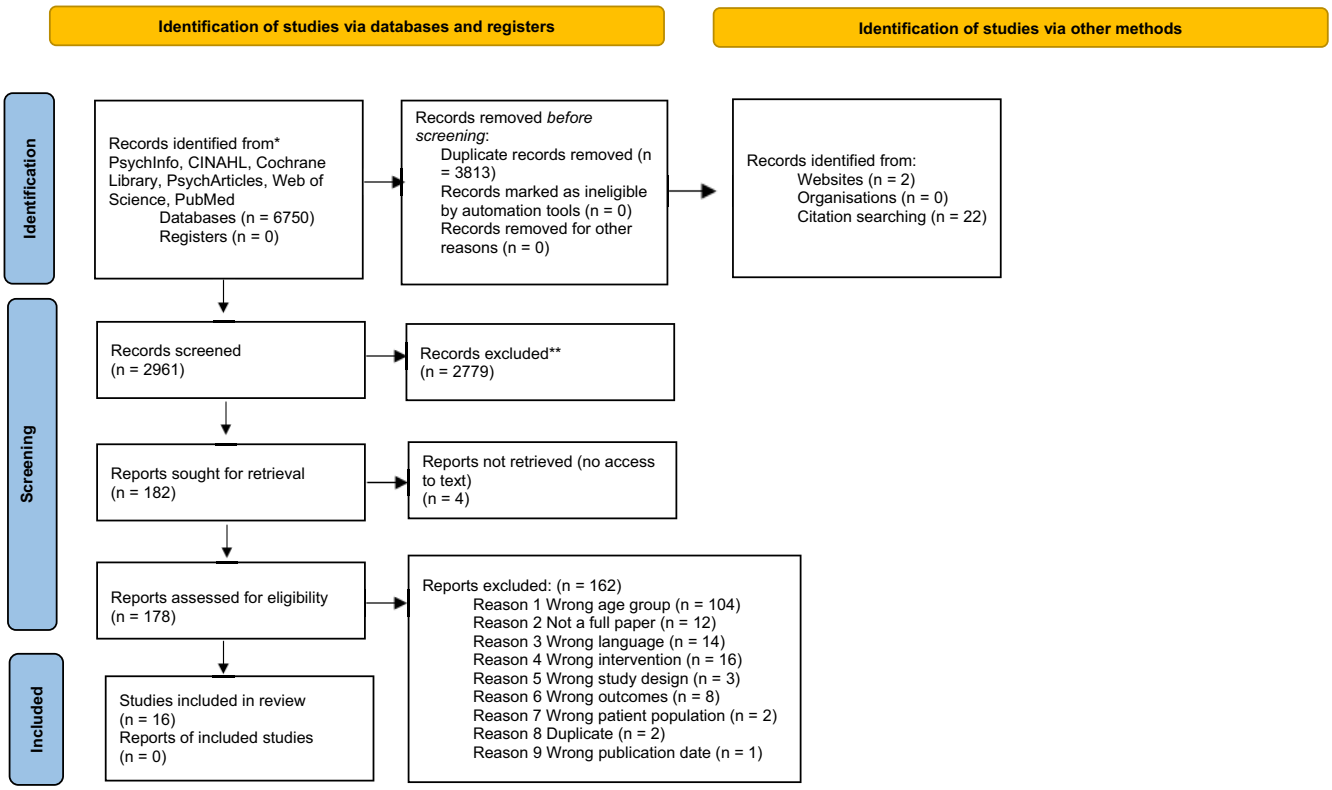

FIGURE A1 The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 flow diagram for new systematic reviews, which included searches of databases, registers, and other sources. *Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers). **If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.
From: Page et al. (2021). For more information, visit: http://www.prisma-statement.org/.

APPENDIX B: FULL LIST OF SEARCH TERMS USED IN THE REVIEW

Search terms (each numbered line terms searched with 'OR') searched in title/abstract:

1. **Child** (child* OR infan* OR toddler* OR pre-school* OR preschool* OR paediatric OR paediatric)

   AND

2. **Parent** (Parent* OR caregiv* OR care-giv* OR mother OR father)

   AND

3. **Sleep-related practice** (pract* OR behav* OR settl* OR sooth* OR bedtime OR "sleep hygiene" OR routine*)

   AND

4. **Sleep outcome** ("sleep* problem*" OR "sleep disturb*" OR "night wak*" OR "night awaken*" OR "sleep latency" OR "sleep onset" OR "bedtime resist*" OR "sleep efficiency" OR "sleep quality")

Medical Subject Headings (MeSH) terms

1. **Population**: Infant OR preschool child(ren) OR child(ren)
2. **Exposure**: parents OR mother OR father
3. **Outcome**: sleep quality OR sleep latency

Grey literature and reference list terms: Child AND sleep AND problem searched on the following sites: Action for Children, American Sleep Association, Baby Sleep Information Source, conference proceedings (via Web of Science), Google Scholar, Lullaby Trust, National Childbirth Trust, National Health Service, National Institute for Health and Care Excellence, Paediatric Sleep Council, Royal College of Nursing, Royal College of Paediatrics and Child Health, and The Sleep Charity.