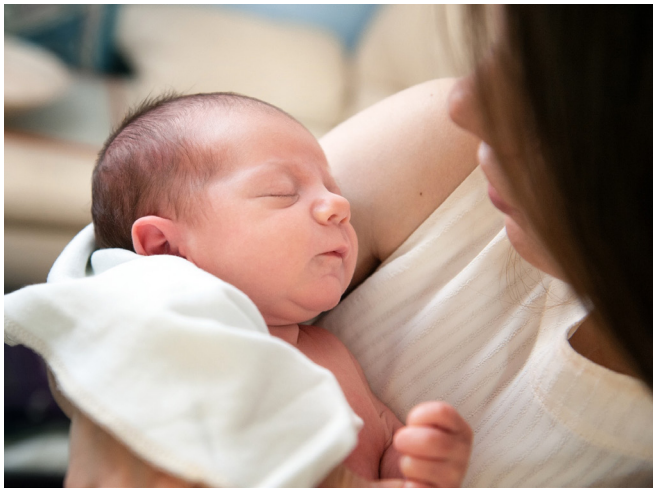
Infant and Early Mental Health Promotion
IEMHP

A program of SickKids

Understanding Infant Sleep in the First Year: A Guide to Inform Conversations with Expectant and New Parents

Section 1: Background – What We Know About Infant Sleep

Many professionals working with infants (less than 12 months old) agree that an infant's sleep pattern in the first year of life is predictably unpredictable. In fact, researchers report that a variety of behaviours, patterns, and physiological changes are unique to infant sleep, and during the first 3 years a child's sleep pattern will undergo significant changes (Owens & Burnham, 2019; Sadeh et al., 2010). It can be difficult helping expectant and new parents understand what sleep can look like and why sleep can be so unpredictable.



Establishing a sleep routine for a baby is a process that may change many times as the baby grows and their needs change - which is an important aspect for parents to understand.

Therefore, conversations about what to expect in terms of infant sleep in the first year should ideally begin before the baby is born. As all family members may be negatively impacted by an infant's disrupted sleep, it is essential to explore:

- Parental expectations about infant sleep;
- How to avoid idealizing sleep patterns;
- Supports available during the day and night;
- What are the family's sleep routines; and
- Importance of sleep to a parent.

Sleep is important for infants' physical and cognitive growth including, memory, language development, and executive functioning (Tham et al., 2017). A challenge is that there is no one standard sleep-wake formula (e.g. 2 hours of sleep followed by 1 hour of activity). The sleep-wake routine will vary for each baby and is influenced by many factors, for example, breastfed babies may wake up more frequently for feeds and all babies (breast or formula fed) will tend to wake more during a growth spurt. Likewise, some babies will be more sensitive to light or sound. As such, it is beneficial to provide parents with suggestions about routines that support positive sleep habits which ultimately help babies fall asleep and stay asleep for a reasonable period of time (Zuckerman et al., 1987). During the first few months, sleep-wake cycles can range from 2 to 4 hours, and establishing a routine that helps the baby learn to fall asleep and stay asleep is important (Mindell et al., 2017).

For example, some families hold the baby until they are asleep and then gently put the baby in the crib only to have the baby wake up. As a result, parents feel that the only way to put their baby to bed is to hold them until the baby falls asleep and this pattern can be very demanding and difficult to sustain. **In the first year of an infant's life, caregivers especially struggle with:**

- Understanding what are typical sleep behaviours;
- Establishing reasonable sleep expectations for their infant;
- Identifying the difference between normal and problematic behaviours;
- What to consider when trying to create a sleep routine to reduce parental stress and lead to better sleep outcomes for the whole family.

This guide aims to prepare professionals to discuss infant sleep with families by educating them on the science behind sleep and providing families with suggestions to support healthy sleep habits for families and their infants.

The Science of Infant Sleep

In Utero

While in utero, fetuses develop sleep patterns thanks to their circadian rhythm, the internal clock that regulates periods of activity/waking and inactivity/sleeping (Davis et al., 2004). There is general agreement among researchers that an infant's sleep states can be identified in the last trimester of the prenatal period. In a 2003 review, Mirmiran et al. (2003) found that at 32 weeks gestational age sleep states (quiet and active sleep states) can be differentiated from each other, suggesting that the circadian clock is already beginning to function prenatally. Additionally, Owens and Burnham (2019) concluded that significant length of active sleep remains constant during the last weeks of gestation which is in direct relationship to the rapid brain development that is occurring during this time of development.

The circadian rhythm is significantly regulated by the presence or absence of light; light indicates a waking period, and lack of light indicates a sleeping period (Davis et al., 2004). While in utero, a fetus has no sense of night and day and the sleep routines and therefore their sleep pattern does not coincide with night and day hours (Davis et al., 2004; Zero to Three, 2016).

To assist infants to accommodate and adapt to the external world (specifically night and day) parents can help establish daytime and nighttime routines early on to help their baby begin to develop this rhythm (Zero to Three, 2016).

First Year of Life

Infants during the first year of life spend a majority of their time asleep, as optimal sleep (duration and quality) is related to physical growth, tissue growth and restoration, cognitive development, learning, memory processing, attention, and emotional regulation (Davis et al., 2004). While there is no clear agreement in the field regarding the distinct categories of sleep-related states, they can be generally categorized as drowsy state, quiet sleep, and active sleep (Thoman, 1990). Drowsy state is the initial stage to an infant's sleep pattern before cycling through the quiet and active sleep states (Davis et al., 2004; Thoman, 1990). Helping parents understand sleep states can provide them with a way to understand and respond when they see movement or hear their baby making noise during a sleep period, and how sleep is connected to growth and development.

The 3 sleep states can be described as the following:

Drowsy state

This sleep-related state consists of 2-5% of sleep and is the awake state from which babies may either fall asleep or awaken further (Anders et al., 1995; Davis et al., 2004). The goal is for parents to understand their infant's sleep patterns and to read their baby's cues about readiness for sleep rather than enforcing an idealized unrealistic sleep pattern for their infant during this period. In the drowsy state, the baby's movements are generally smooth with mild startling and the face often appears still other than the eyes which open and close occasionally or are slit-like (Davis et al., 2004). If a baby is stimulated with activity, light, or noise, the baby will move to the quiet or awake state. When left unstimulated, a baby may fall asleep. As the baby grows, this state develops into either quiet or active sleep (Davis et al., 2004).

Quiet sleep

Characterized as non-rapid-eye movement sleep, infants in quiet sleep will be relaxed while staying nearly still and have minimal or no eye or facial movements (Davis, Parker, & Montgomery, 2004). Other features include slow breathing, lowered heart rate and less responsiveness to sensory stimuli such as noise, touch, or scent. In this phase, only very intense or disturbing stimuli will wake the infant (Davis et al., 2004). This is the initial stage of the actual sleep period and accounts for about 20% of the total sleep time for infants, and increases with age (Anders et al., 1995; Coons & Guilleminault, 1984). Quiet sleep supports (National Institute of Neurological Disorders and Stroke, 2019):

- Organ and tissue growth and restoration;
- Physical growth through release of growth hormones;
- Digestion (Davis et al., 2004).

Active sleep

It accounts for the highest proportion of newborn sleep at about 75-80% of total sleep time, and decreases with age till it is only 20-25% of the total sleep time when the child is 5 years old (Anders et al., 1995; Davis et al., 2004). Usually preceding waking, it is often described as rapid-eye movement sleep and is distinguishable by the fluttering of the eyes beneath closed eyelids (Davis et al., 2004). During this state, the infant is predominately in a 'paralyzed' state with the only movements coming from spontaneous muscle twitches and vocalizations (Davis et al., 2004). Infants have increased heart and breathing rates, which can rapidly change during this period (Davis et al., 2004). Rapid-eye movement sleep occurs more commonly at night compared to daytime sleep periods (Coons & Guilleminault, 1982). Active sleep supports (National Institute of Neurological Disorders and Stroke, 2019):

- Processing and storing of information (Thoman, 1990)
- Cognitive development for improved learning and problem solving (Thoman, 1990)
- Active sleep is also thought to play a role in healthy brain development (Kurth et al., 2015; Peirano et al., 2003).

Common Challenges with Infant Sleep

Challenges with infant sleep are essential to discuss with parents as infants who are unable to establish sleep patterns by six to eight months are likely to adopt difficult sleep behaviours as toddlers and potentially evolve into more significant challenges (Sadeh & Anders, 1993).

Non-Adaptive Sleep Patterns

For many families with a new baby the most typical complaint is of their baby waking during the night. As a reminder, some babies will wake more frequently at night due to hunger and infants under 4 months will typically sleep for about 3 hours or less between feedings (Owens & Burnham, 2019).
On average, infants and children will be aroused multiple times throughout the night as a normal part of their sleep rhythm; often, this waking is brief and the baby will fall back to sleep with little or no intervention.

Challenges occur when infants assume non-adaptive sleep associations and are more likely to wake up at night and have difficulty self-soothing (Fehlings et al., 2001; Sadeh et al., 2010). This develops when parents introduce or establish situations or scenarios to help the infant go to sleep, that the infant can then not recreate at night without the caregiver present (Sadeh et al., 2010). For example, the baby may need to be rocked to get to sleep and once asleep, the parent puts the baby down. Due to their dependence on these specific situations or scenarios, these babies are more likely to wake frequently during the night (France & Blampied, 1999; France et al., 2003).

If during each waking the baby is unable to recreate the situation or scenario they have learned to depend on to fall back to sleep, an exhausting situation for both infant and parent can result (Sadeh et al., 2010). When infants are put to bed while drowsy, but still awake, they learn to fall asleep (Sadeh et al., 2010). In addition, Owens & Burnham (2019) found that when the parental response included holding or rocking the baby this further reinforced this routine for the baby.

Culture may also need to be considered since some cultures do use the family bed when children are very young. In these instances, the practitioner needs to ensure that they provide the family all information about the increased risks for Sudden Infant Death Syndrome (SIDS) so that the family is making an informed decision.

Settling Difficulty

The second challenging sleep issue for parents with young children is that of “settling difficulties”, which typically involve children who delay or refuse bedtime (Owens & Burnham, 2019). These types of behaviours are more likely to be seen with children 2 years and older who try to prolong the bedtime routine; it can be further complicated if parents have not created and/or enforced specific and consistent bedtime routines within the first two years of life (Crowell et al., 1987; Jenkins et al., 1984; Salzarulo & Chevalier, 1983).

What Influences a Baby's Sleep?

Many different factors will influence a baby's sleep and should be discussed with parents. These include:

1. Baby's age:

Sleep patterns and behaviours change throughout the first year of life with accordance with the infant's developmental age, however, the infant's growth rate, personal characteristics (i.e. health concerns), and environment can act to either support or prevent infants from following these previously described patterns (Sadeh et al., 2010).

2. Baby's/parents' temperament:

Infants with easier temperaments (i.e. regularity, ability to self-soothe) may be easier to put to sleep or present with fewer sleep challenges, as opposed to children described as having more difficult temperaments (i.e. slow to adapt) (Sadeh et al., 2010; Spruyt et al., 2008). Similarly, parents with temperaments that allow them to accommodate to the unpredictable nature of their infant's sleep habits are better able to respond to their infant's cues (Sadeh et al., 1994). The caregiver's perception of their infant's temperament and a positive perception or willingness to adapt to their infant's temperament and behaviours are the greatest influences linked to fewer sleep challenges (Sadeh et al., 1994).

3. Parents' sensitivity/understanding of baby's cues:

Sensitivity develops as a parent becomes aware of and attuned to their infant's needs and responds consistently when they are in distress (Sadeh et al., 2010). Parents who are more aware of their infant's sleep cues (i.e. rubbing eyes, fussing, etc.) are better able to understand their infant's sleep readiness and facilitate healthy, consistent sleep patterns.

4. Parental mental health:

Parents with mental health concerns or challenges can have a difficult time adapting to the infant's changing sleep habits as well as their ability to respond to their infant's distress or their cues of being sleepy (Cook et al., 2016; Hiscock & Wake, 2001; Hiscock & Wake, 2002).

The presence of support for the parent during day or night can mitigate against mental health problems and aid those who have challenges by providing them with relief (Keener et al., 1988; Owens & Burnham, 2019; Sadeh et al., 1994; Sadeh et al., 2010; Sorondo & Reeb-Sutherland, 2015; Van Tassel, 1985). As well, parents with mental health challenges may have difficulty responding to their infant's cues and therefore, support can help ensure that the infant is receiving support when expressing distress (Owens & Burnham, 2019; Sadeh et al., 2010).

5. Sensory processing issues:

Infants with sensory processing issues (including fetal alcohol syndrome, autism spectrum disorder, prematurity, etc.) can have difficulty experiencing and responding to sensory stimulation (visual, audial, tactile) (Owens & Burnham, 2019; Vasak et al., 2015). Infants with increased sensitivity are likely to have more sleep challenges and poorer sleep quality because they avoid and/or seek out specific sensations (Vasak et al., 2015).

6. Mismatch between parent expectations and child's sleep patterns:

Parents whose expectations do not match their infant's sleep patterns are more likely to struggle with the nature of their infant's unpredictable sleep patterns (Mindell et al., 2017; Owens & Burnham, 2019; Sadeh et al., 2010). These parents struggle with understanding their infant's needs or cues and are unable to identify, establish, and commit to a sleep routine that aligns with their infant's needs, leading to increased risk of sleep challenges for both the infant and parent.

7. Household routine/sleep routine patterns:

Parents who have household routines are more likely to establish a sleep routine for their infant and follow it. Sleep time routines (i.e. time of day, length of naps, location, sounds, bath-time, etc.) can help to prepare an infant for sleep which can

assist the infant to create a regular pattern. Additionally, a strong factor is the level of parental assistance infants require to fall asleep; infants who are put to sleep while being rocked or fed, for example, are more likely to have increased number and length of awakenings (Sadeh et al., 2010).

8. Parents' sleep history:

Parents with healthy sleep habits prior to and post-birth are better able to respond to their infant's needs and decrease both the risk of developing mental health concerns and their infant experiencing sleep challenges and wakings through the night (Hiscock & Wake, 2001).

9. Feeding:

Breastfed babies will wake up more often since breast milk is metabolized faster than formula.

10. Safe Sleep:

For detailed information about safe sleep for infants, a guide produced by the Public Health Agency of Canada provides detailed information: Safe Sleep for Your Baby (Public Health Agency of Canada, 2018). Additional resources are also available through www.BestStart.org.

What Is Typical?

The first year of life for an infant is a period of rapidly changing and often unpredictable sleep patterns that can often leave parents feeling exhausted and overwhelmed. Given the considerable variability in sleep patterns among infants, it is important for parents to understand the different sleep patterns that occur in the first year to normalize expectations of the baby's sleep patterns, their need to feed, to engage, and the parents' feeling of exhaustion.

Infant Sleep: Birth to 3 Months

Infants during this period sleep approximately 16-18 hours over a 24-hour period with periods of waking and sleep throughout (Tarullo et al., 2011). As infants are not born with a fully established circadian rhythm, they sleep both during the day and night in irregular intervals; while a greater portion of this time will be at night, as much as 5-8 hours may be during the day (Davis et al., 2004; Douglas & Hill, 2013). A majority of their overall sleep time will be spent in the active sleep state versus the quiet sleep state (Tarullo et al., 2011). During the first 3 months, the amount of time a baby sleeps is not likely to change significantly but the distribution of sleep across a 24-hour period is likely to change with more sleep occurring during the night hours (Anders & Keener, 1985; Coons & Guilleminault, 1984). Total sleep may decline after three months but a baby will still typically sleep 12 to 14 hours over a 24-hour period, with an average sleep duration of 2 – 4 hours (Anders & Keener, 1985; Burnham et al., 2002).

This period is strongly associated with brief periods of increased crying, fussing and nighttime waking for feeding (Douglas & Hill, 2013). It is suggested that cue-based care, where parents respond appropriately to their infant's cues, is particularly important during this period as it can assist the infant to develop the ability to self-soothe and for parent-infant co-regulation of feeding and sleeping behaviours (Douglas & Hill, 2013). It is typical for infants to wake up every 2-3 hours throughout the night to feed as they require the nutrition to support their growth (Tarullo et al., 2011). The idea that a baby's need to feed during the night is a "problem" or requires "sleep training" should be discouraged. Atypical sleep patterns such as a baby having very little wake time or less than average sleep time, weight gain or loss may indicate that further medical investigation is needed. A change in the baby's colouring may indicate an emergency medical situation that should be addressed immediately. Towards the end of this period, by the 2nd to 3rd month, infants begin to develop a rhythm and shift to spending more time sleeping during the night (Davis et al., 2004).

Infant Sleep: 4 to 12 months

At this age, infants' sleep patterns are shifting to respond to environmental cues such as feeding and sleep time routines (Davis et al., 2004). Many babies with consistent and predictable routines will have established a sleep pattern and will sleep for longer periods during the night and be alert for extended periods during the day (Douglas & Hill, 2013). Additionally, the amount of waking for crying, fussing, and nighttime waking has declined during this period (Douglas & Hill, 2013). For many babies, the greatest period of uninterrupted sleep occurs between 3 and 6 months at night (Anders & Keener, 1985; Galland et al., 2012). At 6 months, infants are able to sleep about 6 hours continuously at night with only a single waking for feeding (Davis et al., 2004). By 12 months, an infant will sleep approximately 14-15 hours a day with 1 or 2 day time naps (Davis et al., 2004). They may be alert for as many as 10 hours at a time and have developed greater attention and alertness (Coons & Guilleminault, 1982).

In some cases, the infant may have been sleeping through the night and then suddenly, regresses with nighttime awakenings. When this happens, parents need to respond to their baby, reassure them they are there, and help them go back to sleep using supportive strategies from their established night time routines including including putting the drowsy baby - not the sleeping baby - in their sleep space. A spike in night awakening for feeding could indicate a growth spurt.

A shift begins to occur with regards to the sleep states, as the proportion of active sleep decreases while quiet sleep increases (Davis et al., 2004). Infants begin to develop sleep cycles that replicate adult sleep cycles, with early quiet or non-rapid-eye movement sleep periods followed by later active or rapid eye movement sleep periods (Davis et al., 2004). As well, the duration of a cycle (quiet to active sleep states) and the number of cycles during a single sleep period increases to replicate that of adults (Tarullo et al., 2011).

How to Differentiate between Typical Sleep Challenges and When There Is a Problem

As mentioned, sleep patterns differ within the first year of life due to the infant's developmental age and their individual needs and characteristics, making it sometimes difficult to differentiate between typical and problematic sleep challenges.

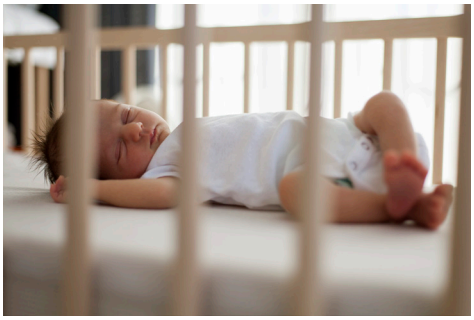
While during the first 6 months, night waking is quite typical it is expected that this gradually decreases until the infant is about 1-year old, when they will be sleeping through the night. If, after a year, a baby continues to struggle to fall asleep at night, the family may want to review their baby's routine with a professional (physician, nurse, etc.) to identify any changes that may ease the transition to sleep (Schwichtenberg & Goodlin-Jones, 2010).

Sleep patterns can also be problematic if the infant's difficulty sleeping or frequent waking is affecting family members and parents report feeling exhausted. Exhaustion from frequent waking will have an impact on the family dynamic and the parents' energy to support a sleep routine consistently (Schwichtenberg & Goodlin-Jones, 2010). In such situations, suggesting a small change to the night time routine to bring about some relief to the family would be a reasonable place to start and then the adults can work to extend the time between night waking. While some level of parental exhaustion is common, if there is reason to believe a parent or caregiver is struggling or is experiencing postnatal depression or other mental health concerns, dealing with a baby's irregular sleep patterns may be particularly challenging. It is essential that the adult connect with their primary health care provider or mental health practioner to explore supportive strategies and resources.

Section 2: Guiding Questions for Discussions about Infant Sleep

For some, no matter how prepared they are for the arrival of their baby and the unpredictable schedule it can bring about, the transition is difficult. Below are some guiding questions to use when discussing the topic of infant sleep with any family, and in particular, families who may be feeling challenged by their baby's sleep routine:

1. When you were expecting, what were your expectations about the first three months and how does the reality compare?
2. What parts of your baby's routine are working and what parts are you finding to be a challenge?
3. Is sleep time an easier or harder part of the day to manage?
4. How is your baby's sleep pattern affecting you?
5. How do you put your baby to sleep?
6. What kind of environment and routine do you set up to create a rhythm for your baby to fall asleep? How is your baby's sleep pattern affecting you?
7. Until your baby's sleep patterns begin to settle, what supports do you feel would be helpful?
8. How do you perceive your stress levels?
9. Are you experiencing any sadness, irritability, etc.?
10. How do you personally deal or manage stress?



Section 3: Strategies to Support Healthy Sleep Routines for Babies and Their Families

Every baby will need help to establish a healthy sleep routine and there are a number of strategies parents/caregivers can implement to help their baby do this.

Creating an Environment that Supports a Baby's Sleep

- During the day when baby is awake, keep the room bright.
- During naps and at night, try to keep the room dark.
- Make sure the baby is not too hot or too cold, and that the temperature in the room is comfortable for the baby.
- Ensure that the sleep surface is safe and the area is free of hazards.

Creating and Maintaining a Routine that Supports a Baby's Sleep

- During a baby's first few months, parents will need to learn to recognize the baby's cues to help create daily routines and be consistent with responses. During alert periods, parents/caregivers should spend time with their baby engaged in serve and return activities (5 Steps for Brain-Building Serve and Return) to promote their baby's development and attachment relationship with their parent/caregiver (Harvard University Centre on the Developing Child, 2020).

- Create a routine for winding down before a sleep time, even for a newborn, and use it consistently. That routine may include a bath, massage, reading a book (even with a newborn), or a quiet activity with a caregiver (Mindell et al., 2017). This routine may include activities of a slower pace and should begin before they want their baby to sleep. For some babies, a gradual slowing down of an hour or more may be necessary.
- Look at all the cues and routines of the day, how they flow together and the pace of each to help understand the baby's most active time and when a baby needs some quiet/sleep time. Overstimulation can distress a baby who is already tired and needs sleep.
- Screen viewing is associated with less sleep, particularly among infants under 6 months (Chen et al., 2019). Have conversations with parents/caregivers about their baby's use of phones/tablets during the day and during sleep routines.

Creating a Calm and Peaceful Setting for Baby's Sleep

- Begin routine in a calm and quiet space where lights are dimmed and distracting noises or attractions are minimal.
- Playing soft music, even the same music, at bedtime becomes a cue for some babies that it is time to sleep.
- Within the context of a baby's sleep routine, it will be important to encourage parents/caregivers to think about what else might be happening in their baby's world that could affect their sleep routine, such as teething, a guest in the house, sickness, changes in the family dynamics, family conflict, parental health, and mental health.

Putting a Drowsy Baby in Their Sleeping Space, Not a Sleeping Baby

- Encourage parents/caregivers to put their baby into their sleep space before they are asleep. When the parent/caregiver notices their baby getting drowsy, they should put their baby into their sleep space.
- Parents/caregivers can continue to rub baby's tummy or forehead and/or sing to their baby until their baby shows signs of getting sleepy. They may also try to put their baby down and say goodnight.
- If their baby cries, they should be encouraged to go back and comfort their baby by rubbing their tummy or forehead and to say goodnight again.

Responding to Baby When They Wake

- If restless during a sleep cycle, encourage caregivers to give their baby a few minutes to self-soothe to go back to sleep. But, if their baby becomes distressed and is hungry or needs a parent/caregiver's help to go back to sleep it is important to respond to these needs, particularly in the early months (Owens & Witmans, 2004).
- Parents/caregivers should monitor their baby's sleep and wake routines, including the frequency, and they should try to consistently respond to their baby in a sensitive way when their baby is distressed.
- For some babies, having the same caregiver for the bedtime routine may be helpful and likewise, to have the same person respond to night waking, with a consistent response, may help. In two-parent or extended families, one person may take responsibility for the bedtime routine while another caregiver would be responsible for the night waking and/or feedings.

Conclusion

Parents/caregivers should not feel pressured or worried if other parents say that their baby sleeps through the night, especially during the first 6 months, as that is actually not the typical experience. Every baby is different, even within the same family. To help infants and young children establish healthy sleep patterns, parents/caregivers need to understand their baby's developmental needs related to sleep, acknowledge when sleep is a concern, and have access to supports. While sleep issues can be challenging, there are strategies for help. A baby's cry is not intended to upset the caregiver, but rather the baby's way to communicate a need to their parent/caregiver. It is important that parents/caregivers try to respond to their baby in a consistent, sensitive manner to offer comfort while they work to establish a healthy sleep routine. Consistently responding to their infant will create a sense of security for the baby as they learn to rely on their caregiver for comfort when they signal they are distressed. Developing this relationship is a significant step toward promoting early self-soothing strategies that become foundational to later emotional and behavioural self-regulation.

Limitations

There are several limitations to the scope of inquiry that this paper addresses, which include:

1. This paper focuses on the sleep patterns for parents/caregivers with a baby under the age of 1 year, and does not address the sleep habits for children beyond this age.
2. The evidence reported is based on a full-term baby with no medical issues.
3. Poor sleep can also be an indicator of other issues requiring medical attention. Parents should be encouraged to consult their medical provider if their baby's sleep patterns are a significant concern to ensure there are no other medical issues.
4. The bidirectional relationship between unpredictable infant sleep patterns and parental mental health and wellbeing is not thoroughly investigated and intervention strategies are not addressed.

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