

Infant Bed-sharing vs Cot-sleeping in the Home Environment

The space between a sleeping mother and baby sharing a bed is a very intimate one of which few individuals outside those involved have knowledge. Early bonding between mother and baby has been the focus of scientific interest for many years¹⁻³ but there are few investigations of this relationship during sleep – partly because of the intimacy involved and partly because of the technology required to investigate this space. This short review of a behavioural and physiological observational study undertaken in New Zealand provides some insight into, and space for reflection about the potential risks and benefits of this shared space in child-raising.

In the early 1990s, investigations to identify risk factors associated with Sudden Infant Death Syndrome (SIDS) threw a spotlight on bed-sharing. Little was known about why families bed-shared or what they did, but in certain circumstances, bed-sharing emerged as a risk factor for SIDS, particularly following maternal smoking in pregnancy. Maternal smoking had been identified as doubling the risk of SIDS for infants sleeping in a cot*⁴, but maternal smoking in combination with bed-sharing was shown to increase the risk of SIDS five fold⁵. Considerable interest has developed in trying to understand the dynamics at play in this intimate space between mother and baby.

Several large epidemiological studies have since identified a range of factors that place bed-sharing infants at increased risk of SIDS. As well as maternal smoking in pregnancy, other factors include maternal alcohol or drug consumption or overtiredness, household overcrowding, soft bedding, infant overheating or infant being younger than eight weeks.⁶⁻¹¹

However, studies investigating parental views on bed-sharing highlight that many groups value the practice either as a traditional practice or as part of a child-centred parenting style.¹²⁻¹⁴ Commonly expressed benefits included easier breastfeeding, increased maternal sleep, more settled infants and an increased sense of security. These benefits emphasise the need to establish safe guidelines for bed-sharing for those who value the practice.

* A “cot” is what North Americans refer to as a “crib”.

Further scrutiny of the bed-sharing space comes from observational studies of mothers and babies sleeping overnight in sleep laboratories. These studies demonstrated increased breastfeeding, increased infant arousals and increased maternal checking of the infant during bed-sharing compared to the infant sleeping in a cot.¹⁵⁻¹⁸ The studies were done in the controlled environment of a sleep laboratory and were of cross-over design where infants were randomly assigned to bed-share with their mother on one night and to sleep in a cot on the other night.

Our group moved the focus of such investigations to explore the dynamics during bed-sharing in the natural setting of the home, with infants sleeping in their usual situation, whether bed-sharing or sleeping in a cot. This was to identify risks and benefits of bed-sharing, and ways that bed-sharing could be made safer. Overnight home video and physiological recordings of 40 bed-share infants (5-27 weeks) and 40 cot-sleep infants matched for age and study season were made. The video was analysed to provide a log of infant/parent sleep positions, movements and interactions. The physiological recordings measured breathing pattern and airflow, inspired CO₂, oxygen saturation (SaO₂), heart rate and rectal, shin and environmental temperatures. The studies were set up by the researchers in the evening, but then families were left unattended during the night. The aim was to make families as comfortable as possible and allow them to carry out normal routines.

Published results from the study¹⁹ included many potential benefits – consistent with the laboratory studies^{15-17,20} but also identified potential risks. Advantages largely centred around increased breastfeeding and infant checking by the mother. The overall health benefits to the infant of breastfeeding are widely acknowledged and many studies have shown breastfeeding to have a protective effect against SIDS^{11, 21-23}. Successful breastfeeding campaigns appear to have led to increased bed-sharing rates²⁴. Parents who choose to bed-share also tend to choose to breastfeed^{14, 25-27}, and bed-sharing mothers almost universally quote ease of breastfeeding as an advantage. In New Zealand, bed-sharing for most of the night at three months of age has been shown to be three times more likely to be associated with increased duration of breastfeeding than cot-sleeping for most of the night²⁸. However, it should be noted that the numbers of bed-sharing infants in this study were small (3.8% of a sample of 350 women), perhaps due to the demographics of the sample group and perhaps due to the controversy surrounding bed-sharing at the time – despite the Ministry of Health SIDS education campaign that only targeted bed-sharing with a mother who smoked in pregnancy. Extended persistence of breastfeeding associated with bed-sharing has also been reported in the UK^{29,30}.

In our study, bed-share infants most commonly slept on their side – a position that likely facilitated breastfeeding, but which has been discouraged in cot-sleeping infants due to the risk of rolling to the prone (front) sleeping position, putting them at very significant risk for SIDS³¹. It is not known if the risk is the same for bed-sharing infants. Bed-sharing infants woke more frequently, but for less time at each awakening, thus there was no significant difference in total sleep time. Sleep deprivation is associated with increased obstructive respiratory events in infants³² and decreased arousals³³ but there is no evidence that the increased waking to breastfeed observed during bed-sharing has any detrimental effects

on infants. These observations of increased breastfeeding and maternal-infant interactions were consistent with laboratory studies and the reports from parents regarding the perceived advantages of bed-sharing.

Unlike the laboratory studies however, our home-study identified an increased number of episodes where the infant's head became covered by bedding¹⁹. These episodes often occurred at the end of a breastfeeding session. Results of the recent large European case-control study identified the risk of SIDS associated with being found head-covered to be 12.5 times that of being found with the head clear⁷. The danger could be a result of overheating, rebreathing of expired air³⁴ or perhaps an inability to arouse³⁵.

Bed-share infants in our home study were found to sleep in colder rooms but with thicker bedding, which resulted in a warmer immediate environment, indicated by higher shin temperatures than the cot infants¹⁹. Despite this thicker bedding and increased head covering episodes all infants were successful at maintaining normal rectal temperature.

These results suggest that when the infant shares the mother's sleeping space he/she is exposed to a warmer physical environment than infants in a cot, due at least in part to the close proximity of the mother and the thicker adult bedding. The increase in shin temperature of these bed-share infants suggests that they were actively losing heat by vasodilation. The fact that they maintained normal rectal temperature suggests their thermoregulatory responses were adequate.

These findings from the home-study do suggest a plausible mechanism for the increased risk of SIDS when bed-sharing with a mother who smoked in pregnancy. The triple risk hypothesis suggests that SIDS may be the result of a vulnerable infant, at a vulnerable stage of development, exposed to an external stressor to which he/she cannot mount an appropriate response³⁶. There is evidence that infants exposed to maternal smoking *in-utero* have impaired development of thermoregulatory control³⁷. Infants of smoking mothers may be compromised in the warmer bed-share environment, especially if an added stressor such as head covering occurs.

There is also evidence to suggest that even if a mother smokes outside the house, nicotine accumulates in the air, in dust, on the mother's skin, and on household surfaces³⁸, and this could include bedding. Measurement of cotinine (a metabolite of nicotine) in urine is used to indicate nicotine exposure. It has been reported that while urine cotinine levels of infants whose parents smoked only outside the house were one-sixth that of infants whose parents smoked inside, they were still eight times that of infants of non-smoking parents. The levels of nicotine in the living room air and on bedroom surfaces were a significant determinant of infant urine cotinine levels³⁸. Smoking by members of the household other than the mother has also been shown to increase the risk of SIDS⁷. This is likely to be linked to the increase in nicotine level due to the presence of smokers, even if they do not smoke in the house or have the close continuous contact as that between mother and infant.

Exposure to second-hand smoke could also come from the mother breathing closely over the baby for some time after smoking a cigarette. We found that bed-share infants most commonly slept on their side. It has also been reported that mothers and infants face each other during

bed-share sleep^{17, 20, 39}. The intimate space between mother and infant may be a source of additional compromise if the mother smokes in the postnatal period – either due to direct breathing over the infant, or through the accumulation of the products of tobacco smoke in the spaces around the infant – whether the mother smokes inside or outside the house. It is not known how long after smoking expired air still contains chemicals from cigarette smoke. Unless the mother is a smoker, direct exposure of the bed-share infant to the mother's expired air is unlikely to be a stressor and may even be protective.

We had insufficient mothers who smoked during pregnancy (4) to be able to test for the effect of maternal smoking on infant responses. Although attempts were made to recruit widely for this study, the participants all appeared to be at low risk of SIDS. All bed-share infants were breastfed, there was little or no maternal alcohol consumption and 90% of mothers had some form of tertiary education.

The main reasons for bed-sharing in our group were related more to active parental choice rather than cultural or economic influences. These reports are consistent with other studies^{12, 13, 15, 40}. The bed-share group were all regular bed-sharers, with 90% of the infants bed-sharing every night for more than five hours. Our results reflect the physiology and behaviour of bed-share infants at low risk of SIDS.

For low SIDS risk families the intimate space between mother and baby during bed-sharing may be a nurturing environment that offers advantages of increased breastfeeding and interactions through the night with little disruption to mother or baby. However, for an infant of a smoking mother or a mother impaired by smoking, alcohol or overtiredness such close contact may lead to increased head covering or overheating and may prove lethal.

While the space between mother and infant is assumed to be a zone of safety, the wider context must also be considered. The adult space that the infant enters must be one where the infant with developing physiological and limited behavioural control is not exposed to undue risk. This requires attention to the thermal environment, to the air that the infant will breathe and to the ability of the mother to respond to subtle infant cues. For this intimate space to truly be a zone of safety for the infant, the practices both within and around the space must be adjusted to the infant's physiological requirements.

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