

Chapter 14

Mother-Infant Cosleeping with Breastfeeding in the Western Industrialized Context

A Bio-Cultural Perspective

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INTRODUCTION AND OVERVIEW OF ISSUES

*"For species such as primates the mother is the environment."
(Blaffer Hrdy, 1999)*

"The utero-gestate fetus, embraced, supported and rocked within the amniotic environment, as an extero-gestate requires the continued support of his mother, to be held and rocked in her arms, and in close contact with her body, swallowing colostrum and milk in place of amniotic fluid." (Montagu, 1986:293)

A human infant is biologically designed to sleep next to its mother's body and to breastfeed intermittently throughout the night, at least for the first year of its life. And however distant and removed contemporary, western urban cultural environments are from the overall variable environments within which human maternal care and infant vulnerabilities co-evolved hundreds of thousands of years ago, it still remains true that nothing a human neonate can or cannot do makes sense except in light of the mother's body (Konner, 1981; Hrdy, 1999; McKenna, 1986; Granju, 1999; McKenna & McDade, 2005).

As if anticipating this view forty years earlier and consistent with recent psychobiological "skin-to-skin" infant care studies (Anderson, 1988; 1989; 1991; Goto *et al.*, 1999), Winnicott observed, "There is no such thing as a baby, there is a baby and someone." This phrase is no less applicable in describing *in utero* fetal-maternal regulatory effects than it is in characterizing the nature of regulation occurring postnatally during what Montagu (1986) calls the phase of extero-gestation for the human

neonate or "...the continuation of the utero-gestative processes outside the womb" (Montagu, 1986:293).

While a major goal of this chapter is to explore scientifically the adaptive bases of breastfeeding in the context of nighttime mother-infant cosleeping, a slightly different but related goal is to illustrate continuities bridging pre- and postnatal infant sensory experiences. The reader should be alerted to the fact that much of the material in this chapter overlaps other research reviews (especially McKenna, Ball and Gettler, in press). In this chapter, however, we emphasize a developmental approach and argue that such pre- and postnatal continuities help to explain how and possibly why infants seem to be so responsive and prepared for their extero-uterine experiences which depends on sustained bodily contact with the mother, i.e., touching, being touched, smelling her, moving with her, sucking on her breasts, tasting her milk, looking at her, and hearing her voice.

Of particular heuristic relevance to many of the arguments we develop is Hofer's (1978) concept of "hidden physiological regulatory effects" in the mammalian mother-infant dyad (Gunnar, 1998). After birth, human infants appear to be pre-sensitized if not pre-adapted to particular "types" of rhythmic and arrhythmic maternal sensory stimuli involving olfaction, touch, taste, their mother's voice, heat, and movement, to name but a few. We use these data and related theories which inform us about why babies do as they do to propose why maternal proximity and contact remains as necessary and important today in promoting

breastfeeding and healthy infant sleep, growth, and development in general as it was in prehistoric times. These data provide a foundation for understanding why, when practiced safely, mother-infant cosleeping with breastfeeding ordinarily provides for all of the infant's and mother's needs in just the right amounts.

Because forms of mother-infant cosleeping are so controversial and so poorly and incorrectly represented in western scientific discourse, we explore the diverse types and kinds of cosleeping, being sure to distinguish between safe and unsafe "types," and we explore their role in human evolutionary prehistory and history. We contrast important differences between breastfeeding-bedsharing and bottle-feeding-bedsharing mother-infant dyads, highlighting the relative safety of infants in each of these sleep environments, particularly as explored by Ball (2006d) in the homes of parents and in a mother-infant sleep laboratory.

We argue that only where sweeping public health recommendations acknowledge and respect maternal capacities and biologically-appropriate emotions and motivations for mothers to sleep close to their infants will there be any hope that these recommendations can be adopted and implemented in ways which promote the survival and well being of the greatest number of mother-infant dyads. According to recent studies (Ball, 2002; McKenna & Volpe, in press), where a baby ends up sleeping on any given night is the result of many

intersecting factors, not the least of which involves what makes the mother and infant happy, but also the particular method of feeding (bottle, breast, or both) and the sensitivities or temperament needs of the infant and/or mother (Figure 1).

The factors and categories of influence depicted in Figure 1 should be considered in discussions of where babies sleep and why, especially the intersection of parental and infant biology. This perspective on what determines sleeping arrangements elevates the importance of parental feelings and interpretations of infant needs contrasts with the more traditional model which employs a "one-size-must-fit-all" answer to the question: where should a baby sleep (Scheer *et al.*, 2003; AAP, 2005). A perspective which considers family goals and the imperatives and uniqueness of each family has the advantage of empowering and informing parents rather than belittling and dismissing them as they learn how best to respond to and protect their infants.

More generally, we suggest that public health policies, messages, and recommendations will greatly benefit from adopting a more holistic and comparative anthropological understanding of human infant-parent biology - a view that is at least minimally compatible with, if not appreciative of, the evolutionary-based and mostly adaptive emotional experiences and expectations of the individuals for whom the recommendations are intended. Current ways of reading and interpreting evidence on the bedsharing and breastfeeding controversies by the American Academy of Pediatrics (2005) and other medical institutions, including a governmental agency concerned with deficient products in the United States (the Consumer Product Safety Commission) (Scheer *et al.*, 2003), not only assume incorrectly that powerful factors that motivate forms of cosleeping can always be denied, but that they should be, a point of view with which we disagree, as the data we present will illustrate.

As is argued elsewhere, the choice made by medical authorities to reduce a complex, heterogeneous practice, such as bedsharing, to a simple, allegedly coherent and always "dangerous" practice without modifiable components implies little or no faith in the intellectual and less ambiguous biological capacities of mothers to successfully and safely respond to their infants' needs, no matter what. Simplistic condemnations of bedsharing ignore and dismiss the nature of the mother-infant relationship itself and ignore recent important data

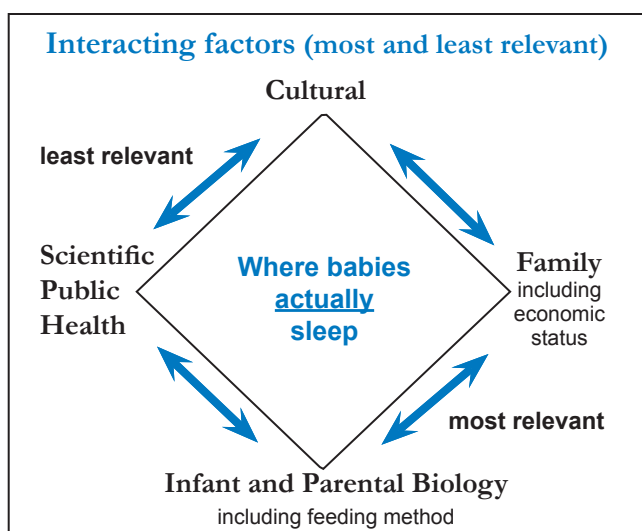


Figure 1. What determines where a baby sleeps per any given night? Most and least relevant factors.

From: Sally Baddock (New Zealand), Peter Blair and Helen Ball (Great Britain), Caroline McQuillan (Australia), James McKenna and Lane Volpe (USA)

showing that bedsharing in the context of breastfeeding looks and functions very differently from bedsharing when bottle-feeding is involved (Ball, 2006d).

Far too often, western medical recommendations, which define and advocate for what is institutionally deemed “safe” and “proper” infant care, derive justification from highly selective, population-wide epidemiological research to the exclusion of laboratory, home, or otherwise clinical or basic research lines, particularly when those alternative data raise questions about the applicability and/or validity of singular recommendations which are supposed to apply equally well across all families and circumstances, but do not (Fleming *et al.*, 2007). In this way, medical authorities ignore the rules required to practice “evidence-based medicine” (Fleming *et al.*, 2007) and confuse their own social judgments, personal preferences, and assumptions for more broadly based and agreed upon scientific findings.

BEFORE INFANT SLEEP: THE IMPORTANCE OF “GETTING A THEORY” FOR UNDERSTANDING AND ASKING RESEARCH QUESTIONS ABOUT HUMAN INFANCY AND PARENTING

As discussed elsewhere (McKenna & Gettler, in press), an ongoing problem with much of western pediatric research is that it remains *a-theoretical*, meaning there is no accepted theory around which questions, predictions, and interpretations of data can be organized. Indeed, a powerful and appropriate theory, all but ignored in medicine in general and pediatrics in particular, is the theory of evolution. The application of evolutionary principles and reference to the human infant's unique place in nature can serve as a powerful beginning point for addressing who the infant is, what the infant needs, and why the infant responds as infants' do to certain forms of care or interventions. That the reference to evolutionary processes is missing in medical discourse is surprising. As David Brown (1993) put it: “Though medical therapies (in most cases) are constructed from the data of biology, medicine in general pays little attention to what is probably the single most important concept in biology: the theory of evolution.” Without a solid empirically-based theory for understanding infancy, untested cultural assumptions rather than biological truths far too easily can appear credible and come to

underlie public health policies and recommendations, cascading at times into unforeseen but nonetheless disastrous recommendations or practices.

Take, for example, the western medical assumption that solitary sleep is normal or beneficial for human infants, rather than infants should sleep in the proximity of caregivers; or that bottle feeding is superior or at least equal to breastmilk; and, worst of all, that prone infant sleep is safe even without any empirical data ever having shown it to be. After being translated into sweeping public health recommendations, these three one-time cultural-based claims were responsible for the deaths of hundreds of thousands of babies who died from SIDS and other illnesses, as breastfeeding, sleeping in a room with an adult, and sleeping on their back reduce by at least half the risk of an infant dying before its first birthday (Chen & Rogan, 2004; Carpenter *et al.*, 2004; Fleming *et al.*, 1996).

Without an organizing theory, such as evolution, understanding research findings or outcomes becomes subject to explanations which accept conventional understandings, assumptions, or stereotypes much more quickly, rather than calling forth diverse scientific studies *that potentially* explain why some factors remain so much more important and influential in determining health and behavior than do others.

Indeed, recent western interpretations of what human infants' need and why reflect far more about what the societies' values want them to be, rather than what they actually are - an infant who from an evolutionary point of view is an exceedingly unfinished (altricial) organism whose biological identity cannot be known except through its connection with the mother. In fact, the virtual absence of the use of the concept of evolution in understanding infancy helps to explain why, as a methodological research tradition, scientific reductionism, i.e., reducing and isolating smaller and smaller parts or pieces of a biological system to its minimal functional role, has not for the most part served the science of human infancy nor pediatric research very well. This is because infants continue to be defined for study relatively separate from the maternal-infant sensory micro-environments in which their bodies were designed to function. Pediatric, developmental, and clinical research continues to overstress, for example, the “amazing” competencies of the newborn infant, preferring to see the infant almost as if it can or should

achieve independence rather than function as part of an age-appropriate dyad involving both the mother and infant, each sensitive and receptive to the mutual physiological regulatory effects of the other.

While contemporary infant science insists for political reasons on conceptualizing the infant as the unit of analysis, it is the mother-infant dyad that most accurately constitutes the true unit of study. In fact, diverse data show convincingly that the infant is so sensitive to changes induced by maternal contact that infant “social” care and engagement of the infant with its mother must be considered synonymous with its physiological regulation. This is because throughout human prehistory prolonged infant carrying, holding, and infant-led breastfeeding in the context of mother-infant cosleeping constituted a highly successful child care system doubtless designed by natural selection to maximize the chances of infant survival and parental reproductive success (McKenna & Gettler, *in press*).

Indeed, as we illustrate below, knowledge of our species’ evolutionary background and characteristics, including human prehistory, greatly enriches our understanding of how and why breastfeeding and some form of mother-infant cosleeping continues to be so ubiquitous worldwide (Konner, 1981). Evolutionary-based reconstructions of parent-infant characteristics helps us to understand how and why, even without formal instructions found in local childcare manuals so familiar to the industrialized west, mother-infant breastfeeding and cosleeping in conjunction with the supine (back) infant sleep position continue to represent an integrated and predominant human universal arrangement. Reference to human evolutionary processes makes this fact not only understandable but predictable, *i.e.*, the only way an infant can feed during the night, to get to and from its mother’s breast, is by being placed on its back, the safest position.

The mother’s body, in all but the industrialized western context, is thought to represent the central social-sensory protective reference point around and against which the infant’s physiological and psychological development is thought to optimally develop. This is a far cry from recent American hospital policies (see below) that treat the ‘mother’s body as a potential lethal weapon against which both she and her infant need protection’ (Model Behavior Program, First Candle & NSIDPSC, 2007).

In our (western) enthusiasm to substitute inanimate objects or technology for stimuli ordinarily provided through maternal contact and proximity, alongside social values favoring early infant autonomy and mother-infant separation, we must observe that clinical pediatric medicine pushes too far the notion of the human infant’s physiological independence from its care-givers. It is easy to mistake the infant’s preparedness to engage with what the mother’s body provides with actual adaptation (how the infant interacts with the external conditions of the environment within which it lives...such as weather, etc.).

In this review, we employ a bio-cultural approach integrating diverse lines of evidence, including evolutionary, psycho-biological, cross-species, cross-cultural, and historical data to help illustrate the limitations of adopting first and foremost a view of infants that is more congruent with recent western social values than with the infant’s evolutionary legacies. Laboratory and home bedsharing-breastfeeding studies are used to assess the biological appropriateness and functions of one form of cosleeping referred to as “bedsharing,” as well as to summarize the known mutual physiological regulatory effects of mother-infant bedsharing as they relate to breastfeeding patterns and SIDS risk factors.

Although it may at first seem a distraction, a thorough discussion of our changing historical-cultural perceptions of infants in western societies is especially pertinent. This background is critical to fully understand the controversies surrounding the issue of cosleeping in the form of bedsharing in western cultures, a childcare practice that has never been considered nor discussed on anything even closely resembling a level scientific playing field. Surely, our western cultural legacy of stressing the importance of mother-infant nighttime separation helps to clarify why medical agencies choose to warn parents about the alleged inherent dangers of “cosleeping” rather than concentrating their efforts on helping parents avoid the adverse factors that can make it dangerous. An alternative approach can be seen as an important way to protect and nurture the nature of the mother-infant relationship that underlies various cosleeping practices, an important point of contention in this chapter.

INFANCY AND PARENTING IN EVOLUTIONARY PERSPECTIVE: HOW AND WHY THE HUMAN MOTHER-INFANT DYAD EVOLVED TO BE SO INTERDEPENDENT

Like scientific research itself, infant-maternal sleep and feeding biology is inseparable from the specific cultural context within which it finds expression. And while cultural factors and contexts can change relatively quickly without genetic change, including the way we think about infant sleep and feeding issues, reference to human evolutionary processes provide a less biased lens through which to examine the worldwide range of child care practices. Findings related to the evolution of the mother-infant relationship, for example, are especially useful when evaluating the reasons why some infant care practices resonate more emotionally with parents than do others as they attempt to meet both the short and long term needs of their infants.

To define an infant's biological needs and to understand to what extent more recent cultural practices might place infants (or mothers) at odds with each other and their own bodies, it is critical to examine what is biologically unique about human infants and mothers, and more specifically, the social and physical context within which the infant-maternal biological characteristics (including infant vulnerabilities) evolved alongside specific parenting responses. Insofar as human infants are born so neurologically immature (only 25% of their adult brain size at birth), it seems sensible that infant needs and parental responses to those needs constitute a dynamic, co-evolving interdependent system which continues to be subject to tremendous cultural manipulation. While it is difficult to know exactly all of the ecological factors that confronted our evolving ancestors to produce present day mother-infant characteristics, the convergence of cross-species, paleo-ecological, and comparative primate anatomical studies give us some important clues.

Why So Immature at Birth? The Effects of Bipedal Locomotion on Human Infancy and Parenting

At birth, the human infant is the least neurologically mature primate of all. It develops the most slowly and is the most dependent on the caregiver for the longest period of time. The evolutionary characteristics and

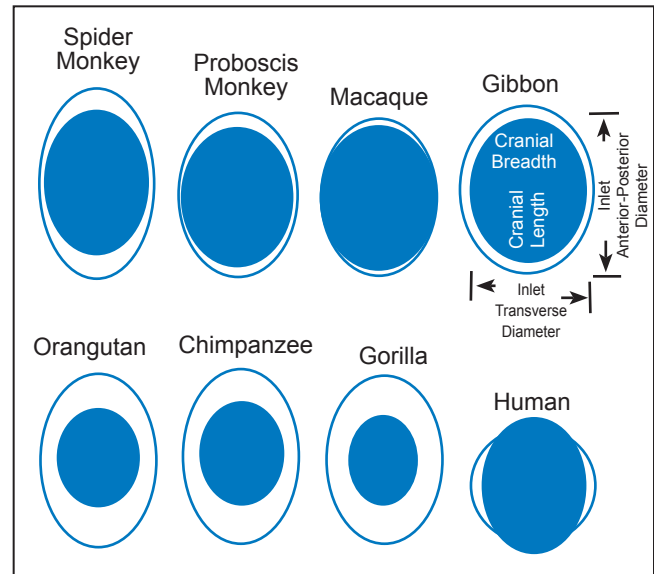


Figure 2. Comparative illustration of the relative ratio of pelvic outlet to fetal head size of different primate species. Only the human fetal cranium exceeds the diameter of its mother's pelvic outlet, complicating and making human birth more difficult.

antiquity of human upright bipedal locomotion, which developed two to six million years ago, seems an unlikely but appropriate beginning point for considering why. The evolution of upright posture cannot explain why humans breastfeed, as reference to a much earlier time period is required for that (Blaffer Hrdy, 1999). As reconstructed from the fossil record, anthropologists infer that the shift to bipedal locomotion precipitated a cascade of related developmental changes unique to human beings, which included the biological and behavioral prerequisites for culture defined here simply as a reliance on tools, language, and symbols for survival.

Consider that the pelvis of quadrupedal primates (monkeys and apes) who move on all fours is long and relatively narrow from one hip plate to the other, while the pelvis of a hominine-human primate to support bipedalism became considerably broader, flared, and more bowl-shaped in the front. The two ilia on each side of the human pelvis rotated forward to support more muscle attachment sites needed to hold the viscera in place while the body stands erect. Additionally, the hominine ischium or floor of the pelvis pushed upward a bit to accommodate the hip-femur sockets needed for efficient walking and running. But in pushing up the floor of the pelvis, the size of the outlet was diminished.

As **Figure 2** illustrates, only the human fetal head exceeds the breadth of its mother's pelvic outlet. These modifications, relative to non-human primates, made the process of human birth (parturition) on average longer in duration, more complex, certainly more risky, and ultimately more energetically costly for mothers and fathers alike (Trevathan & Rosenberg, 2003).

The concurrent morphological transformations (size and shape) of both the hominine cranium and pelvis from a quadraped to a human biped necessitated changes not only in the birth process, but also in parental postnatal survival skills and strategies aimed at keeping their vulnerable and slowly developing infants alive. Specifically, more complex learning and behavioral plasticity involving a more permanent capacity for year round sexual relations between men and women relatively committed to each other's economic survival produced for the first time what is now referred to as a "division of labor," a system which ultimately increases the survivorship of infants and children.

These changes were also required, among other things, to plan effective defense strategies against a variety of vicious predators and to find and keep high energy foods. Hence, relative to body size, both pre- and postnatally, the cerebral cortex of the human brain began to expand at the same time as the human pelvic outlet, the birth canal, was becoming smaller, creating an "obstetrical dilemma" for which the only apparent solution was to give birth to increasingly less neurologically mature human infants.

From the standpoint of comparative primate neuro-development and obstetrics, all human infants are born

premature! Unlike non-human primates at birth, this developmentally early "great eviction" of the human neonate as Karp (2003) aptly describes it means that human infants are unable to cling to their mother's torso, thermoregulate (keep warm by themselves), or locomote on their own. Human infants are unable to control their bowels or their breathing underlying their vocalizations, effectively make sufficient antibodies to fight disease, or communicate, except by virtue of crying or through vegetative sounds and non-verbal cues.

Anthropologists assume that one of the positive trade-offs of upright posture involved freeing the hands to make more sophisticated tools, as well as the ability to carry them or the material resources needed to make them, which contributed to the eventual abilities of humans to organize into highly flexible but complex social coalitions.

Approximately 80% of adult brain size is achieved by two years of age or so, but full adult brain volume is not in place until approximately 18-21 years of age. These data contrast with the much faster neurological development of our closest living primate ancestors, the chimpanzees, who are born with about 45% of their adult brain weight, with 100% of it being reached by 12-14 years of age (**Figure 3**).

All of these inter-related, hominine-human changes occurred in the context of what Bowlby (1982) called the "*environment of evolutionary adaptedness*," specifically, a hunting and gathering lifestyle somewhat akin to life by contemporary gatherers living on the Kalahari, at least we pretend so (Hrdy, 1999), and a set of ecological adaptations that dominated what was to be called the human experience for well over 99% of our existence as an evolving species. The cognitive abilities that made this lifestyle (dependent on language and tools) possible was based on an ever-expanding neocortex. Indeed, brain size tripled in volume during the three million years of human evolution, therein emancipating human behavior from strict hormonal or genetic control. Continuing neurological changes in the brain produced the possibility of and an eventual reliance on language, in addition to tools and technology, all of which defines the genus *Homo*. It accounts for our impressive range of cultural adaptations and expansion to habitats for which humans were not necessarily biologically equipped or designed.

It is from this perspective that we can begin to understand how and why human mothers care for their

Percent of Adult Brain Size:		
	Chimpanzee Infant	Human Infant
At Birth	45	25
3 months	50	35
6	60	45
9	65	50
1 year	70	60
2	75	70
4	85	80
8-9	100	95
*(100% at 14-17 years)		

Figure 3. Percent of adult brain size per developmental age achieved by the chimpanzee and human.

babies the way they do and why such an extraordinary investment is necessary. The kind of micro-environment in which such a neurologically immature, vulnerable infant could survive came to depend on the evolution of highly motivated caregivers on whose bodies after birth the infant's survival would depend as the immaturity of the neural structures controlling the infant's motor system prohibited the infant from walking, crawling, or following the mother except with its eyes. The human infant had to be carried and the duration of its biological dependence was elongated, including the period of time in which it was breastfed and educated. The evolution of parental emotions and responses provided a sensory-rich developmental context within which "extero-gestation" (Montagu, 1986) could occur.

Completing the Human Mother- Infant Adaptive Complex: The Composition of Human Milk Necessitates Nighttime Maternal-Infant Proximity Including Supine Infant Sleep

Human locomotor behavior (bipedalism) and the co-evolving behavioral sequelae are not the only characteristics that made it likely that maternal-infant carrying behavior and proximity would become so important to the human mother-infant dyad. The low amounts of fats and protein in human milk supports the idea that not just one, but a cascade of related behavioral and morphological changes associated with

increased contact and carrying co-evolved to support human infant needs hundreds of thousands of years ago. Compared with other mammals, not only is human milk low in fat and protein, but it is relatively high in carbohydrates, especially lactose, a key nutrient needed, among other things, for sustained but rapid brain growth. The concentration of lactose in milk is highest among primates whose infants at birth are the least neurologically developed and need to be carried and suckled practically continuously.

Schoen (2007) extensively reviewed the biology of human infancy and parenting from a cultural, evolutionary, and psychobiological perspective. She points out that among non-primate mammals, such as lions and several species of deer, the young are left in nests or burrows hidden from view. These types of species are generally called "nested or cached" species with the mothers returning to them at intervals of four to twelve hours. Schoen states: "But unlike human milk, the milk of these nested or cached species remains high in fat and protein (at least a third to one-half more proteins), allowing the young to be satiated for longer periods of time and for intervals between feeds to be great." Deer mothers, Schoen expands, have about 21% fat in their milk. Human milk, with only about 3% fat, is exquisitely designed for the undeveloped infant's intestinal tract, as the milk curds are small and easily soluble (Lawrence, 1974), which also explains why sucking rates of human infants are so much more frequent per unit of time compared with nested species.

Moreover, as Blurton Jones (1974) and Schoen noted, young animals that are typically left alone for much of the day often do not defecate or urinate readily without assistance, probably in order to avoid attracting predators sensitive to scents. "Defecation is often preceded for these species by the mother generally licking her offspring's perineal region, causing the offspring to release the sphincter muscle, which in turn permits either urination, defecation, or both" (Schoen 2007) (**Table 1**).

Blurton Jones (1974) makes the case even stronger by pointing out that offspring of "nested" species never cry spontaneously during the absence of their mothers. Both crying in the absence of the mother and defecating spontaneously occur among human infants, which would attract predators to the nests, leading to the deaths of the infants. As Schoen reminds us, these responses are appropriate for a species whose biological system is designed for continuous contact and carrying. These

Table 1. Biology of Mothers' Milk Predicts Mothering Behavior

Feed and Leave Species	Contact, Cosleeping, and Carry Species
Ungulates	Primates and Humans
High fat High protein Low carbohydrate	Low fat Low protein High carbohydrate
High calories = long feeding interval	Low calories = short feeding interval
To avoid predators, nested infants do not defecate or cry in mothers' absence.	Carried infants cry in absence of mother and defecate spontaneously.
Some species are designed to be "left" by their mothers in their nests or burrows; others, like humans, need to be carried and in continuous contact with their mothers due in part to the composition of breastmilk, particularly the density of calories delivered by the mother per breastfeed.	

adaptations represent evolutionary legacies unaffected by recent cultural preferences or styles of infant care that aim to separate infants from parents during the night.

In fact, the infant who cries when separated from its mother can be said to be acting on its emotions, attempting to ameliorate a potential life threatening event. This must be interpreted positively as the infant is acting in an adaptive and developmentally vigorous, if not predictive, manner. In contrast, it can be said that any western infant who quietly accepts or acquiesces to a “dangerous” situation, such as separation from its mother, might best be described as developmentally less competent. As many have argued, being alone, either during the day or at night, is a context for which human infants are not biologically designed.

How interesting it is, then, that two radically different explanations of this behavior are possible depending on the paradigm used. If infant crying in response to separation from its mother is interpreted from an evolutionary (biological) point of view, it must be deemed expectable and adaptive, i.e., beneficial. If interpreted strictly from a cultural point of view that values infant solitariness and parental separation, the protesting infant can be seen as deviant, uncooperative, and less able to control its own emotions, i.e., developmentally deficient. In this way, one’s theoretical beginning point for analysis matters a great deal in understanding how and why infants behave as they do. This is why, as discussed earlier, starting with a particular theoretical foundation about who the infant is and what criteria will be used to define human infant attributes can be so important in pediatric studies.

Human Birth: Whole New Life or ...Been There, Done That? Pre-and Postnatal Continuities in Maternal Regulation of the Infant

Since especially in western cultures, the human mother’s body is no longer seen to *directly* regulate the infant’s physiology following parturition, western medical models of infant development typically stress that birth represents *the* moment in which the human newborn becomes a completely independent being from the mother, as opposed to a “being” still functionally interconnected in important and critical biological ways. In most hospitals, steps are taken to facilitate the infant’s quick progression and development toward autonomy as early in life as possible, therein maximizing the extent to

which the infant can be pushed to function outside the nutritional, social, and physical regulatory environment of the mother’s body. Right from the beginning, the recommended and preferable forms of infant care are designed to promote psycho-social and physiological autonomy for the infant, i.e., physical separation from the mother for sleep (Pinilla & Birch, 1993) and breastfeeding or bottle feeding routines that encourage less continuous feeding and mutual access, in favor of more parentally controlled breastfeeds and longer sleep bouts, all of which it can be argued is not what the human is designed to experience (Schoen, 2007).

Yet, a variety of research on infants reveal that many, if not most, underlying physiological sub-systems of the neonate, especially those involved in thermo-regulation, growth, immune defenses, and maintenance, including breathing, sleep, and digestion, continue to be influenced, if not developmentally changed, *vis a vis* a variety of on-going maternal-infant (postnatal) sensory exchanges involving olfactory, auditory, tactile, kinesthetic, vestibular, and visual signals and cues with the mother.

Of course, breastfeeding behavior and the full compliment of materials found in human breastmilk function as a direct link to the mother’s entero-immune system, a role played by the umbilical cord before birth. After birth, the form or experience of nutritional delivery assures the convergence of an array of sensory (skin-to-skin) experiences while receiving these critical substances not unlike what occurred in utero. Mother’s milk delivered to her infant obviously includes species-specific nutritional proteins and enzymes in just the right molecular configuration and quantity, but her milk also contains anti-oxidants and unique hormonal proteins along with antibodies unique to the specific home micro-environment within which each mother-infant dyad lives. Together, maternal-infant proximity and contact bridge *in utero* prenatal experiences with postnatal ones.

Breathing behavior is generally considered independent of regulation by another person, yet liquid breathing of amniotic fluid by the human fetus occurs before birth. This “practice breathing” is affected by the mother’s internal physiological status. Might there be postnatal influences that continue to regulate an infant’s breathing when the mother is close? Consider that *in utero* liquid amniotic breathing has been documented among so many mammalian species that it is no longer appropriate to speak of the initiation of breathing at

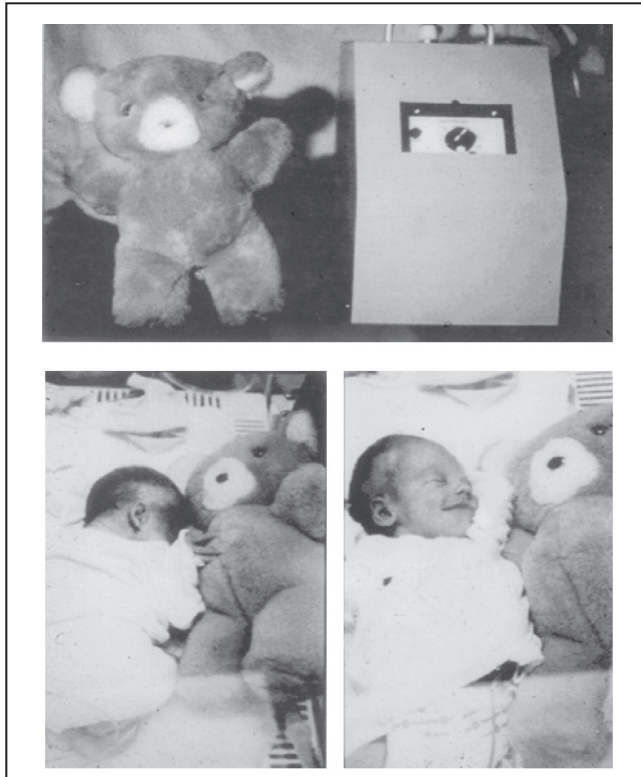


Figure 4. Thoman and Grahams' (1986) experiment with newborn infants and a breathing mechanical teddy bear illustrates the postnatal sensitivity infants maintain from prenatal experiences. The experimental infants changed their breathing patterns in relationship to the movements of their artificial breathing companion, perhaps showing a patterned response learned while breathing amniotic fluid in their mothers' womb (McKenna *et al.*, 1993). Original photo from Thoman and Graham (1986).

birth. Janzen and Chernick (1983) were the first to suggest that "...postnatal breathing may instead be viewed as a continuation of the process begun in utero." Perhaps as long as three months before birth, they suggest that "sensory stimulation alone in the absence of blood gas changes (oxygen/co₂) regularly initiate rhythmic breathing (amniotic or liquid breathing) in the human fetus" (Janzen & Chernick, 1983).

Ultrasound studies reveal that fetal breathing can be identified by observing movement of the chest wall accompanied by outward movement of the abdomen. It is estimated that fetal liquid breathing occurs approximately 40% of the time during the last trimester, beginning around 30-31 weeks gestation, although its frequency varies greatly and may occur in fetuses as early as week 21 of gestation.

It appears that amniotic breathing among humans develops prenatally in conjunction with (and against) rhythmic sounds of the mother's arterial blood flow,

every tenth of a second following contraction of the heart. The fetus is in close contact with the *schwooshing* sounds made by blood passing quickly through the iliac artery, which flows close to the fetus' left ear. Patrick (1978a, 1978b; 1980) monitored pregnant mothers for up to 24 hours at a time during the last ten weeks of pregnancy and found that while the frequency of fetal breathing could vary from hour to hour, it tended to peak about two to three hours after meals. There appears to be a peak between 4:00 am and 7:00 am in the morning when the mother's glucose levels are falling rapidly and the acoustic environment is quiet, permitting the fetus to be sensitized to uterine sounds and rhythms. In this way, the prenatal form of the fetus' circadian breathing rhythm is tied to, if not regulated by, the mother's rhythm through auditory and vestibular sensory stimuli.

Hence, based on breathing experiences in the womb, at least full term neonates are prepared at birth to respond to a variety of their mothers' breathing signals or cues postnatally, including her breathing sounds made as air passes through her vessels, inducing air pressure changes in the mother and infant's micro-environment, as mother exhales on or near the infant creating waves of warmed O₂ and CO₂ gases.

Sensitivity to physiological regulation by the mother's breathing movements and sounds of the infant's breathing is exquisitely illustrated by studies of the effects of a sleeping companion on the human infant's breathing patterns. Thomen and Graham (1986) discovered that even mechanical breathing teddy bears placed next to apnea-prone human newborns have the effect of reducing the number of apneas (on severely apnea-prone infants) by as much as 60% (Thoman & Graham, 1986) (Figure 4).

In another experiment, we found that at varying distances in bed, mothers exhale amounts of CO₂ in front of their infants' faces (and under the blankets) that can shift the amount of CO₂ available for infants to breathe by two to five percent, potentially helping regulate the infant's breathing pace, since the infant's nasal chemoreceptors respond after the infant inhales (Mosko *et al.*, 1998). This is reinforced by added vestibular (movement) stimulation delivered by the mother's rising and falling chest and by stimulation of the infant's pancyan cells in the skin, reacting to maternal touch and passive contact, all of which can be responded to by an infant in proximity to a parent (McKenna, 1986).

The “Social” Experiential Aspects of Learning to Breathe

Perhaps this close connection between prenatal fetal breathing in the womb and the mother’s physiological status also explains why the postnatal breathing of an infant is so dramatically effected by the presence of the human mother while cosleeping in the same bed. Our research team showed that it is possible to identify synchronous breathing patterns among routinely bedsharing mother-infant dyads. Infants could be associated with their mothers based on their eight-hour sleep-wake histograms and breathing traces, and by the fact that each infant seemed to breathe in respiratory cycles per minute, approximately twice the speed of its own mother (McKenna & Mosko, 1990). We also found a high number of instances in which apneas experienced by one of the partners overlapped temporally within seconds by an apnea apparently induced by the sleeping partner (McKenna & Mosko, 1990).

In a more complex and controlled study (Mosko *et al.*, 1996), we examined the differences between the physiology of breathing among routinely solitary sleeping infants and bedsharing mother-infant pairs and found that mother-infant bedsharing was associated with fewer obstructive apneas and more periodic breathing in infants than was the solitary sleep environment, where mothers and babies slept in separate rooms (Richard *et al.*, 1998). During bedsharing, irrespective of the routine sleeping arrangement at home, the infants experienced a higher frequency of short (one to three seconds) central apneas during stages 1-2 and REM (and overall). This is not surprising given that central apneas generally follow arousals. It is hard to say for certain what the functional significance is, though arousals lead to increased breaths and higher oxygen saturation readings for the infant. We can speculate that they are not harmful and might well be beneficial. Among routinely solitary sleeping infants, who slept with their mothers in the same bed in the laboratory, the increase in apneas largely consisted of the

shorter variety (3-5.9 seconds) while in stage 1-2 sleep; but in routinely bedsharing infants, it reflected increases in apneas in the 6-8.9 second range during REM and in the apnea range of 9-11.9 seconds during stage 1-2 sleep. In contrast to central apneas, obstructive apneas were decreased by bedsharing, but only among routinely solitary sleeping infants (while bedsharing) who had a lower frequency overall, specifically in stages 1-2 and REM (Richard *et al.*, 1998).

In general, the amount of periodic breathing was also significantly increased in the bedsharing environment. Routinely bedsharing infants had a higher frequency of periodic breathing and a longer mean duration over the entire night (overall) while bedsharing, specifically during REM. Routinely solitary sleeping infants exhibited more frequent periodic breathing only during stages 3-4 while bedsharing in the laboratory with their mothers (Richard *et al.*, 1998).

Maternal-Infant Contact: “Nice” Social Idea or Fundamental Infant Physiology!

Although forms of infant sleeping, including cosleeping environments, vary enormously from culture to culture, the potentially beneficial regulatory and developmental effects of contact on infants do not (**Figure 5**). Whether born in Brazil, Sweden, the United States, England, or Nepal, whether living in a hunting-gathering society or an industrialized setting, when resting on their mothers’ torso, both premature and full-term infants breathe more regularly, use energy more efficiently, maintain lower blood pressure, grow faster, and experience less stress (Anderson, 1991; Ludington-Hoe, 1990; Ludington-Hoe *et al.*, 1991; Ludington-Hoe *et al.*, 1992a; Ludington-Hoe *et al.*, 1992b). These data suggest that sensory exchanges with the mother alter and potentially regulate an infant’s immature physiology.

As regards infant temperature, Fardig (1980) found that among newborns up to a degree of temperature is lost when infants are removed from their mothers’ torso following birth, even when the separated infants are placed in incubators with ambient temperatures set to match their mother’s body temperature. Richard (1999) found that among 11- to 16-week-old infants, solitary-sleeping infants exhibited lower average axillary (under arm) skin temperatures compared with breastfeeding infants sharing a bed with their mothers.

The question of infant body temperature and the effects of varying sleep environments on it raises

Cultural Influences on Infant Touching

“In the western world, it is perhaps a great advantage for an infant to have a sensitive skin or diaper rash or some other dermatological disorder; for then, at least, it can be assured of receiving something resembling an adequate amount of cutaneous stimulation.”
(Montagu, 1986:247).

Figure 5. Montagu’s perspective: Does diaper rash have any benefit for the western infant?

an interesting methodological question: under what conditions, social or solitary, is “normal” infant sleep temperature (from which notions of elevated or lowered temperatures are proposed) derived? Consider, for example, that it is not that infant skin or core temperatures are “elevated” when bedsharing (suggesting a potential SIDS risk), but that solitary sleeping infant temperatures are artificially “lower” or sub-normal. This is so, it can be argued, because the original (normal) environment is not solitary but social. Applying evolutionary models to the study of infant body temperatures during sleep suggests it is the lower and not the higher infant temperature that is potentially a variation from the norm for the infant and, thus, may be the real stress or physiological challenge.

Hundreds, perhaps thousands, of scientific studies document the important role that maternal contact plays in stimulating infant growth and development, as well as healthy psychological and cognitive development, as reviews by McKenna *et al.* (1993), Trevathan and McKenna (1994), Schoen (2007), and Ball and Klingaman (in press) clearly reveal. Indeed, there is likely no part of an infant’s physiological or psychological (including neurobiological) development that is ultimately unaffected by contact, especially in the human infant’s first two to four months of life, wherein brain cells are being either pruned or nurtured, depending on the infant’s social and physical experiences, before the infants experience their first developmental shift, and myelination is well under way.

Recall that Field’s classic studies of the effects of massage on pre-term infants demonstrated that infants in her experimental group gained weight 47% faster per day when systematically, gently massaged (Field *et al.*, 1986; Field, 2001; 1998; 1995). She speculates that touch stimulates the vagal nerve which induces the gastrointestinal tract to absorb more calories while reducing cortisol, a stress response, which can burn calories rather than permit them to be used for immunological maintenance or growth. Touch acts as an analgesic for infants, increases axillary and core body temperatures and oxygen saturation levels (Trevathan & McKenna, 1994). Touch maintains higher glucose levels in infants, reduces crying, promotes deeper sleep among high risk infants, reduces apneas, and helps to establish not only a more secure social connection (attachment and satisfaction) as regards the mother, but sustained early contact establishes a better maternal milk supply

and an enhanced breastfeeding relationship which, on average, will last a greater number of months the more the mother and infant sleep in contact, i.e., bedshare (Ball & Klingaman, in press).

Not surprisingly, even for nonhuman primates born more neurologically mature at birth than are human infants, separation from the mother, even for older infants (say six to 12 months of age), short term, hour long separations (referred to as privation experiments) are known to induce serious adverse health consequences, including anaclitic depression, cardiac arrhythmias, reduced body temperatures, higher cortisol levels, more interrupted sleep, and susceptibility to colds, breathing problems, and other illnesses. Clearly, while human infants may be on the extreme high side of a continuum of needed maternal contact, all primates depend on touch as a fundamentally critical physiological segue necessary before healthy independence can be achieved, which, for most primates, is years away.

That maternal or bodily touch and sensory exchanges play such a vital role in the infant’s digestion, including calorie absorption capacities and metabolism; sleep, breathing and arousal; and heart rate (Richard & Mosko, 2004) is no longer in need of much additional documentation. Indeed, the infant’s fundamental physiology is regulated by contact and the fact that the human infant’s brain is so undeveloped at birth again reminds us that Winnicott was perhaps more correct than he could have imagined when he said there really “is no such thing as a baby, but a baby and someone.”

Maternal Infant Nighttime Separation and SIDS

When an evolutionary and cross-cultural view of infants and infant care practices is adopted, it is hard to imagine that any health professional could seriously assume that nighttime separation for the human infant could normally be associated with intrinsic benefits, at least where benefits are not defined in terms of parental desire for independence from their infants or in terms of situations where parents pose a real danger to an infant. In fact, the only reasonable prediction for the effects of routine nighttime separation from the mother for the human infant would involve adverse consequences. Indeed, the experiences of the industrialized west, having witnessed SIDS at unprecedented worldwide rates (Nelson *et al.*, 2001), generally supports this way of thinking.

Nelson *et al.*'s (2000) cross-cultural survey of the relationship between bedsharing and SIDS rates reveals that among a variety of cultures and regions worldwide as bedsharing rates increase SIDS rates are reduced or are non-existent. Many confounding factors, such as reduced maternal smoking and increased breastfeeding, likely help explain why SIDS is either unknown or exceedingly low in cosleeping cultures. Nonetheless, these cross-cultural differences in SIDS rates as they pertain to child care practices surely argues against any simplistic notion suggesting that as bedsharing increases across all circumstances so too will SIDS risks.

Finally, it is worth mentioning that even in the United States and Great Britain, it is the sub-groups of families with the greatest increases in both breastfeeding and bedsharing over the last decade (middle class whites) who, as a class of individuals, are experiencing the most precipitous declines in SIDS. These numbers need to be compared with other less fortunate socioeconomic groups (poor African American families in the U.S.) whose bedsharing rates have traditionally remained high (about 50%), but where declines in SIDS have not occurred to the same level or degree as is true for middle class whites, many of whom bedshare for part or all of the night.

HOW CULTURAL FOLK ASSUMPTIONS ABOUT THE NORMALCY OF SOLITARY INFANT SLEEP ACHIEVED SCIENTIFIC VALIDATION

"Our governments recent warning that it was unsafe to ever have babies or small children in bed with parents went way too far...It should be challenged because it's bad science...Bad science sets out to make a point, looks neither to the left nor to the right but only straight ahead for evidence that supports the point it sets out to make. When it finds evidence it likes, it gathers it tenderly and subjects it to little or no testing."

(Vonnegut K, *The Boston Globe*, October 24, 1999)

"Don't sleep with your baby or put the baby down to sleep in an adult bed...The only safe place for babies to sleep is a crib that meets current safety standards and has a tight-fitting-mattress." (Ann Brown, Commissioner, Consumer Product Safety Commission, United States of America September 29, 1999 (10/24/99))

The preceding review of the fundamental biology underlying the more universal characteristics of the human mother-infant relationship provides a background

against which to consider the recent controversy over whether or not, or under what circumstances, mothers and infants should sleep together—on the same or different surfaces (nearby) in an industrialized western context. To clearly understand the direction SIDS research has taken, one must first understand the role that traditional western social values, judgments, and expectations have played and continue to play in what amounts to the “cultural production” of the infant sleep research paradigm.

That is, scientific paradigms are *supposed* to emerge from a synthesis of diverse empirically-based descriptive studies and be relatively immune from ethnocentrism and local cultural assumptions. But, in this case, concepts of how babies sleep and how to measure normal infant sleep never reflected species-wide data nor evolutionary considerations. Indeed, neither the sleep behavior of other primates nor the evolutionary history of human sleeping arrangements, or even cross-cultural infant sleep patterns, were ever considered relevant to research methods concerned with how to derive measurements of “normal” human infant sleep. The idea that throughout all of our evolution human infants slept next to their mothers and breastfed throughout the night was not considered important nor a relevant fact; perhaps it was not even known by early researchers that cosleeping with breastfeeding constitutes the universal context within which infant sleep evolved. The complete omission of important biological processes intrinsic to the evolving nighttime mother–infant relationship, especially the metabolism of breastmilk, may explain why current recommendations to place infants in a separate sleep space continue to leave western mothers confused as regards to why their bodies, emotions, and minds incline them to do otherwise in spite of what our society “approves of ” or “advocates” (Ball, 2002; McKenna & Volpe, in press).

In this section, we leave behind, at least momentarily, our discussion of the evolutionary biology of mothers and infants to consider the cultural history of an ideology endemic to the industrialized west, specifically, the idea that infants sleep best and are always more safe (and healthier) when they are left by themselves and not in bodily contact with either of their parents, whether breastfeeding or not. This ideology is a central premise in a contentious debate about sleeping arrangements and fuels fierce differences in approaches, interpretations of

data, opinions, and conclusions regarding the benefits and risks of bedsharing and other forms of cosleeping (McKenna, 2000).

First, be aware that only in the last century have humans anywhere asked where their babies should or would sleep. It is a very “modern” question not asked by the majority of contemporary people. Indeed, perhaps it is more pertinent to ask whether billions of people could be wrong? The overwhelming majority of contemporary parents outside the western industrialized world appreciate and accept without question the benefits and necessity, if not the inevitability, of mothers sleeping next to their infants (cosleeping), which is seen as natural and expected, if not morally appropriate. Despite medical opposition to bedsharing, an increasing number of Western parents apparently do too, as a record number of western parents are beginning to adopt various forms of cosleeping practices, whether routine or intermittent (Blair & Ball, 2004; Ball, 2000; McKenna & Volpe, in press; McCoy *et al.*, 2000; Ball & Hooker, 1999; Mccarin, 1995; Hoffmann, 1999; Seabrook, 2000; Jackson, 2000; Nix, 2000; Elias *et al.*, 1986; Cable & Rothenberg, 1984; Wright, 1998; Abbott, 1992; Werland, 1999; Goode, 1999).

Indeed, according to several recent surveys in the United States, Australia, and Great Britain, a major cultural shift is underway, leading to fewer infants being

placed to sleep in rooms by themselves than ever before in recent western cultural history. It would appear that during the last decade in parallel with increasingly high rates of breastfeeding, parents in the United States and Europe increasingly “cosleep” either in the form of room sharing or sleeping together on the same surface in the form of bedsharing at least part of the night. Recent surveys and sampling suggest that between 50-75% of western infants sleep part of the night on some days of the week in the same bed with their parents (Lahr *et al.*, 2005; Ball & Blair, 2004; Kimmel, 2002; McCoy *et al.*, 2004). Surely, it appears to be “back to the future” as regards the important link between breastfeeding and forms of cosleeping, as all the studies thus far undertaken are consistent in finding that breastfeeding and bedsharing appear mutually reinforcing...that a decision to breastfeed likely means that a mother will also bedshare, as bedsharing makes breastfeeding easier and seems to just “feel right” (Ball, 2004; 2005; Young, 1999; McCoy *et al.*, 2004; Baddock, 2007; Rigby *et al.*, 2001; McKenna & Volpe, in press; McKenna *et al.*, 1997).

But Where Did The Notion of the Maternally Disconnected, Solitary Sleeping Infant Come From? Historical Roots of an Ideology

As discussed by McKenna (2000) and more recently by McKenna and McDade (2005), reference to unique western social, historical, economic, religious, and other cultural processes are necessary to fully explain the particular ideologies which underlie and enforce medical views of what constitutes healthy infant sleep, including an understanding of the willingness of the pediatric/medical community to adopt what has been proposed as invalid methods of studying “normal, healthy infant sleep.” The western infants sleep research paradigm builds upon negative assumptions about the alleged devastating consequences of cosleeping behavior. Indeed, so entrenched and often hidden are unproven assumptions and false stereotypes about cosleeping, in whatever form it takes, that contemporary researchers/reviewers reading anti-bedsharing reports are not likely to spot or even notice how and where the authors’ cultural assumptions, preferences, and biased interpretations are substituted and passed along as logically deducted scientific truths. These biases prevent researchers from acknowledging that the overwhelming

Table 2. Historical Factors/Forces Influencing Emergence of Western Solitary Infant Sleep Ideology

Notion of infants original sin / need for imposed / self-discipline / fear of spoiling
Fear of infants / children observing sex, masturbation by wet nurses, fear of affection or touching
Catholic church bans bedsharing due to infanticide confessed (in confessionals) by starving mothers
Values favoring individualism, independence, autonomy, self discipline, and self-sufficiency
Re-location of parental decision making to outside of home to external authorities / rise of child care experts...pediatricians, as authoritative medical knowledge comes to dismiss acquired parental knowledge of infant
Emphasis on romantic nature of husband - wife conjugal relationship to exclusion of children
Emphasis on superiority of technology as a substitute for mother's body and what her body provides (cows milk rather than breastmilk, stimulating objects or swings rather than mothers sensory exchanges achieved through contact).

number of deaths in the United States and other western countries involve not cosleeping, but infants sleeping alone.

For at least a century, western social and moral values have served as the basis for defining how and where infants *should* sleep, specifically, moral concerns protecting the conjugal (husband/wife) pair, enforcing social exclusivity and sexual invisibility from children, along with other cultural developments (**Table 2**). The perceived need to produce independent, self-disciplined, and secure infants through enforced nighttime separation from parents by sleeping in cribs inadvertently provided the initial basis for defining uninterrupted solitary infant sleep as “normal” and “healthy” --a desirable and beneficial way for all babies to sleep.

Indeed, the proliferation and expansion of the idea of “romantic love” throughout Europe also contributed to separating the parents, especially the father, from the children. Many European and later American households favored the role of the father as the disciplinarian, as well as the importance of his role in dispensing religious training. To display optimal moral authority, it was thought that the father should constrain from physical contact with his children in favor of functions that really mattered, i.e., providing discipline (Stone, 1977), another belief that might well have contributed to separate sleeping quarters for western children.

The exaggerated fear of suffocating an infant while cosleeping may, in part, stem from an unexpected time in western history where especially urban mothers were so destitute that in order for some of her children to live, others needed to be sacrificed in the form of being overlaid. During the last 500 years, many poor women living in Paris, Brussels, Munich, and London (to name but a few locales) confessed to Catholic priests of having murdered their infants by overlaying them in order to control family size (Flandrin, 1979; Kellum, 1979; Stone, 1977). Led by priests who threatened excommunication, fines, or imprisonment for actual deaths, infants were banned from parental beds (Stone, 1977). The legacy of this particular historical condition in western history probably converged with other changing social mores and customs (values favoring privacy, self-reliance, and individualism) to provide yet another piece of the overall philosophical foundation at the core of our present contemporary cultural beliefs about sleeping arrangements. This particular foundation makes it far

easier to find dangers associated with cosleeping than to find (or assume) hidden benefits.

As discussed by Fildes (1995), the popularity of scheduled bottle feeding in the fifties also reinforced the idea that uninterrupted solitary crib sleeping was ‘normal.’ In the late fifties and early sixties when electrophysiological technology became widely available to measure and quantify infant sleep, breastfeeding was at an all time low in the U.S., with less than nine percent of mothers leaving the hospital breastfeeding, usually for less than a couple of weeks. Both cows’ milk and/or formula were thought to be superior to human milk. Hence, pioneering sleep researchers had no reason to question the appropriateness of quantifying infant sleep and arousal patterns under solitary sleeping conditions using bottle fed infants with little or no parental contact or nighttime feedings.

Furthermore, throughout the last century, infants sleeping separate from their parents has been argued to be ideal, certainly since Truby King, a most influential physician and author of *Mothercraft* in Great Britain. Manuals described by Hardyment (1983) stressed the need to keep babies on “strict feeding and sleep schedules” with parentally controlled and limited feeding. Dr. John Watson of the United States, whose overall support of any behavior toward infants which fostered infant separation and independence and who introduced behaviorism to psychology, also heavily influenced what was already a powerful cultural belief that for the infant’s physical, psychological, and intellectual health, infants needed to be left alone and definitely not touched much or often.

Watson argued that no child can receive “too little affection” and that if parents insisted on any contact with their children at night at all, it should be quick and simple... no more than three pats on the forehead and a quick kiss to the head. Ferber’s sleep training in the United States (though now repudiated by him) and Ford’s (2002) “controlled crying” in which parents leave the infant or child alone for longer and longer periods to condition them to fall asleep on their own represent what Klingaman and Ball (in press) correctly describe as representing several of many modern descendants of Watson’s authoritarian approach to the infant and what infants should be allowed to experience.

In fact, while these predecessors to Dr. Spock all argued a similar nighttime strategy, i.e., separate sleep

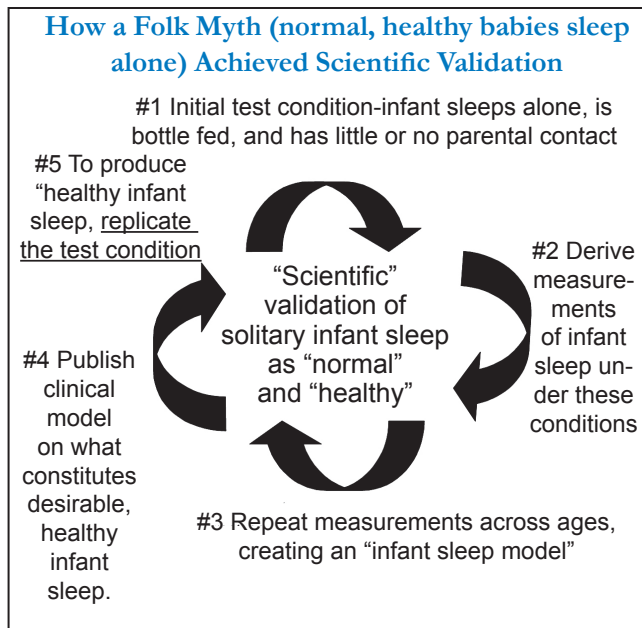


Figure 6. When infant sleep studies were first undertaken using polysomnography, not unexpectedly, the first researchers, measuring the electro-physiology of infant sleep stages and arousal patterns at various times in the first year of the infant's life, only tested the solitary sleeping, bottle-fed infant in the sleep laboratory. At the time, these experimental conditions (the infant being alone and bottle fed) were thought normal and best for the infant.

quarters for infants and children and strict, controlled, minimal nighttime feeds and contact (and certainly breastfeeding was not encouraged), their influence suggested that physicians had moral authority not only over the infants but over the parents who should do just as their doctors order...rather than relying on their own familiarity with their own unique infants. The legacy of this western medical authoritative knowledge being superior to any knowledge parents acquire or bring to their parenting experiences continues to negatively impact parents and moves them to question their own emotions and tendencies when it comes to caring for their babies—a rather strange and unique handicap associated with western cultural history.

Such ideologies and situations fail not only to consider both the biology of the infant and the parent, but such arm-chair models of infant care, rendered for the most part by men who never cared for their own babies or any babies for that matter, claim authority over a behavioral domain for which they had no special knowledge or training. Moral and cultural ideas quickly became one and the same with supposedly scientific

statements and recommendations. Yet, from a human wide perspective, solitary infant sleep remains novel and abnormal, as is infant sleep that occurs after ingesting milk from a different species. Still, the solitary sleeping, bottle fed infant remains the singular source of our scientific understanding of how the healthy human infant sleeps.

The clinical and psychological problems this poses for infants and thus for parents is not trivial. This model of solitary infant sleep places parental expectations at odds with what infants are designed to biologically experience and, of course, accept! Recall that while recent lifestyles and beliefs about where and how infants should sleep can and do change relatively quickly, the physiological needs of human infants do not. Consider that for the last 10,000 years human evolution, including infant biology, has remained relatively unchanged, leading David Barash (1987) to note "...there would be little if any difficulty exchanging a Cro-Magnon and a modern infant, but great incongruity in making the same switch with adults of both cultures" (1987). Only in the last 100 to 200 years and mostly in western industrialized societies have recent cultural concepts concerning the presumed moral value of infant separateness from the mother become embedded within scientific and clinical paradigms that worked their way into popular and scientific culture. These paradigms continue to be used as a basis to limit or constrain the forms, quality,



Figure 7. Sketch from Helen Jackson: *Three in a Bed*

and quantity of nighttime maternal-infant contact and breastfeeding.

The “science” of infant sleep, thus, became one and the same with the morals and folk beliefs of the original scientists who justified the method of measuring infant sleep in the first place—that is measuring “normal infant sleep” while infants slept alone and digested cow’s milk, with little or no maternal or any parental contact. The “science” of infant sleep, meaning quantified measurements of sleep architecture and arousals over the infant’s first year, and the values (both numerical and moral) that clinically defined desirable infant sleep became mutually reinforcing and mutually supportive (**Figure 6**) (McKenna & McDade, 2005).

Of course, this meant that if parents and their pediatricians wanted to produce “normal and healthy” sleeping infants, only by recreating the original environmental conditions under which “healthy” infant sleep was measured (alone and bottle fed) could anyone hope to achieve it. Thus, clinically healthy infant sleep became synonymous with solitary sleep and vice-versa, i.e., culture and science are yet again inextricably bound—a clinically healthy infant must sleep alone and be bottle fed in order to meet the proper “measurement” requirements.

Another negative consequence of these studies is that they inadvertently made infants who could not quite “measure up” to the numbers in need of remediation, either social or biological! How and where infants sleep could no longer be considered a simple relational family issue, but a serious medical one, to be assessed and monitored by authoritative sleep experts passing research information along to family pediatricians. Adherence by infants to quantified *scientific* “models” of healthy solitary infant sleep (including dire warnings to avoid cosleeping at all costs) could be used to predict, it is claimed, lifelong childhood health and sleep hygiene. Infant health could be obtained just as long as mothers, in the words of Dr. Spock, “followed the directions that *their* doctor(s) gave them” (McKenna & McDade, 2005).

Altogether, this chain of events explains how questions concerning what constitutes safe infant sleep environments, i.e., “the bedsharing debate,” has been turned on its head: species-wide and biologically normal and protective infant sleep environments, mother-infant cosleeping with breastfeeding, are assumed to be inherently lethal while solitary crib sleeping is

assumed to be healthy, beneficial, and always safer. The burden of proof concerning infant safety was left to the defenders of mother-infant cosleeping. While a Commissioner of Consumer “Product” Safety who oversees deficient products and goods and presumably knows nothing about infant sleep development, the biological significance of mother-infant cosleeping with breastfeeding, or family psychology, was encouraged by a very small cohort of anti-bedsharing researchers in the United States to make what in any other cultural context would surely be hailed as one of the most extraordinarily outrageous statements of our times: “The only safe place for an infant to sleep is in a crib...” (**Figure 7**).

In sum, socially constructed folk assumptions, not deductive, empirically-based (species-wide) science, answered the original question—how do infants sleep and, thus, how and under what conditions infant sleep must be measured. The history of infant sleep studies in western cultures illustrates how a “belief” in the moral “value” of uninterrupted solitary infant sleep remains, like religion, sacred despite recent scientific studies that seriously challenge its biological normalcy or assumed advantages. These beliefs about infant sleep continue to lead a small number of SIDS and bedsharing researchers to believe, a priori, that any violation of this artificially validated moral principle (solitary crib sleeping) is sure to lead to social or physical harm. In this way, cosleeping--and specifically bedsharing, represent both medical and moral violations---violations of cultural norms which practically assures negative physical and psychological outcomes (McKenna & McDade, 2005; McKenna & Gettler, in press).

BACK TO THE FUTURE: DEFINING COSLEEPING

What is Cosleeping?

“Cosleeping is a generic concept referring to the diverse ways in which a primary caregiver, usually the mother, sleeps within close proximity (arms reach) of the infant, permitting each to detect and respond to a variety of sensory stimuli (sound, movement, smells, sights) emitted by the other. Cosleeping is the universal (species-wide) human sleeping arrangement”
(McKenna et al., 1993).

In one form or another, mother-infant cosleeping continues to represent the preferred sleeping arrangement for most of the world’s parents. Based on

cultures studied thus far, between 44% and 75% of the world's mothers and infants sleep in direct bodily contact (Barry & Paxson, 1971). In fact, outside of the West, there exist no ethnographic examples of industrialized countries where infants sleep outside the mother's room, away from her company.

There appears to be no "one way" to cosleep, either. Mother-infant cosleeping takes hundreds, if not thousands, of forms worldwide (Barry & Paxson, 1971; Whiting, 1981; Levine *et al.*, 1994; Mintern & Lambert, 1964; Munroe *et al.*, 1981). Infants sleep next to their mothers on floor-based futons. They sleep alongside, but not on the same surface as their mother in a crib or bassinet next to the mother's bed, but within arm's reach. Cosleeping occurs when infants sleep in a basket or a cradleboard, in a hammock above or beside the mother's sleep surface, or when mothers and infants lie beside each other on a bamboo mat. Side-by-side mother-infant sleep on the same surface, however, appears to be the most common arrangement worldwide (Barry & Paxson, 1971).

One of the problems associated with understanding differential outcomes associated with forms of cosleeping is that while a proposal to standardize a definition has been made (McKenna *et al.*, 1993; McKenna & Mosko, 2000), many researchers choose not to recognize it. By recognizing different "types" or different forms of cosleeping, one recognizes that cosleeping per se has no singular risk factor, but many, depending on how it is practiced, and this would argue against a simplistic condemnation of the practice. In other words, the diversity of cosleeping in form, function, and outcome is not generally recognized, primarily due to political and ideological reasons characteristic of those who favor the view that any and all cosleeping is dangerous.

"What is cosleeping? When my two lovely daughters are sleeping at the same time." Robert Hahn, CDC

Unlike the discourse associated with crib sleeping which can be addressed in terms of safe or unsafe crib use, one can only conclude that the long history of negative thinking that all forms of "sleeping with baby" are injurious in western society has led many researchers to think of cosleeping behavior as a discrete and homogenous (coherent) behavior, rather than as being composed of many different behaviors, as discussed

above. Many researchers erroneously use the terms "cosleeping" and "bedsharing" interchangeably, as a kind of "dustbin" category, lumping together dangerous forms of cosleeping, like recliner and/or couch cosleeping, in the same category as safe bedsharing, even though each carries remarkably different risk factors.

In the context of SIDS and pediatric sleep research, McKenna *et al.* (1993), McKenna and Mosko (2000), and McKenna and McDade (2005) proposed that the term cosleeping be used generically, as a beginning point, to describe a diverse, but proactive, generalized class of sleeping arrangements, and not to describe any one particular "type" of cosleeping arrangement, for example, bedsharing. One step toward standardizing a definition of safe mother-infant cosleeping that can be extended to include situations where high levels of mother or caregiver-infant body contact occurs during sleep is to apply the description safe cosleeping to particular "types" in which at least one proactive responsible adult cosleeper (whether mother or not) takes safety precautions unique to the particular "type" of cosleeping practiced. And, regardless of whether sleeping occurs on the same or a different surface or with another adult present, the cosleeping dyad are potentially able to communicate through multiple, but at least two mutually reinforcing sensory modalities, such as tactile and visual, auditory and olfactory, visual and auditory, and/or auditory and vestibular sensory channels.

Safe mother-infant cosleeping can be applied to bedsharing situations where the overall bedsharing context (physical setting and social circumstances, including triadic situations) are made as safe as current knowledge permits, and where at least one adult cosleeper/caregiver is physically capable and motivated to detect and respond to changes in the baby's status. Sleep location, such as an infant sleeping alone on an adult bed without a parent present (Drago & Dannenberg, 1999; Nakamura *et al.*, 1999), is not considered bedsharing, using this operational definition.

As proposed here and elsewhere in papers by McKenna, a safe cosleeping environment must always provide the infant with the opportunity to "sense" and respond behaviorally and/or physiologically to the caregiver's signals and cues, for example, to the mother's smells, breathing sounds, infant directed speech, sleep or breathing movements, invitations to breastfeed, touches, or to any as yet unidentified "hidden" sensory stimuli

whether intended or not. In this way, bedsharing is not necessarily excluded from being considered one type of “safe cosleeping,” but like the other specific “types” of cosleeping, bedsharing needs to be further taxonomically differentiated into one of two sub-types: safe or unsafe.

Although the same can be said for almost any sleeping arrangement, such as solitary crib sleeping, bedsharing is probably practiced slightly differently in each household. Yet, now we can identify specific, modifiable “bedsharing risk factors” as well as “crib risk factors” (Blaie *et al.*, 1999) that should help to eliminate unnecessary risk regardless of location or arrangement.

Cosleeping in Form, Function and Outcome: A Many Diverse Thing

Diversity of cosleeping concept? *“I slept in the same bed with my granddaddy..and then in the same bed with my four cousins. I never slept alone until I got married.”*

Bobby Bowden, Head Football Coach, Florida State University, South Bend Tribune, 9/29/2000

An infant’s sleep location is the beginning not the end point for analysis in studying sleeping arrangements for infants because so much more in the environment, including the motives of the mother herself or cosleeping adults, makes a difference in assessing safety and outcomes in general (Kelmanson, 1993; McKenna & Mosko, 2000). For example, all “types” of cosleeping must be distinguished by the condition and composition of sleeping structures or pieces of furniture or materials which are used, including characteristics of the sleep surface (hard, soft, fibrous, textured, or smooth) and by the bedding materials, including infant sleep wrappings, night clothes, and/or blankets, as well as by who and/or how many people are sleeping close to, with, or by the infant or child.

Compared with solitary infant sleep, analytically important features of the cosleeping environment are more numerous and more complex. For example, in the bedsharing environment it appears that the quality of care the infant receives from the caregiver once in bed is partially determined by the nature of their social relationship outside of the bed, which often helps to explain the parent’s reasons for cosleeping. Consider that mandatory, non-elected bedsharing by smoking mothers that occurs in socially chaotic households where bedsharing is the only option leads to outcomes quite

different from those situations in which bedsharing is elected by a non-smoking mother specifically to protect, nurture, and breastfeed her infant under more routinized, stable social circumstances (Kemp *et al.*, 2000; Carroll-Pankhurst & Mortimer, 2001; Clemens, 2003).

To give just a few examples, only recently have researchers begun to address in a serious way (Blair *et al.*, 1999) the impact of particular adverse circumstances on the bedsharing environment. Among parents of infants who have died unexpectedly in Great Britain, the prevalence of alcohol consumption, cigarette smoking, and the use of illegal drugs was also higher, while the infants exhibited adverse clinical features at birth (prematurity, low birth weight). Moreover, during their short lives, these doomed infants experienced more infections and lower daily weight gains, suggesting increased vulnerability from the beginning. Treating bedsharing as a starting point in which risks occur rather than as a crude end-point and a risk in and of itself, Blair *et al.* (1999) found no evidence to suggest that bedsharing was a risk among parents who did not smoke or among infants four months or older.

In another study in St. Petersburg, Russia, compromised maternal attachment was found to be associated with many babies who died while bedsharing. Physicians of the dead infants indicated that the mothers of the deceased infants had been less eager “to quiet or comfort” their infants in general. And, while their infants were being examined by the physician before their deaths, these mothers “paid less attention to the baby’s responses” and were less willing or likely to touch or look at them, compared with matched control mothers whose babies lived (Kelmanson, 1993).

Bedsharing, Room Sharing, Sofa and Recliner Use, as Particular “Types” of Cosleeping

It should be increasingly clear as McKenna and Mosko (2001) previously addressed that bedsharing is just one of many forms of cosleeping, and while all bedsharing represents a more intimate type of cosleeping, not all cosleeping takes the form of bedsharing. Moreover, safe bedsharing can be distinguished from unsafe bedsharing. For these reasons, “cosleeping” and “bedsharing” are not synonymous and should not be used interchangeably, a distinction not acknowledged by Drago and Dannenberg (1999) and Nakamura *et al.* (1999) in their condemnation of “cosleeping” and “bedsharing.”

Bedsharing is complicated because it involves different furniture components, sometimes articulated but sometimes not. Adult beds mostly include mattresses, usually but not always surrounded by other pieces of furniture, such as wood or metal frames. Sleeping in or on a bed represents one of the major contexts within which cosleeping among westerners is likely to take place. Bedsharers sleep on at least one cloth mattress and sometimes on a cloth mattress and a box spring in many western societies. Although cloth mattresses can sit on the floor without a frame, this can be dangerous for infants if the mattress is positioned next to a hard wall or surface. The infant's head can become wedged in the space between the wall and the mattress, leading to asphyxiation, a major category of mechanical death reported by Drago and Dannenberg (1999).

Room Sharing as a Form of Cosleeping That Helps Protect Infants from SIDS

Room-sharing between infants and parents increasingly is the norm in many western countries and is associated with increased protection against SIDS, although studies showing the protective effects of room sharing did not include data on the actual proximity of the infants to their caregivers or if their mothers were breastfeeding. Nevertheless, depending on whether or not the infant and parent can see, hear, and/or smell each other and if the caregiver intends to monitor and respond to an infant, room sharing can be considered another form of safe cosleeping. There is, of course, a spatial distance outside of which caregiver-infant sensory exchanges which define cosleeping, as proposed here, are impossible.

Roomsharing, as one form of cosleeping, is now recommended by the American Academy of Pediatrics as a way to help reduce SIDS, although statements made by the AAP Infant Sleep and SIDS sub-section following the announcement of the 2005 new SIDS guidelines seemed far more interested in publicly recommending against bedsharing, another form of cosleeping, than getting their message across that babies should sleep "proximate" to their caregivers. This recommendation constitutes an unprecedented acknowledgement. This is the first time any prestigious western medical organization has stated that a mother's presence or proximity can be critical to the survival of her infant...

and that infants should never sleep alone!

Epidemiological data show that in the presence of an adult caregiver, room-sharing infants are approximately half as likely to die from SIDS as are infants sleeping either alone or in the same room with siblings (Carpenter *et al.*, 2004; Mitchell & Thompson, 1995; Blair *et al.*, 1999; Fleming *et al.*, 1996). Indeed, these findings also show that it takes a committed adult caregiver to achieve these protective effects as the findings did not generalize as to the presence of other children in the infant's room. This suggests, of course, that the mother plays a proactive role, a special protective role, involving, as has been argued elsewhere, both behavioral responses to the infant, potentially detecting risky conditions and/or dangerous sleeping situations, and inducing biological changes in the infant's body through sensory regulation which permits the infant to more easily resist SIDS (McKenna *et al.*, 1993; Mosko *et al.*, 1993; Mosko *et al.*, 1996).

BEDSHARING STUDIES: WHAT DOES IT MEAN TO BEDSHARE WITH AN INFANT AND WHAT DOES IT MEAN NOT TO? THE MOTHER-INFANT DYAD IN THE LABORATORY: SLEEPING TOGETHER AND APART

Over a 20-year period at both UC Irvine School of Medicine and the University of Notre Dame Mother-Baby Behavioral Sleep Laboratory, we have been conducting various studies of nighttime infant caregiving practices, trying to ascertain what happens when mothers and infants who usually bedshare do not and what happens when routinely solitary sleeping mother-infant pairs bedshare (McKenna *et al.*, 1990; Mosko *et al.*, 1993; McKenna *et al.*, 1999; 1997; Mosko *et al.*, 1996; 1997a; 1997b; Richard *et al.*, 1996; 1998). Our UC Irvine research team quantified differences in the sleep behavior and physiology of 70 routinely bedsharing or routinely solitary sleeping mothers and infants. This particular study was carried out over 105 separate nights and generated 155 eight-hour infrared video recordings. More than 200 separate eight-hour polysomnographic recordings were made of mothers and their infants either sharing a bed or sleeping apart in adjacent rooms over three successive nights. We specifically compared how the solitary sleep environment and the bedsharing environment affected the two kinds of mother-infant

pairs – those who routinely bedshared and those who routinely slept apart.

In randomly assigned order, each mother–infant pair spent two nights sleeping in their routine (home) sleeping condition and one night sleeping in the non-routine condition; that is, routine bedsharing pairs slept in different rooms, routine solitary sleepers bedshared. All mothers and infants were healthy and nearly exclusively breastfeeding. The infants ranged in age from 11 to 15 weeks (the peak age for SIDS) (Mosko *et al.*, 1996). This is the only study ever conducted in which a full montage of recording devices monitored, filmed, and quantified a suite of physiological signals of each individual in the mother-infant pair over three successive nights, alternating between each pair's usual and imposed sleeping arrangement. Heart rates, breaths, oxygen saturation levels, and brain waves and signals were recorded, permitting us, with some accuracy, to score all nighttime sleep stage durations and progressions, including all arousals, both small transient types and epochal larger ones (Mosko *et al.*, 1997a; 1997b).

The “choice” to cosleep, specifically in the form of mother-infant bedsharing, was found to create a cascade of related changes both in terms of behavior and the physiology of each partner in the dyad (McKenna, 2000). Most relevant to our concerns in this chapter is the fact that our laboratory studies documented a significant increase not only in the number of breastfeeds, but in the total nightly durations of breastfeeding. Different laboratories have recorded different total nightly durations of breastfeeding in the bedsharing breastfeeding dyad, but all find that when sleeping next to mother, the number of breastfeeding sessions per night increases significantly (Ball, 2003; Baddock *et al.*, 2007; Young, 1999), which likely has many benefits for the mother and infant.

Bedsharing also correlated with shorter average intervals between breastfeeding sessions. Among 70 nearly exclusively breastfeeding Latina mothers, we found that when bedsharing the average interval between breastfeeds was approximately an hour and a half. When sleeping in separate bedrooms (but still within earshot), the interval was at least twice as long. Moreover, on their bedsharing nights, babies often breastfed twice as often as they did on their solitary sleep night and had three times the total nightly duration, compared with the times they slept alone (McKenna *et al.*, 1997). Also, our studies showed that without instruction, breastfeeding mothers

choose the supine infant sleep position nearly 100% of the time (Richard *et al.*, 1997; Ball, 2006a).

It should be noted that while breastfeeding babies are always under-represented in SIDS populations and fewer breastfed babies die in the first year of life compared with bottle-fed babies (Chen & Rogan, 2004), increased protection specifically from SIDS through breastfeeding is not universally recognized (Gilbert *et al.*, 1995). However, at least half the studies show it as being protective. Since no two studies use the same definition of breastfeeding, research in this area remains difficult to compare (McKenna *et al.*, 1997). In the United States, a major multi-center epidemiological study found that *not breastfeeding* was a risk factor for SIDS in both black and white populations (Hoffman *et al.*, 1988).

Only one epidemiological study has looked at whether dose-specific response effects exist and whether they are stable across races and socioeconomic groups in relationship to SIDS. This study's data support the possibility that increased breastfeeding leads to increased protection from SIDS. Fredrickson *et al.* (1993) found that for both black and white Americans, the risk of

Table 3. Potential Short Term Benefits of Cosleeping in the Form of Bedsharing when Practiced Safely

Short-Term Benefits of Cosleeping	
Mother	
More sleep (in minutes) and increased nightly satisfaction	
Increased sensitization to infant physiological and social status	
Increased comfort with and ability to interpret behavioral cues of infant	
Increased sucking behavior of infant maintains milk supply	
Increased prolactin levels lead to longer birth interval	
Increased ability to monitor and physically manage and respond to infant needs	
More time with baby for working parents	
Infant	
Increased breastfeeding (total minutes and number of nightly feeding sessions)	
Increased infant sleep duration	
Less crying time	
Increased sensitivity to mother's communication	
More light (stage 1-2) sleep, less deep (stage 3-4) sleep, appropriate for age	
Increase in infant heart rate	
Reduction in number of obstructive apneas in stage 3-4 sleep	
Practice at arousing	

SIDS decreased for every month of breastfeeding. Conversely, for white mothers, the risk of SIDS increased by 1.19 for every month of not breastfeeding and 2.0 for every month of non-exclusive breastfeeding. For black mothers, the risk of SIDS increased by 1.19 for every month of not breastfeeding and by 2.3 for every month of non-exclusive breastfeeding (Jura *et al.*, 1994).

Mother-infant Interactions and Mutual Responses

In the face of no explanation of how supine sleeping might protect infants against SIDS, it is reasonable to assume that sleep position is but one factor among many. Other potential explanatory factors include arousals, sleep-stage progression and duration, body orientation, feeding, touching and movement patterns, time asleep, time awake, body temperature, and vocalizations. These physiological and behavioral changes mutually regulate each other when the breastfeeding mother-infant dyad sleeps in close proximity. Surely, as Ball (2006a) so carefully documents, almost every aspect of the infant and mother's physical orientation to each other in bed and the use of the bed and bedding by the mother (Table 3), in addition to physiological sensitivities, i.e., response to each other's arousals, is changed if she is a breastfeeder, as compared to a bottle feeder. It is likely the convergence of these changes that makes it safer for the breast versus bottle feeding bedsharing infant.

From our infrared video studies of mothers and infants bedsharing, it appears supine infant sleep maximizes the infant's overall ability to communicate with its mother and to control its micro-environment (McKenna *et al.*, 1994; Young, 1999). In addition to permitting the infant to move to and away from the breast, back-sleeping permits the infant to remove blankets covering its face, to turn to face toward or away from mother's face or body, to touch its own face, wipe its nose, and, without a great deal of effort, suck its fist or fingers.

Similar to Baddock *et al.* (2007), we found that in the bedsharing environment mothers interact and respond to their babies much more frequently and in more diverse ways than they do when the infant sleeps in a separate room. These interactions range from rearranging the infant's bedding and blankets, to visual inspections, to re-positioning the infant, such as pulling the infant away from pillows or uncovering the infant's head. At

times, mothers just kiss or whisper to their infants, often leading to EEG identified arousals, including changes in heart rates and breathing in the infant, all potential benefits (McKenna *et al.*, 1994).

Our studies suggest that supine infant sleep in the breastfeeding/bedsharing context maximizes the chances the baby will be able to detect and respond to mother's movements, sounds, and touches, and vice versa. The supine position of the infant further promotes easy and constant communication, such as visual glancing and brief touches of the mother's breast which initiates breastfeeding sessions. This reportedly serves as the basis for growing mutual attachment between mother and infant, a prerequisite for healthy infant development (Lewis & Haviland, 1993).

Our studies have also found that, in general, small EEG-defined transient infant arousals recorded in the brain are facilitated in the bedsharing environment, albeit selectively, and that even when routinely bedsharing infants sleep alone, they continue to exhibit more transient arousals than do routinely solitary-sleeping infants sleeping alone (Tables 2, 3). Furthermore, bedsharing significantly shortens the amount of time per episode that infants remain in deeper stages of sleep (Stage 3-4). They spend more time in Stages 1 and 2 and more total time asleep (Mosko *et al.*, 1996). More arousals and less time in deep sleep may reduce the likelihood of an infant dying from SIDS, especially for infants born with arousal deficiencies.

We also documented an acute sensitivity on the part of the routine-bedsharing mothers to their infant's presence in bed. When sharing the bed, mothers who routinely bedshare aroused significantly more often than did routinely solitary-sleeping mothers, discounting instances in which the infant aroused first. This finding argues against the possibility that bedsharing mothers habituate to the presence of their babies and, thus, may pose a danger of overlaying them while asleep (Mosko *et al.*, 1997b).

Surprisingly, even though they awoke more often and fed their infants, routinely bedsharing mothers enjoyed as much sleep as routinely solitary-sleeping breastfeeding mothers (Mosko *et al.*, 1997a). Moreover, 84% of the routinely bedsharing mothers evaluated their sleep following their bedsharing night in the laboratory as being either good or enough, compared with 64% of the routinely solitary-sleeping mothers.

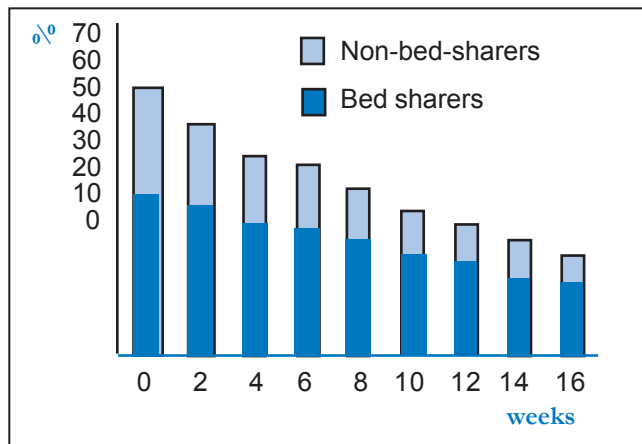


Figure 8. Ball shows here that compared with solitary sleeping breastfeeding mothers, bedsharing breastfeeding mothers were more likely to breastfeed their infants for a greater number of months.

In two earlier studies, we found that bedsharing mother-infant pairs exhibited a trend toward greater simultaneous overlap in all sleep stages, i.e., stages 1-2, 3-4, and REM. This synchronization of sleep states was not explained by chance and is not found when compared with the sleep/wake activity of randomly selected non-cosleeping infants (McKenna *et al.*, 1991; Mosko *et al.* 1993).

Researchers at the University of Otago in Dunedin, New Zealand (Baddock *et al.*, 2007) conducted a study comparing physiologic and overnight video data from two groups of healthy infants: 40 bedsharing infants and 40 cot-sleeping infants. Bedsharing infants were defined as sleeping a minimum of five hours per night in the parental bed, whereas cot-sleeping infants regularly slept in a cot/bassinet in the parental bedroom for a minimum of five hours per night. All infants were monitored over two consecutive nights in their own homes in their normal sleep situation.

The key findings from different research papers using the same data include:

- Routinely bedsharing infants engaged in more feeding and more infant-mother interactions than cot-sleeping mother-infant dyads.
- Bedsharing infants were checked more frequently by their mothers than were cot-sleeping infants.
- Despite warmer micro-environments compared to cot-sleeping infants, bedsharing infants maintained normal rectal temperatures through increased vasodilatation.
- Total sleep time and sleep efficiency were similar for both groups.

- Five bed-sharing infants spent brief time in prone sleep. This usually followed feeding with the infant sleeping on the mother's chest. Two cot-sleeping infants spent the entire night in prone sleep.

At the University of Durham Parent Infant Sleep Laboratory, utilizing a combination of methods involving ethnographic narratives, interviews, infrared photography, and physiological monitoring devices, Dr. Helen Ball has conducted a variety studies involving various bedsharing mothers, fathers, twins, and singleton infants. Indeed, Dr. Ball also conducted the first in-home and laboratory study of co-bedded twins (Ball, 2006b; 2006c), and the first study showing significant differences between the bedsharing, bottle feeding dyads (in bed) and the breastfeeding-bedsharing dyads (Ball, 2006a), contributing much new information to professional and scientific discourse on breastfeeding, SIDS risk factors, and sleeping arrangements, especially in the home and in hospitals (Ball, 2006d).

In one of her early studies, Ball *et al.* (1999) began with a study involving 60 mothers who were contacted in prenatal interviews at North Tees Hospital (Great Britain) regarding their intentions for child care practices.

Table 4. Characteristic Differences Among Breast and Formula Fed Infants

Orientation To Mother	Formula fed	Breastfed
Mother facing infant	59%	73%
Infant facing mother	46%	65%
Face to face	32%	47%
Infant Sleep Position		
Infant supine	83%	40%
Infant lateral	6%	54%
Infant prone	0%	0%
Height of infant in bed relative to mother		
Infant face level with mother's face or chin	71%	0%
Infant face level with mother's chest	29%	100%
Feeding frequency	1 bout	2.5 bouts
Total feeding time	9 minutes	31 minutes
Awakening frequency	2(0-4)	4(3-5)
Maternal arousals per night	2(0-4)	4(3-5)
Infant arousals per night	2(0-3)	3(2-5)
Mutual arousals	1(0-2)	3(1-4)
Source: Ball, 2006a.		

40 of these mothers were then interviewed regarding their actual child care practices two to four months following the birth of their infants. At two to four months, they found that 70% of new parents were found to bedshare at least occasionally, despite the fact that 0% intended to at the time of their prenatal interviews. Furthermore, 35% of experienced parents anticipated bedsharing, whereas 59% were actually doing so at the time of follow up. Finally, 11 of 13 babies that habitually bedshared were breastfeeders, at least initially, compared to the five infants that never bedshared and were bottle fed from birth.

Similarly, Ball (2003) focuses on postnatal interviews with 253 mothers at North Tees Hospital as well as two secondary, in-home interviews at the first and third month. Mothers were asked to complete seven sleep logs over seven consecutive days in the first and third month. Ball found that 47% of infants bedshared at least occasionally in the first month and 30% continued to do so after three to four months. Also, in this study, 87% of bedsharing mothers attempted breastfeeding in the first month compared to 50% of non-bedsharers. Finally, 46% of bedsharing infants still breastfed at three to four months versus 23% of non-bedsharers, suggesting that bedsharing may make it easier for mothers to breastfeed for a greater number of months. This finding is consistent with other studies that demonstrate that bedsharing and breastfeeding are mutually reinforcing: bedsharing promotes both a greater number of feeds per night (Baddock *et al.*, 2006; McKenna *et al.*, 1998) and a longer duration of breastfeeding in months (McCoy *et al.*, 2004).

Furthermore, Ball (2006a) observed the in-home, nighttime behaviors of 20 regular cosleeping families, comparing ten currently breastfeeding-bedsharing mothers-infant pairs with ten mother-infant pairs that had never breastfed. Her findings show that the cosleeping experience is markedly different for both the infant and the mother based on the method of feeding (**Figure 8**). Among other differences, she found prominent discrepancies between the two groups related to the positioning of the mother and infant in relation to one another and the infant's sleep position; mothers of formula fed infants faced their infants only 59% of the time, whereas breastfeeding mothers did so 73% of the time. Likewise, formula fed infants had their faces at the level of their mother's face or chin during 71% of the night and at their mothers' chest 29% of the time. This

finding is significant for infant health because the risk of infant suffocation increases when the infant is positioned in and around the parent's neck or face due to blanket and pillow constriction/head covering. These findings can be juxtaposed against that of the breastfeeding infants who were found with their face at chest level 100% of the night in order to facilitate feeding as needed (**Table 4**).

Finally, in terms of infant sleep position, formula fed infants spent the night sleeping supine 83% of the time compared to six percent laterally (side sleeping). Breastfed infants slept supine 40% of the time and laterally 54%. This last figure, again, owes to the feeding method and the need for breastfeeders to have ample, frequent access, i.e., proximity, to the breast. The function of lateral sleeping in the breastfeeding, bedsharing environment is not to be conceptualized in the same way as a solitary lateral sleeping infant. The breastfeeding, lateral sleeping infant is unlikely to role into the prone position (a risk factor for SIDS) due to the fact the breastfeeding mother has positioned her body in a way, knees tucked up and often facing the infant, that prevents the infant from rolling completely prone. None of the breastfeeding-lateral sleeping infants in Ball's study rolled prone, nor did it appear that they physically could. Altogether, these data reaffirm the idea argued elsewhere that feeding method changes the functional relationship between the bedsharing mother and her infant in the direction of increased safety. This occurs by way of changes in the likely function or consequences of factors that, had the infant been sleeping alone or as reported with a formula feeding mother, they might have to be considered risky. But observations show that the mother plays an active role in mediating what might otherwise have to be considered a "risk." Other data, including feeding and awakening frequencies, which are significantly higher among breastfeeding versus formula mother-baby dyads, can be found in (**Table 4**).

Using data from Dr. Ball's sleep laboratory at the University of Durham, Leech (2006) analyzed overnight and physiological recordings of ten routine bedsharers and 11 occasional bedsharers over three consecutive nights. The first night was considered habituation, where the participants slept in their normal conditions to grow accustomed to the environment. The second and third nights were spent either bedsharing or in a cot by the bed (BTB), the order of which was randomly assigned. Leech found that infants on the BTB night spent greater

time awake, less time in REM sleep, and more time in quiet sleep. Similarly, mothers spent more time awake on the BTB night and slept more overall when bedsharing. In addition, mother-infant pairs experienced more time in shared REM and total shared sleep when bedsharing, as the dyads showed 12% more simultaneous sleep time when bedsharing versus the BTB night.

Outcomes: Cosleeping Versus the Solitary-Infant-Sleep-Training Model

The ideas and comparative data justifying McKenna's original hypothesis that safe cosleeping and breastfeeding ought to reduce an infant's chances of SIDS was based on the idea that the highly neurologically immature human infant has not changed enough biologically or psychologically to accommodate the physiological challenges of sleeping alone, deprived of mother's sensory exchanges and regulation. The argument is that these mechanisms help buffer the infant from internal or external perturbations or deficits that conspire to increase SIDS risk. Expectations that infants should sleep deeply (stage 3-4) to consolidate their sleep as early in life as possible were cultural goals imposed on infants before knowing if deep sleep or more time spent in the deeper stages of sleep were safe for infants, given that arousal mechanisms, what wakes an infant up to terminate an apnea, are not on the same structural neurological time table for maturity as sleep stages are.

Aside from survival issues, it must also be remembered that emotional responses by infants and children to sleep isolation from the parent are innate and adaptive. They probably explain why anywhere between 25% and 45% of otherwise healthy infants and children in Western societies are said to suffer from "sleep disturbances" or "sleep problems" (Sadeh & Anders, 1993; Anders & Eiben, 1997). To blame infants and children for responding as they are designed, to protect themselves by crying to provoke parental retrieval if sleeping alone, is akin to blaming the victim for the crime. Not all infants and children are able to follow the cultural scripts of sleeping unattended through the night, as early in life as is possible, to accommodate parental work schedules. Indeed, it would appear that infants and children are not really supposed to do so at all when their biology is considered (Lummaa *et al.*, 1998), quite possibly because it can be dangerous, given their neurological immaturity and developmental delays.

Ancient adaptive emotions in infants probably also explain why when parents *elect* to have their infants and children sleep by their sides, i.e., non-reactive cosleeping (Madansky & Edelbrock, 1994), such pediatric sleep disturbances are greatly reduced if reported at all (Hayes *et al.*, 1994; Heron, 1994; Elias *et al.*, 1986; Latz *et al.*, 1999; Morelli *et al.*, 1992; McKenna, 1994).

THE PROFESSIONAL WORLD OF INFANT SLEEP RESEARCH ... SOCIAL VALUES MASQUERADING AS SCIENCE?

Western child-care strategies have emerged in recent decades that favor early infant autonomy. Parents have been encouraged to "train" their infants to sleep alone and to allow them to "soothe themselves back to sleep." The goal has been to eliminate nighttime feedings and/or sustained and spontaneous parental reassurances of the infant (Pinilla & Birch, 1993; Godfrey & Kilgore, 1998). Pediatric sleep "experts" and pediatricians have informed parents that infants should never be permitted to fall asleep at the breast or in the mother's arms (AAP Guide To Your Child's Sleep, 1999), even though this is the very context within which the infant's "falling asleep" evolved. As many parents will attest, this advice alone proves highly problematic.

Parents are also taught that to establish lifelong "healthy" sleep habits, infants "need" and should be "trained" to sleep alone. If the infant cannot fall back to sleep alone, it is said, the infant may have a "disorder" that can lead to sleep disabilities later in life (Ferber, 1985; AAP Guide To Your Child's Sleep, 1999). These infant-child care practices are supposed to promote early infantile independence, juvenile and adult self-assuredness, individual competence, and similar personality characteristics judged to be socially advantageous.

The problem is that it has never been shown that the "independence" achieved by the infant through learning to "soothe" itself back to sleep leads to any permanent developmental advantages or competencies later in life. No researcher has ever defined what "independence" or "autonomy" mean for an infant or young child (McKenna, 2000). Nor has "independence" been shown to correlate with any particular set of skills or talents not obtainable or more effectively acquired through other social experiences or child-care practices, including

cosleeping. Indeed, according to the most recent annual report of the National Sleep Foundation in the United States, 62% of American adults – who likely were themselves reared by independence-minded caregivers – report difficulties falling and staying asleep. Sixty percent of children under the age of 18 have complained to their parents about being tired during the day and 15% admit to falling asleep in school (National Sleep Foundation Annual Report, 1999).

These data suggest that the solitary infant and childhood “sleep training” model aimed at creating “healthy sleep habits” and advocated for over 60 years have failed miserably. Yet sleep guides continue to advocate this approach (AAP Guide To Your Child’s Sleep, 1999; Ferber, 1985; Godfrey & Kilgore, 1998).

Conversely, results from the first-published studies of people who coslept as infants contradict conventional Western assumptions that cosleeping leads to negative psychological, emotional, and social outcomes (Ferber, 1985; Robertiello, 1975; AAP Guide To Your Child’s Sleep, 1999). Heron’s (1994) recent cross-sectional study of middle-class English children shows that children who “never” slept in their parents’ beds were more likely to be rated by teachers and parents as “harder to control” and “less happy,” and they exhibited a greater number of tantrums. Children never permitted to bedshare were also more fearful than children who always slept in their parents’ bed for all of the night.

When done safely, other research points to further advantages of cosleeping over solitary sleeping. For example:

- In their survey of adult college-age subjects, Lewis and Janda (1988) report that males who coslept with their parents between birth and five years of age had significantly higher self-esteem, experienced less guilt and anxiety, and reported greater frequency of sex. Boys who coslept between six and 11 years of age also had a higher self-esteem. For women, cosleeping during childhood was associated with less discomfort about physical contact and affection as adults.
- Crawford (1994) found that women who coslept as children had higher self-esteem than those who did not. Indeed, cosleeping appears to promote confidence, self-esteem, and intimacy, possibly by reflecting an attitude of parental acceptance (Lewis & Janda, 1988).
- A study of parents of 86 children in pediatrics and child psychiatry clinics (ages two to 13 years) on military bases (offspring of military personnel) revealed that cosleeping children received higher evaluations of their comportment from their teachers than did solitary-sleeping children, and they were *under-represented* in psychiatric-care populations, compared with children who did not cosleep. The authors state:
Contrary to expectations, those children who had not had previous professional attention for emotional or behavioral problems coslept more frequently than did children who were known to have had psychiatric intervention and had lower parental ratings of adaptive functioning. The same finding occurred in a sample of boys one might consider “Oedipal victors” (e.g., three-year-old and older boys who sleep with their mothers in the absence of their fathers) – a finding which directly opposes traditional analytic thought (Forbes et al., 1992).
- In the largest and possibly most systematic study to date – involving more than 1,400 subjects from five ethnic groups in Chicago and New York – Mosenkis (1998) found far more positive than negative adult outcomes for individuals who coslept as children. The results were the same for almost all ethnic groups (African Americans and Puerto Ricans in New York; Puerto Ricans, Dominicans, and Mexicans in Chicago). An especially robust finding cutting across all ethnic groups was that cosleepers exhibited a feeling of satisfaction with life.

Cross-cultural Perspectives on Infant Survival and Survival while Cosleeping

“The AAP’s recommendations to advise against bedsharing and promote dummy use needs to be questioned, not for the carefully weighed evidence presented but rather the gaps in our knowledge of infant care practices and their consequences that still remain.”
(Fleming et al., 2006)

There is no evidence whatsoever that bedsharing is never safe, or mostly not safe, or cannot be made safe. There is only evidence that shows clearly the circumstances by which bedsharing is made dangerous and increases the risks of SIDS. This occurs when the mother smoked

during or after her pregnancy, where premature babies bedshare, when the infant is positioned prone in the bed or on pillows, when drugs or alcohol are involved, or where other children are bedsharing alongside an infant.

Dangerous gaps in the furniture surrounding a mattress on which the infant sleeps or where night tables or other objects, including mattresses, are placed slightly away from a wall provide an opportunity for the infant to become wedged, all constituting modifiable factors which increase the risk of infant death (Scheer, 2000; Drago & Dannenberg, 1999; Nakamura *et al.*, 1999). However, there is no one-to-one relationship between cosleeping or cosleeping in the form of bedsharing and infant mortality.

In the United States, the subgroups for which the greatest declines in SIDS rates continue to take place are precisely the groups for which bedsharing is increasing the most and reaching historic highs (Willinger *et al.*, 2002; McCoy *et al.*, 2004). Consider the Japanese data. Maternal smoking is exceedingly low (about 5%), while breastfeeding rates reach almost 95%, and forms of bedsharing represent the cultural norm in almost 90% of the population. In Japan, infant mortality in general

and SIDS in particular are among the lowest rates in the world.

In 2001, The SIDS Global Task Force Child Care Study published the results of a study in which over 56 cultures or regions were examined with particular respect to the relationship between SIDS and bedsharing rates. Contrary to what would be predicted as regards the presumed positive relationship between bedsharing and SIDS rates that some think to be inevitable, the opposite proved true: as bedsharing rates of a country, city, or region increased SIDS rates decreased. Another way to describe the findings is that as solitary infant sleep increased so did the SIDS rates! Apparently, the researchers did not expect this finding as they called it a “paradox” clearly revealing their bias... the idea that, surely, high bedsharing must correlate with high SIDS. At this point, Nelson *et al.* (2001) had no problem adopting a more complex view of the relationship between SIDS and bedsharing. Instead of concluding that bedsharing may be protective when done safely, they argue that: “Interactions with smoking may help explain this paradox, but further research is needed to understand the exact methods and complexity of bedsharing both between and within cultures.”

Sankaran *et al.* (2000) present data from Saskatchewan, Canada, showing that where breastfeeding and forms of cosleeping co-exist, SIDS deaths are reduced. This finding is consistent with a study in South Africa showing that bedsharing babies have higher survival rates than solitary-sleeping babies (Kibel & Davies, 2000).

In Hong Kong, where cosleeping is the norm, SIDS rates are among the lowest in the world (Davies, 1985; Lee *et al.*, 1989). In many other Asian cultures where cosleeping is also the norm (China, Vietnam, Cambodia and Thailand), SIDS is either unheard of or an unfamiliar type of infant death (Wilson, 1992; Yellend *et al.*, 1996).

Meanwhile, data collected by Grether, Schulman, and Croen (1989) looking at Asian immigrants to the United States found that the longer different Asian immigrant subgroups lived in the United States and presumably began to adopt American lifestyles, including placing infants in cribs for nighttime sleep, the traditionally low SIDS rates of these ethnic groups began to rise to match the higher rates of whites.

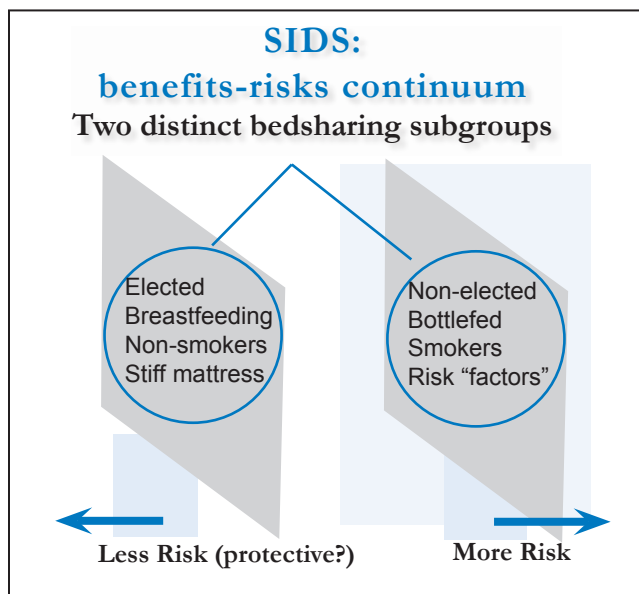


Figure 9. Outcomes associated with bedsharing, whether risky or protective, depend on the circumstances and characteristics of the sleep environment within which it occurs and, most especially, whether mothers breastfeed their infants, as breastfeeding significantly changes the functional connection and sensitivities between the mother and her infant, including the position in bed compared with bottle-feeding-bedsharing mother-infant dyads.

In contrast to studies showing the potential protective effects of bedsharing among urban, economically marginalized minority groups in which multiple relevant risk factors exist, bedsharing continues to be associated with high numbers of infant deaths, either from SIDS or accidental asphyxiations. This is especially true in the United States among African Americans living in large cities, such as Chicago, Washington, D.C., and St. Louis, the three cities that (not coincidentally) provide bedsharing critics data to argue against the safety of any and all bedsharing. Epidemiological studies also show that across marginalized sometimes indigenous groups, such as the Maori from New Zealand, Aborigines from Australia, and Cree from Canada, bedsharing or other forms of cosleeping are likewise associated with significantly increased risks. This is especially evident when associated with maternal smoking and other specific modifiable factors (Blair *et al.*, 2000; Wilson, 1992; Mitchell & Thompson, 1995).

Such disparities in outcomes associated ostensibly with the same practice are explained by looking more closely at bedsharing/cosleeping contexts and examining what is meant by the terms cosleeping, bedsharing, and a bedsharing death. The question is whether it is valid to extrapolate and infer from highly stressed and disadvantaged populations universally applicable principles concerning the relationship between SIDS risks and bedsharing. We argue it is not. Rather, these findings underscore the need to appreciate how risk factors (and general environmental factors rather than practice) can converge to make bedsharing more dangerous.

As argued elsewhere, bedsharing risks or protective factors are best conceptualized as occurring along a benefits-risk continuum (McKenna & Mcdade, 2005; McKenna & Mosko, 2001) (**Figure 9**) where, for example, breastfeeding in the context of non-smoking and highly committed mothers electing to bedshare for nurturing purposes is found, positive outcomes can be expected. Compare this situation to bedsharing as it occurs in poor environmental circumstances where mothers may have smoked before bedsharing and bottle feeding is practiced (with attendant less protective sequelae as discussed earlier). Among mothers whose economic situation provides no caregiving choice but to bedshare and cribs are not affordable, outcomes tend to be less positive.

SUMMARY, CONCLUSIONS, REFLECTIONS, CONCERNS

Where the Bedsharing Controversy Is Headed and What It Means for Breastfeeding Mothers and Infants

"...it would be a mistake to leap to the conclusion that because human immaturity makes possible high flexibility in later adjustment, anything is possible for the species...we would err if we assumed a priori that man's inheritance places no constraint on his power to adapt" (Bruner, 1972).

The consequences of enacting population-wide changes in infant and child care based mostly on cultural assumptions or limited science without comprehensive systematic and holistic studies carries many hidden risks. We learned this fact the hard way. It is now known that *not* breastfeeding in the United States alone leads to at least 750 infant deaths from congenital defects, birth complications, and/or primary and secondary infections (Chen & Rogan, 2004). The cultural dismantling early in the last century of what was for the most part an integrated cosleeping with breastfeeding adaptive complex contributed significantly to the deaths of hundreds of thousands of western infants from sudden infant death syndrome (SIDS). Turning infants onto their backs from their stomachs (the natural position of a breastfeeding-cosleeping infant) has reduced the SIDS rates at least by one half in most industrialized countries, while keeping babies "cosleeping" in rooms with a committed adult also cuts the chances of an infant dying by one half.

Indeed, the traditional cultural ideologies about the inherent dangers of sleeping with an infant under any circumstance continues to dominate the belief system associated with western medical institutions, including the apparent belief that mothers have no intrinsic proper sense of what is "good" or safe for their infants. Therefore, they must be taught or warned against experiencing too much contact with their infants and how and where that contact should take place. This belief is evident in a recent campaign being promoted by a national SIDS organization referred to as "First Candle." The program brochure is intended for nursery and NIC ward nurses and is entitled "*Model behavior: the most important modeling job of your life.*" The set of guidelines emerges from the idea that parents tend to copy practices observed by nurses in hospital settings.

The brochure states: “As a nurse, you play a vital role in ensuring an infant’s health and survival after they leave the hospital. This is the most important modeling job of your life.” Judging from the tone of the brochure, the moralistic framing and text, there is no mistaking that the intent is to promote widely accepted SIDS reduction strategies, i.e., back to sleep, which is good, but also no bedsharing even for breastfeeding mothers, an issue upon which there is much less agreement professionally.

In addition, these guidelines and recommendations imply, though it is not explicitly stated, that any skin-to-skin contact should be heavily discouraged for fear that mothers will think skin-to-skin with their babies once in bed is an acceptable practice at home. Special emphasis is given, for example, on how dangerous it is to permit a mother ever to lie her infant prone on her chest, as if prone position on her chest while awake or asleep carries the same risks for SIDS as a baby lying prone on a soft or solid inert surface in a crib while sleeping alone.

Already, the AAP recommendations in the United States against any and all bedsharing with which many SIDS researchers and other scientists disagree is having a negative cascading effect in hospitals. New policies are being established to minimize the amount of contact mothers will be permitted to have with their infants and to stop practices that, for example, encourage skin-to-skin contact and/or the cobedding of twins, i.e., placing twins in the same bassinet.

One suggestion recently obtained from a U.S. government listserv associated with infant and fetal mortality review board professionals describes discussions apparently going on at hospitals in which, at least in the Washington DC area, mothers may be asked, or already are being asked, to sign contracts before their babies are permitted to be born in the hospital in which they promise never to shake their baby or to bedshare, as if bedsharing, like baby shaking, is a form of child abuse.

A salient brochure message being given on “model behavior” for NIC ward nurses mentioned above suggests that nurses have a responsibility to impress on mothers before leaving the hospital that first and foremost contact between her infant and herself is potentially dangerous. The message itself implies that “moral” nurses must all agree that bedsharing should never be permitted in a hospital or at home, and “good” nurses like “good” mothers cannot or should not disagree with the strong anti-bedsharing message.

Altogether, the heavy emphasis and uncompromising stress on denying a mother spontaneous contact with her infant and the emphasis on all the potential harm mothers can do leads us to believe that if such guidelines are adopted as endorsed by First Candle and other government-sponsored SIDS organizations under the Department of Health and Human Services rubric, breastfeeding will be negatively impacted. These guidelines, brochures, and hospital “contracts” reflect a complete dismissal of other legitimate strategies to maximize safety. These policies likewise reflect an exceedingly narrow range of scientific sources from which they are willing to draw to help formulate policies that will affect potentially millions of babies and, our guess is, many of them adversely. These kinds of messages and policies need to be challenged not only because they fail to appreciate a diverse body of scientific evidence that refutes their claims and assumptions, but they dismiss and undermine the unique qualities of each mother-infant dyad and how critical early contact can be in helping establish and facilitate optimal milk letdown and learned skills at breastfeeding, all of which are integrated with the process of mother and infant attachment.

Certainly, the emphasis on mother-infant separation and the general portrayal of potential negative effects that come with too much maternal-infant contact, with minimal attention given to the way breastfeeding changes the safety of contact, not only represents a threat to successful breastfeeding, but will no doubt further undermine maternal confidence. If the attitudes conveyed by these brochures are adopted by pediatric health personnel in general, these “programs” will no doubt significantly reduce the kinds of individual joys, experiences, and satisfaction that ordinarily come naturally as mothers and infants explore their own unique new relationship and feelings for each other in these first critical days.

It is important to realize by this example how the American Academy of Pediatrics recommendation against any and all bedsharing and the general historical negative presumptions against the practice are finding new and inappropriate applications in the neonatal and new mother nurseries. As is true in so many aspects of western infant care that involve intimate contact between an infant and its mother, sometimes knowing if, in fact, a caregiving behavior is actually dangerous or not is not

as important as simply *believing* and *concluding* that it is, or that by avoiding it, infants will always benefit.

This chapter has reviewed the biological bases of increased contact and breastfeeding that generally exists between a human mother and her infant and why, when done safely, each member of the dyad benefits. For the infant, it is not untrue to say nor an exaggeration to emphasize that increased contact, especially when it begins with exclusive breastfeeding with its mother, increases and improves the infant's chances of survival and well being.

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