

The nocturnal life of babies: breastfeeding, bed-sharing and informed choice



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The anthropology of infant sleep

- “Every primate baby is designed to be physically attached to someone who will feed, protect, and care for it... they have been adapted over millions of years to expect nothing else” (Small, 1998)



- Euro-American societies are cross-culturally unusual in separating mothers and infants for sleep

Small, M. F. (1998). *One baby, countless lives: biology and culture shape the way we parent*. New York: Doubleday Dell Publishing Group Inc.

Solitary infant sleep = historically novel



- Prior to the early 20th century infant social sleep was normal practice
- “The bosom of the mother is the natural pillow of her offspring” Dr Conquest (1848)
- Dr Chavasse, in *Advice to mothers* (1839) recommended bed-sharing until an infant was weaned at 9 months

“The First Born” by Yorkshire artist Fred Leighton was painted in 1918 and hangs in Venus Gallery, Kingston upon Hull

Scientific baby care

- Inter-war era: dawn of ‘scientific baby-care’
- Baby-care ‘products’ were invented
- Fashions developed in infant care practices
- Infant ‘formula’ became desirable
- Vintage infant care manual the Glaxo baby book advised “The place where the baby most likes to sleep is the place where he must not be” – babies were best sleeping in a quiet dark place, and should be kept completely still – rocking cribs or cradles were bad for babies too.



Expert advice



- During the 1920s John B. Watson and Frederick Truby King dominated ‘scientific’ attitudes to infant care
- The primary discourse of child-rearing revolved around independence, self-control and self-reliance
- Watson believed that no child could have too little affection, while a good ‘Truby King’ baby preferred solitary confinement to human interaction
- Their influence lingers in some of the underlying assumptions about babies that we still hear today.

Hardyment, C. (1983). *Drum: Baby, child and the London, Jonathan Cape Ltd.*

The importance of physical contact

- Western fashions in infant care have changed much more rapidly than infant evolutionary biology.

- Harlow’s experiments into the social development of infant monkeys demonstrated how physical contact, warmth and comfort was of vital importance for infant development.



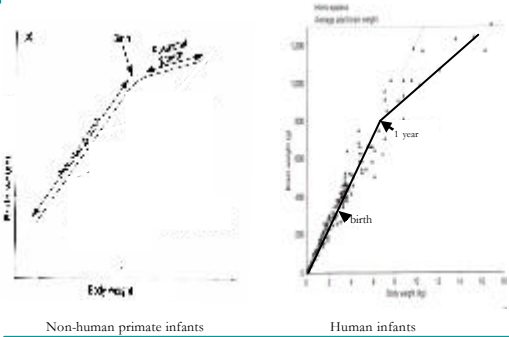
Blom, D. (2002). *Love at First Suck: Monkeys, Humans and the Science of Affection*. Cambridge, Mass, Perseus.

The evolutionary obstetrical conflict

- Human infants are neurologically underdeveloped at birth
- Human infants continue foetal rate of brain growth for 1 year



Martin, R.D. 1990 *Primate Origins and Evolution: A Phylogenetic Reassessment*. London: Chapman and Hall



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The evolutionary obstetrical conflict

- Human infants are neurologically underdeveloped at birth
- Human infants continue foetal rate of brain growth for 1 year
- Evolutionary conflict between bipedalism and encephalisation
- Compromise = truncated gestation and total caregiver dependency (an 'external gestation')
- Infant physiology regulated by mother while infant brain matures



Martin, R.D. 1990 *Primate Origins and Evolution: A Phylogenetic Reassessment*. London: Chapman and Hall

Effects of physical contact

- soothes and calms infants
- promotes sleep
- conserves heat / energy
- analgesic for newborns
- separation is stressful
- premature infants experience less agitation, apnoea, bradycardia and more stable SatO₂
- reduces maternal anxiety
- more efficient participation in care
- effective breastfeeding initiation



Anderson GC et al (2003). Early skin-to-skin contact for mothers and their healthy newborn infants (Cochrane Review). In: *The Cochrane Library*, Issue 2 2003.

Social sleep for infants



- Sleep contact for human mothers and infants is a species typical trait
- Reflects the juxtaposition of the lactational characteristics of a precocial species with development of secondarily altricial infants.
- If sleep contact is historically & cross-culturally widespread, and evolutionarily & physiologically beneficial, is it really absent from the behavioural repertoire of parenting in the industrialised West?

- Have Euro-American mothers lost the instinct for social sleep with their infants?

North Tees Infant Sleep Study

- 1998-2000 253 families with newborn infants born at N. Tees
- Sleep diaries for 7 consecutive days during 1st and 3rd month
- Semi-structured interviews at end of 1st and 3rd month
- Half of all babies bed-shared sometime during 1st 3 months



Bell, I.L. (2002) "Reasons to share: why parents sleep with their infants". *Journal of Reproductive and Infant Psychology*, 20 (4): 207-221.

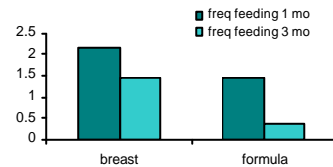
Do UK parents & infants sleep together?

	North Tees Study	CESDI Study
Bed-shared in 1st month	47.4%	47.9%
Bed-shared in 3rd month	29.4%	24.2%

- Breastfeeding and bed-sharing are very clearly intertwined:
 - 72% of infants who breastfed for 1 month or more were bed-sharers
 - 38% of formula-fed babies bed-shared

Blair PS & HL Ball (2004) "The prevalence & characteristics associated with parent-infant bed-sharing in England" *Archives of Disease in Childhood* 89:1106-110

Frequency of feeding at night in 1st & 3rd month



No sig. diff between night feeding in 1st & 3rd months for breastfed babies
 $p < 0.00001$ for night feeding in 1st & 3rd months for formula-fed babies

Ball, HL, (2003) "Breastfeeding, bed sharing & infant sleep" *Birth* 30 (3): 181-188

Coping with night-feeding

When mothers are unwilling/unable to get up & breastfeed:

1. Feed the baby formula
2. Undertake 'infant-training' programme
3. Sleep next to the baby



Ball, HL, (2003) "Breastfeeding, bed sharing & infant sleep" *Birth* 30 (3): 181-188

"One barrier to breastfeeding is the need for a satisfied baby that sleeps through the night and does not feed too frequently"
 (Marchand & Morrow 1990)

"The mother's need for an uninterrupted night's sleep may be promoting the early cessation of breastfeeding"
 (Pinilla & Birch 1993)

Our interviews echo these views:

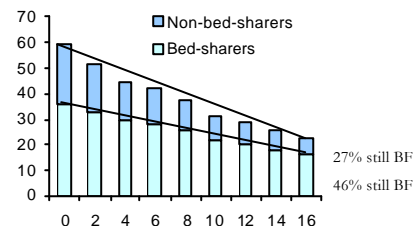
- Mother 118: Baby was too demanding and feeding too often. Breastfeeding didn't allow a good night's sleep and I have a toddler as well.
- Mother 203: Baby was too demanding – waking too frequently. Baby now sleeps solid 12 hours at night.
- Mother 407: Baby was unsettled on the breast and not sleeping. Now (on formula) baby not fed at night
- Mother 412: Breastfeeding was too tiring, wanted Dad to help at night.

Biologically appropriate infant care

- Recognises that breastfed infants have different sleep habits from formula fed infants
- Breastfeeding dyads sleep in close contact
- Younger babies bed-share more than older babies
- Bed-sharing promotes breastfeeding, which promotes infant and long-term health

Ball, HL (2003) "Breastfeeding, bed-sharing & infant sleep". *Birth* 30 (3): 181-188

Breastfeeding decline over 1st 4 months



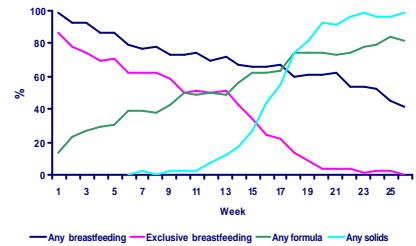
bed-sharing at 1 month and breastfeeding to 4+ months ($\chi^2=5.45$, $df=1$, $p=0.02$)

Longitudinal study of bed-sharing & breastfeeding

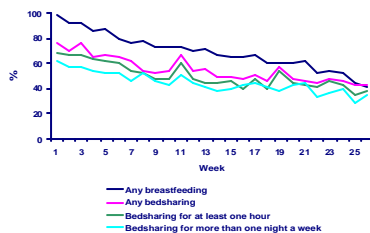
- Conducted in 2003
- 100 mothers and babies, recruited following delivery, reported feeding and sleeping behaviour every week for 26 weeks
- Recruited only mothers who initiated breastfeeding
- Tracked relationship between breastfeeding and bed-sharing behaviour weekly

Ball, HL. (In press) Bed-sharing practices of initially breastfed infants in the 1st 6 months of life. Infant and Child Development.

Formula use increased linearly from 1 to 6 months, with over 80% of infants in the sample receiving formula by the age of 6 months. By the age of 5 months almost all babies were receiving some solid food.



Bed-sharing was negatively correlated with infant age ($r = -0.91$, $p < 0.0001$). 70% bed-shared in the 1st month, falling to 44% at 6 months. Over all 75% were involved in some amount of bed-sharing between birth and 6 months of age.



Duration of bed-sharing

	Regular bed sharing >23 weeks	Regular bed sharing <23 weeks	T-test
Introduction of solids (all infants)	16.6 n=21	16.9 n=20	p=0.795
Introduction of solids (breastfed infants)	17.4 n=14	17.4 n=9	p=0.99
Introduction of formula milk	13.9 n=21	11.8 n=20	p=0.24
Termination of breastfeeding	22.0 n=21	15.8 n=20	p=0.03
Mother's return to work	22.8 n=21	24.7 n=20	p=0.1

Summary of longitudinal data

- Negative correlation for bed-sharing and breastfeeding with infant age
- Timing of cessation of bed-sharing related to the actual cessation of breastfeeding rather than the introduction of 'complementary' foods
- Bed-sharing = a common activity for healthy term infants, particularly breastfed infants and in the initial months of life – mothers explain this as making night-time breastfeeding easier.

The importance of frequent suckling

- Following parturition, prolactin mediates milk secretion; while oxytocin triggers 'milk ejection' or 'let-down'
- The prolactin peak is very important to initiating the process of lactation, particularly in triggering the copious milk production of lactogenesis II.
- In the early post-natal period, each time the infant stimulates the nipple via sucking or touch, there is a rapid increase in prolactin secretion.
- The amount of prolactin released is directly related to the intensity of nipple stimulation.
- Night-feeding is associated with greater prolactin release than daytime feeding
- Frequent prolactin secretion between birth and lactogenesis II increases the efficiency of subsequent milk production
- Maintenance of lactation (galactopoiesis) depends on successful development of prolactin receptors, which also depends upon frequent feeding and high prolactin secretion.

Ball, HL & MP Ward-Platt "Evolutionary intervention on the postnatal ward: a test of mother-infant proximity" Evolutionary Anthropology, (under review)

Bed-sharing encourages frequent suckling

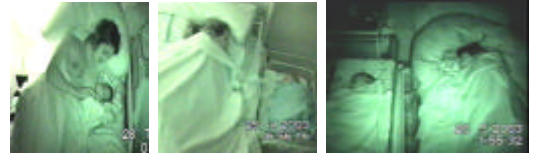
- McKenna et al observed that mothers and 11-15 wk infants breastfed twice as frequently at night when sleeping in contact than when sleeping apart.
- In our community study we found:

Breastfeed frequency at night (maternal nightly report)

	Bed-sharers	Non-bed-sharers	
1 st month	2.31 (n=69)	1.91 (n=59)	p=0.03
3 rd month	1.92 (n=28)	0.88 (n=30)	p<0.001

- To explore the effects of sleep contact on both early breastfeed frequency and long-term duration we randomised 64 mothers and infants to 3 different sleep conditions on the post-natal ward: Baby in bed, baby in side-car crib, & baby in bassinette.

McKenna, J. J., et al. (1997). "Bedsharing promotes breast-feeding in Latino mother-infant pairs." *Pediatrics*, 100: 214-219.



Randomised trial of mother-infant sleep contact on post-natal ward

- 2.5 year project
- 64 mothers and babies
- Recruited pre-natally at Bloomsbury workshops
- Randomised to 3 conditions
- Videoed on 1st and 2nd nights
- Normal deliveries
- No opiate analgesics within 24 hours



Babes in Arms

Outcome variables

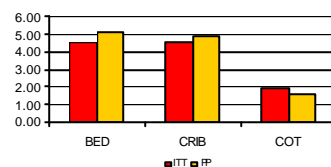
- Breastfeeding initiation (frequency)
- Infant safety (actual & potential risks)
- Mother's & infant's sleep
- Mother's satisfaction
- Assistance from staff
- [Long-term breastfeeding]
- [At home infant sleep site]

Data Analysis

- Intention to Treat (ITT)
 - Includes all mothers who were filmed and followed up regardless of whether they remained in their allocated condition throughout the study
- Per Protocol (PP)
 - Includes only those mothers who adhered to the allocated condition for the majority of the period observed

Breastfeeding initiation

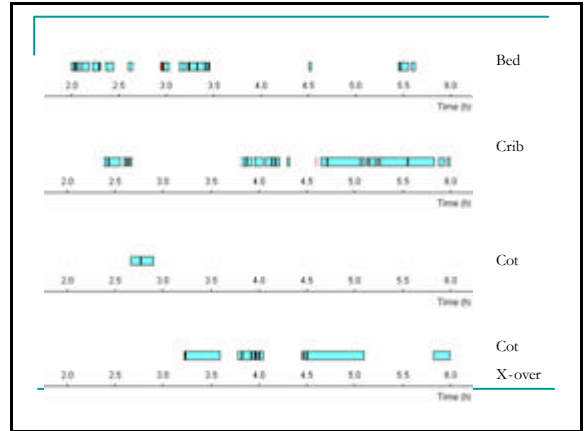
Feeding Effort
Successful and attempted bouts/hour



Bed vs. cot, $p < 0.01$; Crib vs. cot, $p < 0.00$; Bed vs. crib = ns

Breastfeeding initiation

	Bed	Cnb	Cot	Pair-wise t tests
Successful feeds per hour	1.69	1.80	0.79	Bed vs Cnb; ns Bed vs Cot; $p=0.01$ Cnb vs Cot; $p=0.01$
Feeding attempts per hour	3.01	2.78	1.15	Bed vs Cnb; ns Bed vs Cot; $p=0.01$ Cnb vs Cot; $p=0.02$
All feeding effort per hour	4.50	4.58	1.94	Bed vs Cnb; ns Bed vs Cot; $p=0.01$ Cnb vs Cot; $p=0.00$
Nipple presentation per hour	5.97	5.31	3.04	Bed vs Cnb; ns Bed vs Cot; $p=0.02$ Cnb vs Cot; $p=0.03$



Unhindered access

- Facilitates contact between mother and baby
- Allows baby to easily attract mother's attention
- Encourages greater interaction
- Facilitates frequent attempted feeds
- Results in more frequent successful feeds
- Practice leads to confidence
- Short and frequent feeding bouts = less nipple trauma
- Regular frequent nipple contact (esp. at night) elevates prolactin levels, stimulates milk production, milk comes in earlier, more prolactin receptors produced → more successful breastfeeding

Infant safety

Types of risk event considered

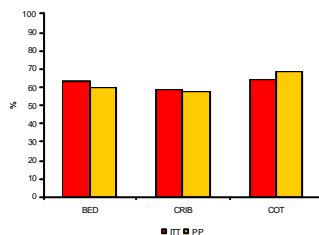
- Breathing (airways covered)
- Falling (positioned precariously)
- Overheating (head covered)
- Entrapment (baby squashed by equipment)
- Overlying (baby squashed by mother)

No actual events observed in 1024 hours

	Bed	Cnb	Cot	t test
All potential risk per hour	0.15	0.05	0.02	Bed vs Cnb; ns Bed vs Cot; $p=0.01$ Cnb vs Cot; ns
Potential breathing risk per hour	0.12	0.03	0.02	Bed vs Cnb; ns Bed vs Cot; $p=0.04$ Cnb vs Cot; ns
Potential falling risk per hour	0.02	0.02	0.00	Bed vs Cnb; ns Bed vs Cot; ns Cnb vs Cot; ns

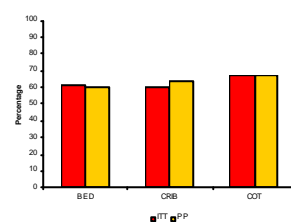
Mothers' sleep

Duration of mothers' sleep as proportion of observation



Infants' sleep

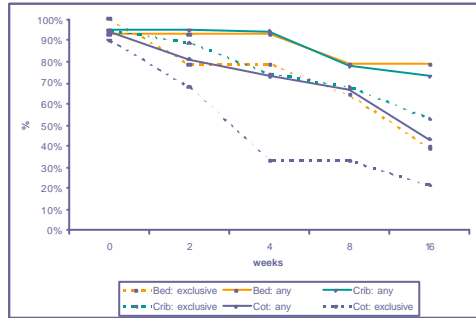
Duration of infants' sleep as proportion of observation



Calls to staff

	Bed	Crib	Cot	t test
Calls/hour	0.13	0.17	0.03	Bed: Crib = ns Bed: Cot = 0.02 Crib: Cot = 0.01
Visits/hour	0.40	0.40	0.30	Bed: Crib = ns Bed: Cot = ns Crib: Cot = ns
% duration visits (1%=2.5min)	2.1	1.3	1.1	Bed: Crib = ns Bed: Cot = ns Crib: Cot = ns

Breastfeeding (any & exclusive) duration



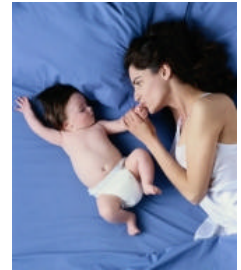
Final outcomes and recommendations

- Sleeping proximity significantly affects breastfeeding frequency
- Standalone cot is inferior to bed/side-car crib for initiation of bf
- Shared sleep surface = higher 'potential' safety risk
- Side-car crib = most effective sleep location for safety & bf
- Infant sleep location has no overall effect on mother's sleep, infant's sleep or staff visits
- Sleep location on post-natal ward may affect bf duration, but does not appear to affect at-home sleep arrangements
- Implications for bf establishment in groups at-risk for bf failure

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Why do UK parents and infants bed-share?

- Ease and convenience of night time breastfeeding
- Enjoyment of close contact with infant
- Necessity due to lack of space
- Anxiety regarding infant health or safety
- To settle a fractious infant
- Family bed ideology



Bell, H.L. (2002) "Reasons to share: why parents sleep with their infants". *Journal of Reproductive and Infant Psychology*, 20 (4): 207-221.

Enjoyment



Family bed



Necessity



The instinct for social sleep

- Have Euro-American mothers lost the instinct for social sleep with their infants?
 - No. The majority of parents practice some bed-sharing. Parents bed-share with different degrees of frequency, and for different reasons
- Have Euro-American mothers lost the instinct for SAFE social sleep with their infants?

Sleep contact behaviour

Breastfeeding bed-sharing mother-infant pairs sleep together in a characteristic manner:



Ball, H.L. (2005) "Parent-infant bed-sharing behaviour: effects of feeding type and father presence". *Human Nature* in press

Characteristic bed-sharing position

- Facilitates easy access to breasts by baby
- Babies orient towards their mothers' breasts (olfactory?)
- Safety benefits:
 - baby flat on mattress away from pillows
 - baby constrained by mum – can't move up or down bed
 - mum controls height of bed covers over baby
 - very difficult for baby to be rolled on
 - mum close enough to monitor temperature and breathing

Ball, H.L. (2006) "Parent-infant bed-sharing behaviour: effects of feeding type and father presence". *Human Nature* in press

Social sleep behaviour of non-breast feeders

- Formula-fed infants were placed to sleep with heads and shoulders on or between pillows for most of the night -- breastfed infants were never observed on pillows.
- Mothers of formula-fed infants did not orient themselves towards their infant to the same degree as the mothers of breastfed infants.
- Mothers of formula-fed infants who had never breastfed did not create a constrained space for their infant to sleep in with their bodies.

Ball, H.L. (2006) "Parent-infant bed-sharing behaviour" *Human Nature* in press.



Evaluation of social sleep environments

- Have western mothers lost the instinct for sleeping safely in contact with their infants?
 - Breastfeeding mothers?
 - Formula feeding mothers?
 - Fathers?
- Are western bedding and sleeping arrangements incompatible with safe sleep contact?
 - Where do we sleep?
 - How do we arrange the sleep environment?

Safe infant social sleep

- a safe physical environment
 - space
 - sleep surface
 - bedding
 - gaps
- a safe social environment
 - alcohol / drug consumption
 - smoking
 - crowding

Sleep environment



The risks of bed-sharing

- Infants sleeping with a parent who smokes have an increased risk of SIDS
- Accidental suffocation is sometimes a cause of bed-sharing deaths
- In most cases drugs, alcohol or excessive tiredness inhibited normal parental awareness of infant during sleep
- Very rare for breastfed infants – but no national-level data are recorded.
 - Make-shift bedding arrangements, sofas etc
 - Smoking
 - Alcohol and drug use
 - Lack of forethought / no responsible caregiver

Bed-sharing is important for breastfeeding

- Strong association between breastfeeding and infant sleep location
- 70-80% of UK mothers who breastfeed bed-share
- Facilitates night-time feeding, and helps maintain milk supply
- Many breastfeeding organisations highly value mother-infant sleep contact
- Breastfeeding promotion organisations vigorously oppose efforts to introduce anti-bed-sharing policies
- Tension in infant health policy between SIDS /accidental death reduction and breastfeeding promotion

Solitary sleeping environments for newborn infants are historically novel, culturally circumscribed, developmentally inappropriate, and evolutionarily bizarre.

Insistence that all infants should sleep in solitary environments at all times is biologically unrealistic, particularly for breastfed babies

Providing parents with information on identifying and eliminating the hazards to infants of the western social sleeping environment is more logical than denying the instinct for infant social sleep itself.