

Infant Crying and Sleeping: Helping Parents to Prevent and Manage Problems.

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1. Impacts and Costs of Infant Crying and Sleeping Problems

Babies who cry a lot or are unsettled at night have a variety of impacts on parents and health services. First, because many parents find their babies' crying or sleep-waking hard to manage, these problems are troublesome for parents and costly for health services. For instance, in a national survey, 74% of American parents of 4-9 month old infants reported discussing infant night waking and fussing with paediatricians ¹. In the United Kingdom, the professional time devoted to discussing the problems with parents of 1-3 month-old infants costs the National Health Services about £66million per year ². Second, less commonly and more alarmingly, prolonged crying may trigger 'shaken baby syndrome', resulting in infant brain damage or death ^{3; 4}. Third, early crying and sleeping problems are sometimes the prelude to long-term disturbances in parent-child relationships and psychological problems in school-aged children ^{5; 6; 7}. There is a need for evidence about the nature and causes of these problems and for its translation into services which support parents and babies cost-effectively. The aim in this chapter is to summarise our current understanding and its implications for services and research, with a focus on the first six months of infancy. The concern will be with crying and sleep-waking amount and pattern, rather than with sleep type indices such as Rapid Eye Movement sleep, since parents are usually unaware of these ⁸. Below, evidence will be considered adequate when it stems from at least two studies from independent research groups (i.e. includes replication).

2. Distinguishing Infant Crying from Sleep-waking Behaviours and Infant from Parental Problems

Although crying and sleeping problems are not usually distinguished, they present differently, at different ages, often in different infants, and may well have distinct

causes. Infant crying and parental concern about it peak at around 5-6 weeks of age, with most of the crying in the daytime and, particularly the evenings^{9; 10; 11}. In contrast, infant 'sleeping problems' occur mainly at night, after three months of age¹²; ¹³. Most babies wake at night for feeding in the early weeks and parents expect this. Parents report that most babies begin to 'sleep through the night' by about 12 weeks of age^{14; 15; 16}. It is the failure to achieve this milestone, so that infants continue to settle poorly or wake their parents at night after 12 weeks which accounts for most 'infant sleeping problems'¹³. Emphasising the distinctness of crying and sleeping problems, a recent randomised controlled trial found that a behavioural programme delivered by parents increased the number of infants who 'slept through the night' by 12 weeks of age, but did not affect 24-hour amounts of crying¹⁷.

As well as this separation of crying from sleeping problems, it is important to distinguish between the problem and the infant behaviour which underlies it. Reviews of the evidence estimate that only about one in 10 infants taken by parents to professionals for infant crying problems have a food intolerance or other organic disturbances^{18;19}. These parents are generally correct in judging that their babies cry more than average amounts, but most infants who cry a lot in the first two months of infancy are healthy, put on weight normally, and do not have long-term disturbances^{18;20}. Details about their crying behaviour will be presented below, but 'infant crying problems' as a clinical complaint are characterised chiefly by parental alarm and concern about crying, rather than by a pathological infant condition ^{18; 19}.

Likewise, most infants who wake and disturb their parents at night beyond three months of age do not have general or long-term disturbances, other than continuing

sleeping problems^{21,22}. To a large degree, parental concern about infant night waking reflects Western cultural practices and norms^{23,24}. This does not downplay parental complaints, since parents who work Western office hours need to sleep at night themselves, while it is true that most Western infants over three months of age remain settled for long periods at night. Rather, the implication is that most infants who fail to develop this ability are in good health, so that the infant behaviour needs to be distinguished from the, largely parental, problem.

Emphasising these distinctions, epidemiological studies have found that most infants who have crying problems do not have sleeping problems (and vice-versa). Wolke et al's²² epidemiological study of five month olds found that 11% of infants had sleeping problems, 10% crying problems, and just 5% had both types of problems, while sleeping problems, rather than amounts of crying at 5 months, predicted later sleeping problems. Similarly, Von Kries et al.²¹ found that prolonged crying in the first three months was not associated with increased rates of sleeping or feeding difficulties. Earlier reports that crying babies sleep less per 24 hours were probably due to the inaccuracy of parent reports about *non-criers*, which exaggerate the amounts these babies sleep because their parents are not aware of periods when they are awake but settled²⁵. Lehtonen's review of follow-up studies of crying babies concluded that most of them slept normally at a later age²⁰. Likewise, Zuckerman, Stevenson & Bailey²⁶ found that infants who had sleeping problems solely at eight months did not have later behaviour problems, whereas those with chronic sleep problems continuing to three years of age were more likely to have additional behaviour disturbances.

These findings have two implications. First, the problem and infant behaviour underlying it both need to be assessed, but considered separately. Second, two main groups of infants, and clinical phenomena, exist: infants who cry a lot in the day and evening in the first two months, and infants who fail to develop the ability to remain settled at night by three months of age. In addition, a much smaller third group of infants has organic disturbances^{18; 19}. Recent research has identified a group of infants who have multiple, crying sleeping and other problems which persist after three months of age and who have extensive psychological and family disturbances^{5,21}. The nature and causes of these different behavioural and developmental pathways will be examined separately below.

3. Infant ‘Colic’ and the Infant Crying Peaks

Prolonged unexplained crying in early infancy has traditionally been attributed to gastrointestinal pain, as reflected in the term infant ‘colic’²⁷. Recent studies have challenged this assumption and led to a reconceptualisation.

First, although prolonged crying can be due to food intolerance and other organic disturbances during the first three months, these are absent in 90% of cases^{18; 19}. Furthermore, the evidence about the main organic conditions believed to cause crying – Gastroesophageal Reflux Disease (GERD) and food allergy – is equivocal. For GERD, Heine’s²⁸ review concluded that ‘A direct causal relationship between acid reflux and colic therefore appears unlikely’ (p.222). For allergic (atopic) disturbances, the recent evidence suggests a weak relationship, but is unclear about its nature. Studying infants at familial risk of atopy, Kalliomäki et al²⁹ found that infants who later showed eczema or asthma fussed (but did not cry) more at seven weeks, and

cried more at 12 weeks, than infants who did not develop eczema or asthma. In contrast, Castro-Rodriguez et al's³⁰ prospective study of a large community sample found no association between physician-reported colic in early infancy and markers of atopy, asthma, allergic rhinitis, wheezing and bronchial constriction from nine months to 11 years of age. Nor were rates of parental asthma or positive skin tests for allergy raised where infants had colic. Heine's²⁸ review concluded that colic is not usually associated with raised infant serum IgE or food-specific IgE levels. The most rigorous, randomised, controlled trial of the effects of a low-allergen diet for breast-feeding mothers³¹ found a much greater reduction in diary-measured infant fuss/crying in the week after mothers began a low-allergen diet than occurred in control-group infants. However, the groups did not differ at outcome in the proportions of infants who 'still had colic' (defined as ≥ 180 minutes fuss/crying per 24 hours). Moreover, neither maternal ratings of their infant's amount of crying at outcome, nor of whether colic behaviour was 'improved, the same or worse', differed between the treatment and control groups – implying that the low-allergen diet did not resolve the problem for parents. The implications of this complex evidence for identifying and treating organic colic cases will be revisited in Section 6.

A second reason for reconceptualising infant 'colic' is that studies which have gone beyond clinically referred groups to include general community samples have found resemblances in crying behaviour, such that babies in general have a crying peak in the first two months of infancy, with an evening clustering, followed by a marked reduction in crying by 12 weeks of age^{9, 11}. This peak has been found too in non-Western cultures, prompting the suggestion that it is a behavioural universal of infancy⁹. Most clinical cases appear to be at the extremes of the normal distribution,

rather than a separate group. Further, the belief that the crying reflects pain has been disputed both by studies which have compared crying bouts acoustically and by a critical re-examination of the evidence that it is possible to tell the cause of crying from its sound ^{32, 33}. Rather than 'cry types' which reflect different underlying psychological states (pain; hunger; anger) reliably, infant crying in the early weeks is now considered to be a 'graded signal' which conveys the infant's degree of distress, but not the precise cause. Caregivers have to work out the cause using experience and contextual information. It is thought that the chief features of early crying that disturb parents are its relative intensity (a high cry: fuss ratio), the prolonged length of the cry bouts, and the resistance of the crying to soothing techniques which usually stop babies from crying ^{34, 35}. The unsoothability of the crying is thought to be its most salient feature, since this makes parents feel helpless and unable to manage ³². Studies where trained researchers have found such infants hard or impossible to soothe have confirmed that this is an objective feature of the infants ^{34, 36}.

Although the cause of these long and unsoothable crying bouts is uncertain, recent analyses have indicated that they are probably specific to early infancy ³⁵. Several researchers have argued that they are linked to the reorganisation of brain systems which occurs at around two months of age, as reflex systems are replaced by cortical control of behaviour ^{37, 38}. In particular, the long and unsoothable nature of the bouts has been attributed to a temporary deficit in 'responsivity', so that infants are hyper-reactive or unable to regulate (stop) crying once it has started ^{39, 40}. Evidence for this hypothesis is so far equivocal, since parental diary reports show that 1-3 month old infants who cry a lot have more cry bouts as well as longer ones ^{32, 35}. However, accurate separation of cry bouts may require more precise measurements than the

parental diary methods, used so far, allow. A further challenge is that the two-month 'neuro-behavioural shift' involves changes to several systems, including attention, sensory, circadian and social abilities, such as the emergence of social smiling³⁸, as well as changes in electroencephalographic activity⁴¹. Attempts to narrow down the neuro-physiological systems involved have so far not proved replicable, so that further research is needed to confirm this contemporary view of the causes of unsoothable crying in early infancy.

As well as changes to endogenous infant systems, explanations of prolonged crying in early infancy have attributed it to inadequate parenting. In particular, early intervention studies showed that both increasing and decreasing parental response to the crying reduced its amount^{42; 43}. These studies have been criticised on methodological grounds⁴⁴, but since intervention often quietens babies, reducing overall crying amount is neither difficult nor the point. Unless interventions address the prolonged unsoothable bouts which are the source of parents' concerns, they are unlikely to resolve the problem.

In principle, the optimum research method in this area involves randomised, controlled designs, where groups are assigned arbitrarily to alternative forms of parenting. In practice, two kinds of obstacle have been encountered. First, the findings have proved inconsistent. For example, supplementary carrying reduced crying preventively in one study⁴⁵, but not in two subsequent replication attempts which achieved similar amounts of carrying^{46; 47}, while supplementary carrying in response to crying proved ineffective as a treatment⁴⁸. Second, these supplementation studies have achieved only modest changes in Western parents'

behaviour, perhaps because they resist changes to their care. A recent randomised controlled trial of the 'REST' nursing regime for helping parents to manage colic found benefits for parents^{49; 50}, but used maternal subjective ratings of infant changes rather than validated measures of infant behaviour, so that it is not clear whether infant crying was reduced. Furthermore, mothers in the control group, who received much less support than the REST mothers, reported similar improvements, albeit of lesser degree. The value for parents of professional consultations is highlighted by Jordan et al's⁵¹ randomised, controlled trial, which found that an infant mental health (IMH) consultation for mothers was as effective as anti-reflux medication and a placebo prescription in reducing infant crying (with over 90% of mothers in all three groups reporting that crying was improved), whereas fewer mothers receiving the IMH consultation were admitted to the hospital for crying-related stress. The REST and similar approaches appear to provide valuable support for mothers, but research to uncover the nature of any effects on infant behaviour, and the cost-effectiveness of these interventions, is needed.

Comparative studies provide an alternative, if less methodologically robust, means of evaluating the consequences of parenting variables for infant crying. Two studies speak most directly to this issue. First, Hubbard & van Ijzendoorn's^{52; 53} careful observations found no evidence that typical variations in how long Western parents took to respond to crying predicted the amounts infants cried at later ages. More rapid parental response in the first nine weeks was associated with small *increases* in crying *frequency* in weeks 9-27, but the associations were modest and did not suggest any effect of early parental responsiveness on the amounts infants cried later on.

Second, by including much greater variations in parenting, a recent cross-cultural study has shown quite different consequences for infant crying overall than for unsoothable crying bouts. The methods used involved comparing three groups longitudinally on parenting and infant crying: London parents; Copenhagen parents (who were expected to be more responsive); and parents who elected before their babies' birth to practice 'Proximal care'. This anthropological term was chosen to describe the key feature of this form of parenting, extensive infant holding, in contrast to the common Western practice of putting babies down⁵⁴. Each of the groups included over 50 infants and infant and caregiver behaviour was measured by validated behaviour diaries. As expected, large group differences in parenting were found when the infants were 10 days and five weeks of age. Proximal care parents fed their babies more often than other groups (14, compared to 10-12 times, per 24 hours) and held their babies for an average of 15-16 hours per 24 hours, about twice as much as London parents, while Copenhagen parents fell in-between. Proximal care parents co-slept throughout the night with their babies much more often than both other groups. London parents had 50% less physical contact with their babies than the other groups, both when settled and when crying, and abandoned breast-feeding earlier.

These differences in parenting were associated with substantial differences in amounts of infant crying. The London babies fussed and cried 50% more than both other groups at 10 days and five weeks of age. Fussing and crying declined at 12 weeks in all three groups, but remained higher in London infants. In contrast, unsoothable crying bouts were equally common in all three groups. Likewise, infant colic

(defined as ≥ 180 minutes fuss/crying per 24 hours), occurred equally often, in 5-13% of infants in each group, at five weeks of age.

These latest findings need careful interpretation until they are confirmed by randomised controlled trials, but they are consistent with a good deal of supporting evidence. First, Schön & Keskivarra's⁵⁵ similar study of Western parents practicing 'natural parenting' found this to be associated with low amounts and, particularly, frequencies of fuss/crying. Previous Danish and African studies, too, have found that high amounts of body contact and responsive parenting are associated with low amounts of infant crying^{56, 57, 58}. Second, Harlow & Harlow's⁵⁹ primate and Hofer's⁶⁰ rat studies have each documented infants' preference for body contact. Hofer argues that early crying evolved as a reflex behaviour that serves dual functions: a communicative function, which encourages maternal contact, and a homeostatic function by assisting recovery from hypothermia. In turn, early parenting acts as an 'external regulator' of infant physiological homeostasis⁶⁰. Similarly, Greenough, Black & Wallace⁶¹ argued that some infant brain systems are 'experience-expectant', that is, presuppose the existence of environmental conditions which are evolutionarily typical. Thirdly, the finding that variations in parenting do not prevent the bouts of unsoothable crying which occur in early infancy is consistent with the evidence cited above that these are specific to early infancy and linked to endogenous neuro-developmental changes at this age.

In sum, the best available evidence strongly indicates, but does not yet confirm, that unsoothable crying bouts are common and specific to early infancy, not affected by parenting, and probably due to neuro-developmental changes which are a normal part

of development. In contrast, overall 24-hour amounts of crying are substantially reduced when parents adopt methods of care which involve more physical contact and greater responsiveness. Prolonged crying in the first three months can be due to food intolerance and other organic disturbances in a small number of cases. The implications of these findings for clinical practice will be revisited below.

4. Infant Sleeping and Sleeping Problems

van Gelder ⁶² summarises contemporary knowledge of sleep-waking mechanisms in adult mammals. There is extensive evidence that the brain's suprachiasmatic nucleus provides the biological 'clock' upon which sleep-waking and other circadian cycles are based. Environmental stimuli, including particularly the effects of light via photoreceptors in the eye, can reset the clock. Other environmental stimuli are less well understood, but dynamic interplay between a variety of external and endogenous regulatory influences is probably involved. Salzarulo et al ⁴¹, for example, identify rising body temperature and Rapid Eye Movement sleep as precursors of spontaneous waking in adults. A further finding of importance here is that older children and adults do not remain asleep at night for continuous periods of eight or more hours of time. Rather, adult sleep involves brief awakening and re-settlings, so that continuous sleep periods may not last more than six hours ²³.

During the first three months of age, most infants pass from a pattern of short sleep wake cycles which are more or less evenly distributed across the day and night to a pattern involving consolidation of sleeping into long periods at night and waking into the daytime ⁶³; ⁶⁴, ¹⁶. Newborns have been said to lack day:night differences in sleep and waking, but some, parent-report, studies have found more sleep at night within

the first two weeks of age^{65, 66}. Studies involving even younger ages and other methods are needed, but infants may be predisposed to show rudimentary circadian sleep-waking organisation from the first days of age.

The crucial question of how this developmental progression takes place has so far yielded only a partial answer. Arguably the most seminal finding is that parents are not correct in reporting that three month old infants 'sleep through the night'. Infra-red and light-sensitive video recordings have shown that, like adults, infants wake several times each night^{63, 64, 67}. Most infants acquire the ability to resettle, but approximately a third disturb their parents called 'signallers' by Anders, Halpern & Hua⁶³. As noted above, it is this waking and signalling, rather than inadequate sleeping, which is the core feature of 'infant sleeping problems' complained of by parents. It is worth noting the methodological implications of this evidence, since objective methods, rather than parent reports, are required to measure infant sleeping behaviour accurately.

As with adults, it is likely that both endogenous and exogenous factors influence how this early process of sleep-waking consolidation takes place. Since waking prior to three months of age is thought to reflect the need for frequent feeding, nutritional processes are probably involved. For instance, infants' stomachs may need to be large enough to contain sufficient milk before they can sustain a long period without feeding, which may explain why heavier babies at birth sleep through the night at a younger age⁶⁸. Wright⁶⁹ has found that the amount of breast-milk taken at each feed is similar from birth to four weeks of age, but typical infants show a diurnal pattern by eight weeks, taking the largest feed at the beginning of each day, possibly in response

to night-time deprivation. By four to six months, the largest feed occurs at the end of the day, suggesting that infants have adapted to anticipate the coming fast⁶⁹. The implication is that learning influences behavioural organisation after the first few postnatal weeks.

The belief that feeding activities contribute to sleep-waking is supported by the consistent evidence that bottle-fed infants remain settled for sustained periods at night, and stop having a feed between midnight and 6am, at an earlier age than breast-fed infants^{70, 71, 69, 26}. Although this is sometimes attributed to differences in the constituents of the two milk types, particularly by parents⁶⁹ it is not clear that this is the case. Indeed, several lines of evidence suggest that exogenous factors associated with feeding may be more important sources of sleep-waking organisation than milk constituents. First, two randomised controlled trials have shown that breast-fed infants whose parents adopt structured 'behavioural' methods of care are more likely than other infants to remain settled at night by 12 weeks of age^{72, 73}. The second of these studies also found that the behavioural approach was particularly effective in promoting settled night-time behaviour at 12 weeks among infants who had a large number of breast-feeds (>11 per 24 hours) in the first postnatal week. Second, there is evidence that co-sleeping through the night (but not for short periods) is associated with persistent night waking^{68, 74, 26}. In keeping with this, although both Proximal care and Copenhagen babies were breast-fed more often than London babies in the cross-cultural study described above, Proximal care babies (who typically co-slept with parents throughout the night), were more likely to wake their parents at night at 12 weeks of age^{72, 73}.

In summary, these studies provide robust, convergent evidence that exogenous environmental factors contained in parenting are important sources of individual differences in infant night-time waking and ‘signalling’ behaviour by 12 weeks of age. Unfortunately, we do not yet know which factors are functionally important, while at least five possibilities exist. First, McKenna and colleagues found that bed-sharing mothers and infants aroused more frequently (usually as a result of the other’s movement or sound), and spent significantly more time in lighter stages of sleep (Stage 1 and Stage 2), and less time in deeper stages of sleep (Stage 3 or 4), compared to infants sleeping alone ⁷⁵. The implication is that co-sleeping might cause infants to wake more often. Second, the proximity of co-sleeping infants and parents may lead parents to detect infant vocal and other cues more readily. Indeed, there is evidence that waking infants often spend time making low noises before a full cry ⁷⁶. Third, the behavioural approach to care described above asks parents to maximise day:night differences in light: darkness, as well as in social stimulation and play. It may be that these environmental cues help infants to learn to set up a circadian sleep-waking organisation, as happens with adults. Fourth, settling infants while awake may be important, since this may enable them to re-settle autonomously on waking, while infants who fall asleep in their parents’ arms may require this for re-settling^{77, 64, 74}. Settling babies while awake is one of the elements of the behavioural approach found to reduce night waking and crying described above. Fifth, co-sleeping may facilitate immediate feeding when babies wake, rewarding the waking, whereas separate sleeping arrangements may delay feeding. Burnham et al ⁷⁸ found that delayed parental response to night waking at three months predicted autonomous re-settling at 12 months. Delaying feeding for a few moments to break the bond between waking and feeding is a further element of the behavioural approach described above.

These five potential mechanisms are not mutually exclusive and several may be involved. At least three of them predicate learning and the importance of learning for the development of settled night-time behaviour is supported by evidence that behavioural methods, which ignore waking and reward settled behaviour, provide the most effective treatments for sleeping problems at older ages ⁷⁹; ²⁴. Although further research into the relative importance of these mechanisms is needed, the existing evidence-base is sufficient to guide clinical practice and will be revisited in Section 6.

As well as parenting practices, it is likely that endogenous factors contribute to some 3-6 month old infants' night waking. At older ages, 1-3 % of children are thought to have sleep problems due to organic parasomnias and 'bio-maturational disorders', compared with a prevalence of 15-35% of 'psychosocial cases' ⁸⁰. It is reasonable to expect that a variety of bio-maturational factors will contribute to night waking in early infancy, while a smaller group will have serious organic disturbances. Burnham et al ⁷⁸ found that high levels of Quiet Sleep at birth predicted which infants resettled at night at 12 months of age, suggesting that infant maturational characteristics play a part. However, there is currently no evidence-base for distinguishing such cases or infants with organic disturbances. The implication is to point to the need for fine-grained, longitudinal research. However, since behavioural methods are the preferred treatment even for neuro-developmental cases ⁸¹, here too clinical practice need not wait upon more accurate data.

5. Crying, Sleeping and Other Problems in Infants Over Three Months of Age

Beyond three months of age, there is growing evidence of a third and at least partly distinct group of infants with multiple disturbances, rather than crying or sleeping problems alone. For example, von Kries et al.²¹ found that infants over six months of age who cried a lot were 6.6 times more likely than other infants to have sleeping problems and 8.9 times more likely to eating difficulties, according to parental reports. These infants also have far poorer outcomes than those who cry a lot or wake at night alone.^{82,6; 7} Wolke et al.⁷ found a greatly raised prevalence of pervasive hyperactivity problems at school-age, compared to case-control children, in such cases. Similarly, Rao et al.⁶ found that prolonged crying after three months of age (but not before three months), predicted hyperactivity, cognitive deficits, poor fine- motor abilities and disciplinary problems when the children reached five years of age. Other studies have found a high rate of emotional and behavioural problems where crying or sleeping problems persist^{26; 82}. The persistence, nature and severity of these problems suggest that organic disturbances may play a part in some of these cases, a speculation which is supported by Kalliomäki et al's²⁹ finding that crying beyond 12 weeks characterised atopic cases. However, many of these infants' parents also have vulnerabilities, including a high rate of marital discord and maternal depression⁸², which themselves are known to predict child problems at older ages^{26,83}.

At present, we have inadequate evidence about the prevalence of these chronic cases and the important question of whether their problems develop out of pre-existing crying or sleeping problems, or have a distinct aetiology. A longitudinal study of 547 Canadian infants from birth to six months of age⁸⁴ provides some information. Using a definition of three or more hours of fuss and crying per 24 hours to define

prolonged crying, this study found a prevalence at six and 12 weeks, respectively, of 24% and 6.4%. About half the infants who cried a lot at 12 weeks had continued to do so since six weeks, while in 3% of infants the onset of prolonged crying did not occur until 12 weeks of age or later. These figures need to be qualified by the methodological limitations of this study, including the use of retrospective reports in an unspecified proportion of cases, while it is not known how many of the infants had multiple problems. With these provisos, the findings suggest that half of infants with prolonged crying at 12 weeks have an earlier onset, while in half – perhaps 3% of infants – the onset occurs at or after 12 weeks of age. Rao et al's⁶ prospective study of problem criers found continuity beyond 12 weeks in 25% of cases.

Few intervention studies have specifically targeted this group. An exception is Papoušek et al's⁸² Munich study, where parents received an intervention programme focusing on sensitive management of infant behaviour. Although 93% of parents and infants were rated 'fully or partially improved' at the end of the programme by a psychologist and paediatrician, at a follow-up assessment at 30 months of age the programme infants were reported by parents to be highly difficult, hard to control and to have high rates of sleeping and behaviour problems.

In summary, many of the infants who come to clinical attention because of prolonged crying, sleeping and other problems after three months of age are reported by parents to have multiple problems, while some families of such infants face multiple psychosocial adversities. These combined features are associated with more serious and long-term disturbances than are typical where infants have crying or sleeping problems alone. Although we do not have accurate prevalence figures, the data

suggest that about 50% of such infants start their problems earlier, while others have their onset at, or after, three months of age, suggesting distinct etiological pathways. The findings implicate parenting as a contributing factor in some cases and this is consistent with our understanding of the importance of parenting as a scaffold for older infants' development⁸³ and the evidence that parenting programmes can improve young children's behaviour⁸⁵. However, the current data neither distinguish the cases where this is applicable nor indicate the sort of interventions likely to be most effective in these cases. Rather, the findings highlight the paucity of evidence about this group of infants and the need to prioritise these cases for research and clinical work.

6. Implications for Professionals: Helping Parents to Manage Infant Crying and Sleeping.

There is a longstanding debate in the research and popular literatures about the merits of forms of parenting which respond to babies' perceived needs, for example by breast-feeding on demand and co-sleeping (often called 'infant-demand' or 'infant-led' care), and forms of parenting which seek to impose routines and constraints upon babies' behaviour ('routine-based', 'scheduled' or 'structured' care, Ford 2002⁸⁶.. The evidence reviewed here goes some way towards explaining why this debate has persisted, since it indicates that neither of these parenting approaches is better overall; rather they are associated with different benefits and costs. The clearest evidence, emerging both from comparative studies and randomised controlled trials, is that structured care (as exemplified by parents following behavioural programmes) leads infants to develop the ability to remain settled at night by 12 weeks of age. The best available evidence, not yet subjected to randomised trials, indicates that 'infant-

demand' care, exemplified by the frequent breast-feeding and high levels of responsiveness, holding and co-sleeping involved in Proximal care, leads to low amounts of overall fussing and crying in the first two months of age, but to waking and crying at night which continues at and beyond three months of age.

These findings and the lack of evidence that most infants who cry a lot in the first two months, or wake and cry at night at three months, are unwell or likely to have long-term problems, are empowering for parents. Rather than doing what's medically 'best', the findings imply that parents can make informed choices. The aim below will be to translate the evidence into guidance which healthcare professionals can give to parents to help them make such choices during early infancy.

1. Since there is no evidence that the bouts of unsoothable crying which occur in 1-3 month babies are affected by parenting, parents can be prepared for these and reassured that they are not their fault. Anticipatory guidance can also emphasize that it is not currently possible to predict which particular baby will cry a lot. Variables such as gender, birth-order and method of feeding are poor predictors and there are currently no reliable tests for predicting food intolerance. It follows that parents will need to choose the care approach which is most compatible with their goals and resources and make adjustments as necessary with experience.
2. The available evidence indicates that the main benefit of infant-demand care lies in the early weeks, when both Proximal and Copenhagen forms of care are associated with 33% less overall fuss/crying than typically occurs among babies who receive conventional London parenting. Where parents consider this is a

desirable goal, the choice between these two approaches involves balancing a number of benefits and costs, some of which are inadequately understood. Schön & Silvén⁸⁷, for instance, argue that Proximal care methods have overall benefits, including shorter and less intense crying periods. Conceivably, co-sleeping infants may not reach a full cry when they wake at night-time for feeding, so that their parents are not disturbed by feeding as much as non-co-sleeping parents⁸⁸. Unfortunately, there is a dearth of systematic research to confirm these benefits, or identify other costs. For example, there is some evidence that conflicts may sometimes arise at later ages when parents wish to stop co-sleeping⁵⁴, but the conditions under which this does and does not happen are unknown.

Some parents may find Proximal care difficult to accomplish within the resources and constraints imposed by contemporary Western society. Notably, for instance, just 29% of Proximal care mothers in the cross-cultural study described above were employed before their babies' births, compared with 57% of London and 64% of Copenhagen mothers. Parents will also need to keep in mind that continuation, particularly, of co-sleeping throughout the night to a later age has been repeatedly linked to continued infant night-waking. Anticipatory guidance should also alert them to the evidence about co-sleeping and Sudden Infant Death Syndrome, (see point 4 below).

Where parents find Proximal care beyond their resources, a noteworthy finding in the cross-cultural study described above was that Copenhagen parents' care was as effective as Proximal care in minimising early crying and as effective as London care in enabling infants to remain settled at night by 12 weeks of age.

There is no evidence that co-sleeping for short periods during the night, as practiced by Copenhagen parents, increases night waking problems. Many parents may wish to follow Copenhagen parents' approach as a workable compromise between Proximal and conventional Western care and health professionals may wish to bring it to their attention. Unlike Proximal care, it does not involve such continuous day-time carrying or night-time co-sleeping.

3. Where parents wish to prevent night waking and signalling after 12 weeks, there is strong evidence that introduction of structured parenting based on behavioural principles from about six weeks of age is likely to help. A noteworthy finding is that no benefits of this approach were apparent before six weeks of age.

Important advantages are that this approach is effective with breast-fed infants and that, unlike 'extinction' and 'controlled crying' methods used to treat infant sleeping problems after they have arisen, does not involve leaving babies to cry.

The elements of this approach are described more fully in the original publications^{72, 73}, but in essence it comprises just three steps. First, parents are advised to maximise the difference between day and night-time environments, by minimising light and social interaction at night. Second, they are asked to settle a baby judged to be sleepy in a cot or similar place, and to avoid feeding or cuddling to sleep, at night-time. Third, once the baby is at least three weeks old, healthy and putting on weight normally, they can begin to delay feeding when baby wakes at night, in order to dissociate waking from feeding. This is done gradually, using nappy changing or handling to introduce a delay, and does not involve leaving babies to cry.

4. Another consideration affecting parental choices is the controversy about the relationship between co-sleeping and infant Sudden Infant Death Syndrome (SIDS). Experts are divided in their interpretation of this evidence, with some concluding that co-sleeping increases the risk of SIDS, even where parents do not show other risk factors such as smoking and alcohol consumption^{89; 90} and others concluding that co-sleeping helps to keep infants in lighter stages of sleep and consequently may protect against SIDS⁷⁵.

Clearly, most parents will wish to prioritise a form of care which minimises the risk of SIDS over care which minimises sleeping problems. However, there is no direct evidence to support a protective role for co-sleeping, while there is systematic, albeit inconclusive, evidence that co-sleeping increases the risk of SIDS^{89; 90, 91}. The website for the Foundation for the Study of Infant Deaths (<http://www.fsid.org.uk/babycare.html> accessed 1pm 09/02/2007) currently recommends that the safest place for a baby to sleep is in a cot in the parents' bedroom for the first six months, and recommends against sharing a bed with a baby, as does the American Academy of Pediatrics⁹². On this basis, and providing infants settled in cots are placed on their backs or sides and carefully monitored, there is no reason to expect that using cots and a structured approach to infant sleeping after about six weeks of age will increase the likelihood of SIDS.

5. Where parents report an established infant crying or sleeping problem, parental complaint, rather than infant behaviour, is the presenting phenomenon. Such complaints involve a subjective judgement, while parents vary in their knowledge and tolerance. Measurements which accurately assess infant behaviour are an

essential first step in understanding what the problem is. Instruments for measuring infant sleeping and crying have been developed for research and can be adapted for routine health service practice. Behaviour diaries, such as the Baby's Day Diary, ⁴⁵ are the most accurate method. Where parents cannot keep them, summary questionnaires such as the Crying Patterns Questionnaire ⁹³ can be used. Questionnaire and diary methods exist for measuring infant sleeping ^{94, 95, 81}. There is a need for cost-effectiveness research, which evaluates the use of these procedures under routine health-care service conditions.

6. Because some parents are particularly vulnerable to infant crying and night waking, collection of information to identify maternal depression, social supports, single parenthood, and other sources of parental vulnerability should be a core part of the primary workup, so that services can be targeted towards need.

7. In about 1 in 10 cases, persistent crying in 1-3 month old infants reflects an organic disturbance. Health services need effective means of identifying and treating these special cases. Gormally ¹⁸ and Treem ⁹⁶, two paediatric members of an expert panel on infant crying and colic, recommended the following inclusion and exclusion criteria for identifying organic cases:
 - high pitched/abnormal sounding cry;
 - lack of a diurnal rhythm;
 - presence of frequent regurgitations, vomiting, diarrhoea, blood in stools, weight loss or failure to thrive;
 - positive family history of migraine, asthma, atopy, eczema;
 - maternal drug ingestion;

- positive physical exam (including eyes, palpation of large bones, neurological, gastrointestinal and cardiovascular assessment);
- persistence past four months of age.

Heine et al ⁹⁷, too, recommend that gastroesophageal reflux should be diagnosed only in cases with feeding difficulties and frequent regurgitation (>5times daily).

Where organic disturbance is suspected, parents again need to make choices about the benefits and costs of alternative actions. An important consideration is that there are no reliable tests available to confirm atopic or gastroesophageal cases ^{28,29}. Consequently, confirmation requires dietary manipulations, which carry their own inconvenience and cost. Wolke ⁴⁴, points to the advantages of breast-feeding and notes that manipulations of breast-feeding mother's diets in order to change their milk constituents are difficult to achieve in practice. Heine ²⁸ identifies the need for expert supervision where breast-feeding mothers' diets are restricted, so that this approach may be inappropriate where expertise is lacking. Further, as noted above, there is little evidence that low-allergen diets for breast-feeding mothers produce changes in infant behaviour which resolve the crying problem so far as parents are concerned. Where babies are bottle-fed formula feeds, there is clearer, but not universally accepted, evidence that changes to a hypo-allergenic formula can reduce crying in some cases ²⁸. Parents who favour this option will need expert support.

8. Where no organic disturbances are found, the available evidence provides no basis for advising parents in general that changes in their care are likely to resolve

crying problems in 1-3 month old infants once they have arisen. This is particularly true of the prolonged, unsoothable crying bouts which seem to be central to parents' concerns in early infancy. Instead, once organic disturbance is considered and the infant's healthy growth and development is confirmed, the focus of intervention should be on containing the crying and providing parents with information and support. Important elements advocated by an expert group⁹⁸ are:

- Examining the notion that crying means that there is something 'wrong' with a baby of this age. Introducing alternatives – e.g. that it signals a reactive or vigorous baby.
 - Viewing the first three months of infancy as a developmental transition, which all babies go through more or less smoothly.
 - Reassuring parents that it is normal to find crying aversive and discussing the dangers of 'shaken baby syndrome'.
 - Discussing ways of containing/minimising the crying, and highlighting positive features of the baby.
 - Considering the availability of supports and the development of coping strategies which allow individual parents to take time out and 'recharge their batteries'.
 - Empowering parents and reframing the first three months as a challenge which they can overcome, with positive consequences for themselves and their relationships with their babies.
 - Continuing to monitor infant and parents.
9. Compared with infants who have solely crying or sleeping problems, there is consistent evidence of poor long-term outcomes in cases with multiple behaviour

disturbances beyond 12 weeks of age. Unfortunately, the current data neither distinguish the cases where organic or social-environmental explanations are most applicable nor indicate the sort of interventions likely to be most effective in these cases. Since there is evidence that interventions which target parenting are effective from about six months of age through the pre-school period^{99, 85} programmes of this kind may be considered as an important part of healthcare services. However, the chief implication of the findings in this area at present is to highlight the paucity of evidence about this group of infants and to identify them and their families as a priority for health services and research.

References