

Preliminary evaluation of a primary care intervention for cry-fuss behaviours in the first 3–4 months of life ('The Possums Approach'): effects on cry-fuss behaviours and maternal mood

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Abstract. Problem crying in the first few months of life is both common and complex, arising out of multiple interacting and co-evolving factors. Parents whose babies cry and fuss a lot receive conflicting advice as they seek help from multiple health providers and emergency departments, and may be admitted into tertiary residential services. Conflicting advice is costly, and arises out of discipline-specific interpretations of evidence. An integrated, interdisciplinary primary care intervention ('The Possums Approach') for cry-fuss problems in the first months of life was developed from available peer-reviewed evidence. This study reports on preliminary evaluation of delivery of the intervention. A total of 20 mothers who had crying babies under 16 weeks of age (average age 6.15 weeks) completed questionnaires, including the Crying Patterns Questionnaire and the Edinburgh Postnatal Depression Scale, before and 3–4 weeks after their first consultation with trained primary care practitioners. Preliminary evaluation is promising. The Crying Patterns Questionnaire showed a significant decrease in crying and fussing duration, by 1 h in the evening ($P=0.001$) and 30 min at night ($P=0.009$). The median total amount of crying and fussing in a 24-h period was reduced from 6.12 to 3 h. The Edinburgh Postnatal Depression Scale showed a significant improvement in depressive symptoms, with the median score decreasing from 11 to 6 ($P=0.005$). These findings are corroborated by an analysis of results for the subset of 16 participants whose babies were under 12 weeks of age (average age 4.71 weeks). These preliminary results demonstrate significantly decreased infant crying in the evening and during the night and improved maternal mood, validating an innovative interdisciplinary clinical intervention for cry-fuss problems in the first few months of life. This intervention, delivered by trained health professionals, has the potential to mitigate the costly problem of health professionals giving discipline-specific and conflicting advice post-birth.

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Introduction

Background

One of the most common problems presenting to health professionals in the first months of life is the baby who cries and fusses. One in five new parents report that their baby cries excessively (Wake *et al.* 2006). Many others cite unsettled behaviour as a reason for commencing supplementary feeds with formula, as crying and fussing are commonly believed to signal that the mother doesn't have enough breastmilk (Li *et al.* 2008; de Lauzon-Guillain *et al.* 2012; Odom *et al.* 2013). Research into infant crying has been confused by attempts to quantify and define problem crying, but this paper accepts that clinically, problem crying is most usefully defined by parental perception (Barr 1993; Reijneveld *et al.* 2001). We use the terms crying

behaviour, crying excessively, cry-fuss problems and unsettled behaviour interchangeably.

Crying behaviour is a marker of risk post-birth because it increases the risk of premature breastfeeding cessation, child abuse and postnatal depression (Reijneveld *et al.* 2004; Howard *et al.* 2006; Vik *et al.* 2009). Also, excessive crying has been linked with an increased risk of both feeding and behavioural problems later in childhood, particularly if the problem crying persists beyond 3 months (Brown *et al.* 2009; Hemmi *et al.* 2011; Sirvinskiene *et al.* 2012). Early intervention is important, yet doctors, midwives and child health nurses give conflicting advice. As a result, parents with crying babies are more likely to seek help from multiple health care providers and emergency departments, which is costly

What is known about the topic?

- Parents whose babies have cry-fuss problems in the first 3 or 4 months of life complain of receiving conflicting advice, and recourse to multiple providers. Early intervention, including for feeding problems, is important.

What does this paper add?

- Preliminary evaluation of the effects of a primary care intervention for cry-fuss problems ('The Possums Approach') shows promise, demonstrating significantly decreased infant crying and significantly improved maternal depression and anxiety symptom scores at follow up 3–4 weeks later.

(Morris *et al.* 2001; McCallum *et al.* 2011). They also resort to expensive residential programs.

Extensive review of the heterogeneous evidence from many fields of inquiry investigating infant crying in the first few months of life, including medical science, neuroscience, lactation science, developmental psychology and psychiatry, cross-cultural studies and evolutionary biology, demonstrate that infant cry-fuss behaviour is a complex problem that emerges out of multiple dynamically interacting and co-evolving factors. It is more likely to occur in situations of prenatal stress, birth complications or parental psychosocial risk factors, and appears to be moderated by temperament and an individual infant's level of neurodevelopmental maturity (Kurth *et al.* 2010; Schmid *et al.* 2011). Although infant crying and fussing often cannot be traced back to any single cause, linear, discipline-specific interventions are commonly recommended, arising out of discipline-specific theoretical frames and interpretation of data. These linear approaches, including certain common medical diagnoses and behavioural interventions, have significant limitations and risk unexpected outcomes (Douglas *et al.* 2011).

Aim

We developed an integrated, interdisciplinary intervention for cry-fuss problems in the first 3–4 months of life from key informant interviews and comprehensive reviews, which are peer-reviewed and published (Douglas 2005, 2013; Douglas and Hiscock 2010; Douglas *et al.* 2011, 2012; Douglas and Hill 2013). Similarly, the clinical details of this approach ('The Possums Approach') are elucidated elsewhere (Douglas and Hill 2011a, 2011b; Douglas and Shirley 2013). During the consultation, the clinician systematically considers five domains: the fundamentals of infant and maternal health – 'baby's health' and 'mother's health' – and the three neurobehavioural domains, of 'feeds', 'sensation' and 'sleep' (Fig. 1). Individualised plans are developed with parents that suit their values and philosophies; flexibility and experimentation are supported as a key to resilience; families are educated concerning the importance of sensible, cue-based care; and cross-professional communication and referral occur as necessary. Both mother and infant are neuroplastic post-birth, the infant extremely so. The mother–baby pair are characterised by sensitivity to initial



Fig. 1. The five domains of 'The Possums Approach'.

conditions as a result, and intervention as early as possible is important (Swain *et al.* 2007; Shonkoff *et al.* 2009). A theoretical model for infant crying ('The Possums Model') has been developed to explain the underlying neurobiological mechanisms of infant crying and the underlying mechanisms of clinical intervention (Douglas and Shirley 2013).

This study reports on preliminary evaluation of the efficacy of this integrated, interdisciplinary clinical intervention ('The Possums Approach'), delivered by trained primary care practitioners to families who report that their baby has problem crying.

Methods

A single-group pre-post study was conducted to determine the effect of attendance at the Possums Clinic for Unsettled Babies by mothers of babies 16 weeks and under who self-referred for help with infant cry-fuss problems. Both parents were encouraged to attend the consultation. The Possums Clinic for Unsettled Babies was located in a Queensland superclinic, UQ Health Care Annerley, between October 2011 and October 2012. Possums health professionals were trained by PD in 'The Possums Approach', and comprised three GPs, two midwife-lactation consultants, an occupational therapist and a perinatal mental health practitioner. The training was delivered to Possums practitioners and 15 other health professionals from the community, including child health nurses, psychologists, GPs, midwife-lactation consultants and a paediatrician, as a written handbook and a 1.5-h presentation. The training was evaluated in two focus groups with independent facilitators, and the focus groups data was transcribed, analysed and reported by a third independent researcher. A Research Ethics Committee at The University of Queensland approved the study (2009001791), and participating patients signed consent forms.

In the waiting room before the first consultation with a Possums health professional, mothers were asked to fill out a pre-consultation questionnaire. They were also invited to consent

to a follow-up phone call by an independent research assistant 3 weeks later, to arrange completion of a telephone post-consultation questionnaire at a convenient time. Each questionnaire, both pre-consultation and by phone post-consultation, took 10 or 15 min to complete. Both questionnaires included the Crying Pattern Questionnaire (a validated tool for measurement of frequency and duration of infant crying, frequency of bouts of unsoothable crying, feeding methods and strategies used for settling) (St James-Roberts *et al.* 1993; Wolke *et al.* 1994; Alvarez and St James-Roberts 1996). Likert scales were used to assess perception of sleep problems and maternal self-efficacy, and the Edinburgh Postnatal Depression Scale (EPDS), a widely used validated screening tool for postnatal anxiety and depression, was administered (Cox *et al.* 1987). The initial consultation comprised a 30-min consultation each for mother and baby, a total of 1 h duration. The clinical intervention was delivered flexibly, appropriate to the family's needs. Mothers and babies were followed up, or referred to other health professionals, as required. Changes in crying patterns and the EPDS were tested using the Wilcoxon Signed Rank Test. Changes in feeding methods and sleep problems were tested using the McNemar's Test. Analyses were conducted with SPSS Statistics Version 20 (IBM, NY, USA). Alpha was set to 0.05 for all analyses.

Results

Out of 40 eligible mothers presenting with cry-fuss problems in infants 16 weeks of age or less, 32 consented, and 20 completed both questionnaires. The average age of infants was 6.15 weeks. Eighty-one percent of mothers reported feeding their baby any breastmilk in the previous 24 h, and 68.8% had used formula at some time before the initial consultation. The average duration of follow-up time was 3.2 weeks with a minimum of 3 weeks and a maximum of 5 weeks. One mother who consented at pre-consultation withdrew before the second questionnaire. One consenting mother did not complete the second questionnaire as her baby was hospitalised for the 3-week follow-up period.

There was a statistically significant reduction in the babies' hours of fussing and crying in the evening ($P=0.001$), with the median hours reduced from 1.5 pre-consultation to 0.5 post-consultation (Fig. 2). Hours of fussing and crying at night also significantly reduced ($P=0.009$), from a median of 0.5 h pre-consultation to 0 h post-consultation (Fig. 3). The median total hours of fussing and crying over a 24-h period reduced from 6.12 to 3 (Table 1). There was also a statistically significant reduction in the EPDS, from a median score of 11 at pre-consultation to a median score of 6 post-consultation ($P=0.005$) (Fig. 4). We found no significant change over time in feeding method (whether breast or mixed feeds or formula), or in mothers' perception of sleep as a problem, or in maternal self-efficacy. There was no statistically significant reduction in hours of fussing and crying in the morning (0600–1200 hours) (Fig. 5) or afternoon (1200–1800 hours) (Fig. 6), or in bouts of unsoothable crying.

Because infant crying is a self-limiting problem, we also analysed the data for the smaller subset of mothers whose babies were 12 weeks of age or less, with average age of the infant 4.71 ($n=16$). This analysis corroborated the findings above: there was a statistically significant reduction in hours of fussing and crying in the evening (1800–0000 hours) ($P=0.003$), and in the night (0000–0600 hours) ($P=0.016$). The median hours of fussing and crying reduced from 2 h during the evening at pre-consultation to 0.875 h post-consultation, and from 0.5 to 0.125 h each night. The median total amount of fussing and crying for babies 12 weeks and under reduced from 7 to 3.75 h. There was a statistically significant reduction in the EPDS ($P=0.011$) from a median score of 10.5 at pre-consultation to 6.5 at post-consultation.

Our evaluation of maternal satisfaction with the Possums clinic showed that 95% rated feeding support as very or moderately helpful; 80% rated information on the baby's needs for sensation as very or moderately helpful; 75% rated information about sleep as very or moderately helpful; 85% rated information about how the baby's brain works as very or moderately helpful; and 85% rated the emotional support as very or moderately helpful. Mothers reported on the positive

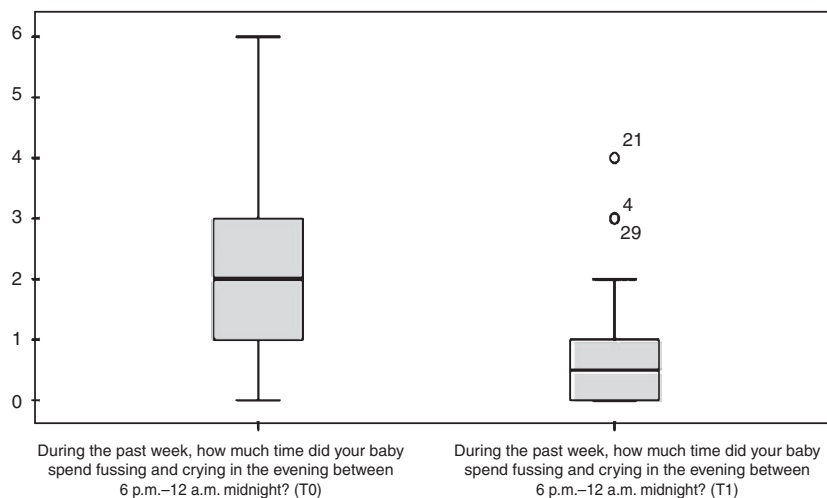


Fig. 2. Hours of crying and fussing in babies aged ≤ 16 weeks in the evening pre- and post-intervention.

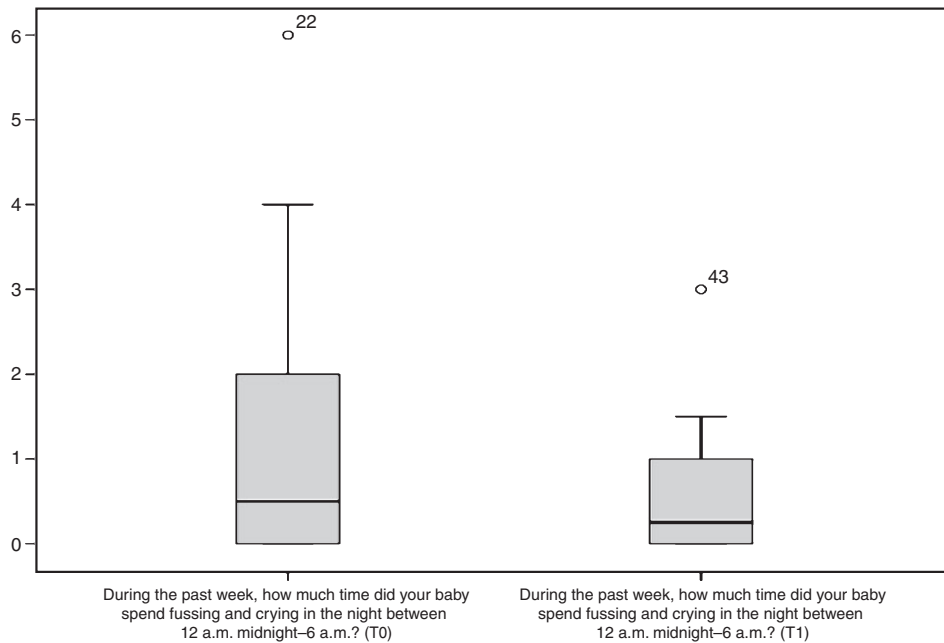


Fig. 3. Hours of crying and fussing in babies aged ≤ 16 weeks in the night pre-and post-intervention.

Table 1. Total hours of crying and fussing in babies aged ≤ 16 weeks in 24 h

T0, prior to initial Possums consultation; T1, 3–4 weeks after initial Possums consultation

	Minimum hours	Maximum hours	Percentiles		
			25th	50th (median)	75th
T0	2	15.5	3	6.12	8.69
T1	0.25	16	2.25	3	5.25

benefits of the feeding-management advice and access to specialised care: ‘I know what to do to calm my baby now’ (ID 029) and ‘It was nice to go to someone specialising in babies who knows what they are talking about. They picked up the problem straight away’ (ID 038). Several mothers commented on the emotional support and reassurance they received at the clinic: ‘The information made me less stressed, changed my attitude. I left the clinic feeling more psychologically equipped’ (ID 011) and ‘She [Possums GP] was very good at making me feel like I was doing the right things’ (ID 016). When asked to rate the Possums program as a way to help with the baby’s crying or unsettled behaviour, 60% of mothers rated it excellent or very good, 35% said it was good or fair and one mother (5%) said it was poor.

Discussion

Decreased crying during evenings and night

The finding that an interdisciplinary clinical intervention (‘The Possums Approach’) decreases crying in the evenings by 1 h is important because babies are more likely to cry during the evenings in the first months of life. The finding of decreased crying during the night by half an hour is also important, as it is

not the number of instances of signalled nocturnal waking that are linked with postnatal depression, but the amount of time it takes a mother to go back to sleep. The longer the baby cries and fusses in the night, the more likely the negative impact on maternal anxiety levels and sleep efficiency (Dørheim *et al.* 2009; Goyal *et al.* 2009; Miller and LaRusso 2011).

Although health professionals commonly advise parents to use behavioural interventions if their new baby is crying and fussing (e.g. feed spacing; teaching the baby to ‘self-settle’ by not allowing baby to fall asleep at the breast, in arms or in the same room), behavioural interventions for this population arise out of a discipline-specific interpretation of evidence (Matricciani *et al.* 2012; Stremmler *et al.* 2013). Feed spacing and ‘feed-play-sleep cycles’ are associated with lactation failure (Hill *et al.* 2005; Kent *et al.* 2006; McCormick *et al.* 2010); infants who sleep in another room from parents are at increased risk of sudden infant death syndrome (Blair *et al.* 2010); behavioural interventions do not decrease amounts of infant crying (St James-Roberts *et al.* 2001; Symon *et al.* 2005; Sirvinskiene *et al.* 2012); and more routinised, less flexible infant care methods result in increased infant crying (St James-Roberts *et al.* 2006; Sirvinskiene *et al.* 2012). Although behavioural interventions have been demonstrated to result in a mean extra 29 min in the cot over a 24-h period and longer periods of self-regulated sleep periods nocturnally, these findings do not correlate with improved maternal or infant outcomes in the first 3–4 months of life (Bryanton and Beck 2010; Kendall-Tackett *et al.* 2011; Price *et al.* 2012; Douglas and Hill 2013). Cue-based care, on the other hand, has been linked with more settled infant behaviour, and our findings corroborate this link (St James-Roberts *et al.* 2006; Sirvinskiene *et al.* 2012).

Decreased symptoms of depressed or anxious mood

One in six women suffer postnatal depression, and mothers with babies who cry excessively are more at risk, with higher symptom

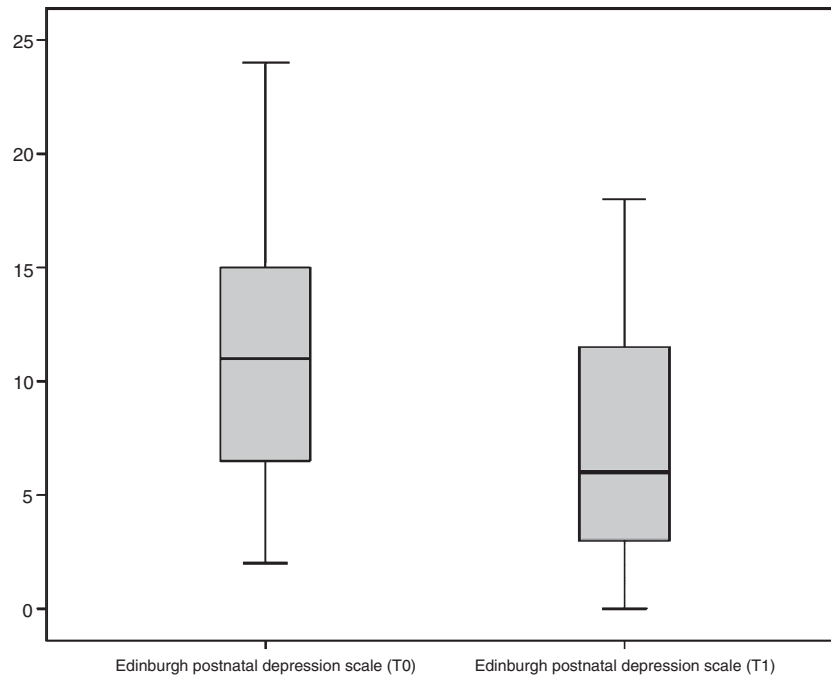


Fig. 4. Edinburgh Postnatal Depression Scale scores for mothers of babies aged ≤ 16 weeks pre- and post-intervention.

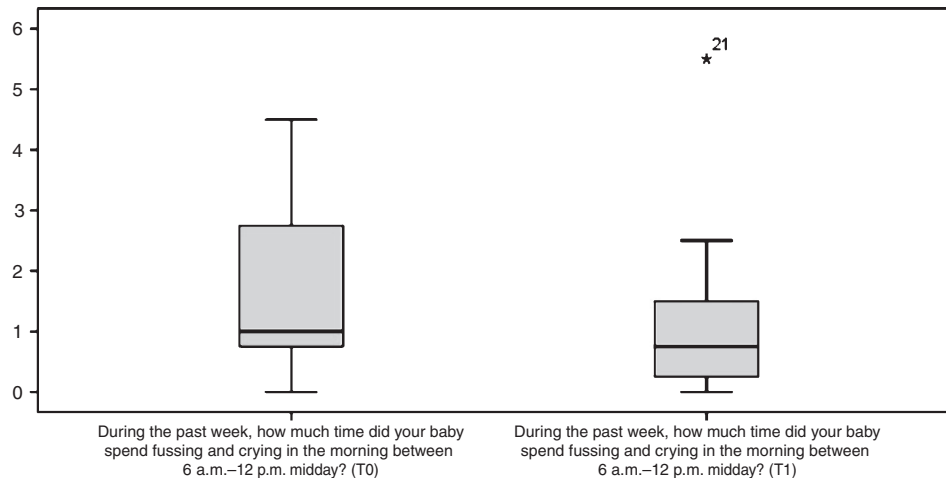


Fig. 5. Hours of crying and fussing in babies aged ≤ 16 weeks in the morning pre- and post-intervention.

scores on the EPDS (Vik *et al.* 2009). The findings of significantly decreased EPDS scores in our study, from on average 11 to 6, support our hypothesis that an interdisciplinary clinical intervention for cry-fuss behaviour (‘The Possums Approach’), which identifies and manages underlying clinical problems including feeding problems, helps optimise maternal mental health.

Optimising breastfeeding support is known to protect against postnatal depression (Miller and LaRusso 2011). Contemporary highly medicalised birthing practices compromise the initiation and duration of breastfeeding by affecting both primitive neonatal reflexes and maternal neurohormone secretion (Dewey *et al.*

2003; Colson *et al.* 2008; Brown and Jordan 2013; Sakalidis *et al.* 2013). Doctors, nurses and researchers – even those with positive attitudes to breastfeeding – have significant knowledge gaps in the identification and management of breastfeeding problems (Brodribb *et al.* 2008; Bernaix *et al.* 2010; Feldman-Winter *et al.* 2010; Renfrew *et al.* 2012). In this context, almost all crying baby research is confounded by unidentified and unmanaged feeding problems. For example, overly frequent or prolonged breastfeeding with frequent night-waking and crying indicates an underlying feeding problem, which requires appropriate assessment and management, not behavioural regulation with feed spacing (Hill *et al.* 2005; Kent *et al.* 2006; McCormick *et al.*

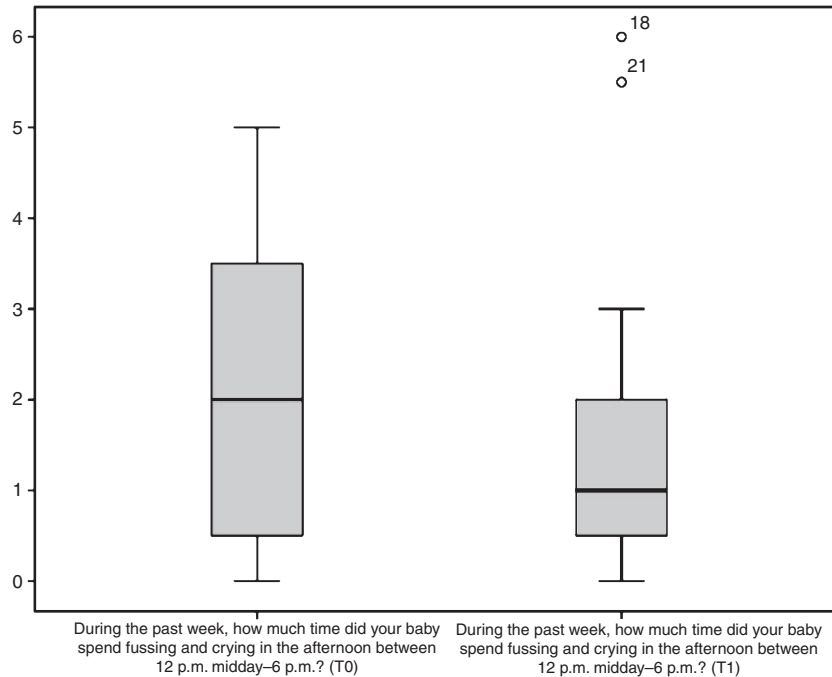


Fig. 6. Hours of crying and fussing in babies aged ≤ 16 weeks in the afternoon pre-and post-intervention.

2010). In another example, in this population backarching and feeding refusal indicate an underlying feeding problem, not acid-peptic or allergic oesophagitis (Colson *et al.* 2008; Smillie 2012). Disrupted maternal–infant relations concerning feeds quickly entrench, regardless of feeding method, and may persist long term (Davies *et al.* 2006; Reyna and Pickler 2009; Ammaniti *et al.* 2010).

Improved maternal mental health has important implications for the child’s long-term mental health, due to the deleterious effects of maternal depression on infant brain development long term (Swain *et al.* 2007).

Study limitations

Our study has significant limitations. Because of the small sample size, and lack of a non-intervention comparison group, it is indicative only. Crying baby research is confounded by the natural attrition of infant crying, because crying begins to decrease from about 6 weeks, and is usually resolved by 12–16 weeks of age (Wolke *et al.* 2011). For example, natural attrition also confounds the results of a paediatrician-delivered tertiary intervention for 59 unsettled infants whose parents had already sought help from multiple providers in primary care. That intervention demonstrated significant decreases in EPDS and in parental report of the presenting problem (either crying or sleep problems), but the infants had an average age of 14.9 weeks, ranging from 2 weeks to 7 months. Similarly, there was no comparison group (Smart and Hiscock 2007).

In our study, we examined the subset of babies 12 weeks of age or less (average age 4.71 weeks) to help mitigate against this problem of natural attrition, yielding the same results as our analyses of the larger sample of babies 16 weeks or less in age

(average age 6.15 weeks). Of those who filled out the pre-consultation questionnaire, 62.5% completed the second questionnaire, which may bias the results toward those who had a positive outcome. Elsewhere, we have argued that improved maternal depression and anxiety symptom scores resulting from interventions that include a behavioural component in this age group are attributable to the effects of group support, caring therapeutic relationships and caring residential support, rather than to any specific behavioural component (Bryanton and Beck 2010; Kendall-Tackett *et al.* 2011; Price *et al.* 2012; Douglas and Hill 2013). The improved maternal depression and anxiety symptoms scores demonstrated in our evaluation could also be attributed to the caring therapeutic relationships that characterised our clinical intervention.

Conclusion

Parents with unsettled babies receive conflicting advice and recourse to multiple health providers, including emergency departments (McCallum *et al.* 2011). The problem of conflicting advice arises out of discipline-specific theoretical frames and interpretations. Elsewhere, we identified the need for an early interdisciplinary primary care intervention for families whose babies have cry-fuss problems in the first few months of life (Douglas *et al.* 2012). We developed an interdisciplinary intervention for cry-fuss problems in the first months of life out of systematic reviews of the heterogeneous evidence (‘The Possums Approach’), delivered by trained primary care practitioners. Preliminary evaluation demonstrates decreased duration of evening and night-time crying and improved maternal mood 3–4 weeks after intervention. Although this pilot study has significant limitations, including small sample

size, it nevertheless establishes the program's readiness for summative evaluation, according to Patton's model for the evaluation of complex interventions (Patton 2011).

Conflicts of interest

None declared.

Acknowledgements

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