Parent characteristics and conceptualizations associated with the emergence of infant colic

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Abstract  The goal of the present study was to examine parental characteristics associated with the emergence of infant colic using a prospective longitudinal study. When infants were 2 weeks of age, parent measures of personality, marital satisfaction, parenting stress, and social support were obtained. In addition, parents were asked about their definition of colic. When infants were 6 weeks of age, parents completed a 4 day, 24 hour cry diary. Parents also completed a stress questionnaire. Based on the fussing/crying data derived from the diaries, 22 of the 128 infants were identified as having colic. Results showed colic infants to have distinctive crying and fussing patterns. Differences in parent conceptualizations of colic were also identified for colic and non-colic families. Results indicated that parental variables, particularly parenting stress and marital satisfaction, may have contributed to the parents’ report of excessive crying and fussing.

Much of our current knowledge about crying in early infancy, particularly excessive crying, is based on parental report. Using either interviews, questionnaires, screening mechanisms, or cry diaries, the results have provided important evidence for a cry peak during the 6th to 8th week of life and confirmation of a more extreme condition of crying in an otherwise healthy infant, i.e. colic (Barr, 1990; Brazelton, 1963; St. James Roberts, 1989). Parental reports have been instrumental in colic research because of the intensive and temporal properties of this condition. The most widely used definition of colic, fussing or crying lasting for a total of more than 3 hours a day occurring on more than 3 days a week for at least 3 weeks in the infant’s first 3 months (Wessel et al., 1954), demands daily observations by necessity. Consequently, parents are regarded as the most logical and efficient observers of their infants’ cry behaviour.
While recognized as an important source of information, parental reports of infant behaviour have their limitations (Bates, 1989). Several studies have shown parental perceptions of their infants' behaviour to be a function of the parents' own personality (Bates & Bayles, 1984; Diener et al., 1995; Matheney et al., 1987). Parental reports of infant colic could be similarly affected. For example, a parent with a low threshold for crying may interpret fussing behaviour as excessive crying. Indeed, characteristics of the mother measured prenatally were found to be related to whether she reported retrospectively that her child had colic (Rautava et al., 1993) or to be more temperamentally difficult (Pedersen et al., 1996). Clinical studies in which parental complaints of problematic crying were used to recruit infants with colic also suggest that the source of excessiveness may be in the 'eye of the beholder' (Barr et al., 1992; Papousek & von Hofacker, 1995; Pauli-Pott et al., 2000). For example, Barr and colleagues (1992) found that 65% of the infants referred for problematic crying did not meet the Wessel criteria for colic based on information from diaries. The significant difference in overall total of crying/fussing between these two groups of referred infants led Barr to conclude that contextual factors may play a role in understanding parental assessments of excessive crying. It is important to note that parents of the non-Wessel and Wessel colic groups rated the after-feed cries of their infants as more 'sick' sounding (Barr et al., 1992). Moreover, a follow-up acoustical analysis demonstrated that the cries of both colic groups were more vociferous than the non-colic control group (Zeskind & Barr, 1997) suggesting that parents who refer their infants for problematic crying may not be entirely biased.

In a series of studies which attempted to illuminate the bases for maternal perceptions of excessive crying or colic, St. James Roberts (St. James Roberts et al., 1995) screened infants for colic from a community sample and then verified this grouping with parental diaries. The results revealed that while colic infants were reported by parents to cry more than non-colic infants, the predominant distress type was not crying, as expected, but fussing. Colic infants were also found to be less soothable using an objective criteria. In a follow-up study (St. James Roberts et al., 1996) which used audio recordings to confirm the daily diaries, parents were found to be reliable in their assessments of long cry bouts as a characteristic of colic. However, the audio recordings did not verify parental reports that colic cries were distinct from other cries of distress. Finally, in a third cross-cultural study that compared the audio and diary recordings of infants of British and Manali mothers (St. James Roberts et al., 1994), St. James Roberts found that the Manali mothers reported up to 20% less crying in their infants compared to the British mothers while the audio recordings revealed they cried at similar rates. Thus, as St. James Roberts suggests, excessive crying or infant colic might best be regarded as social phenomenon involving the interaction between an inconsolable child and the expectations and experiences of the parents.

Developmentally, infants begin to increase in the duration of their crying at approximately 2 weeks of age with a peak emerging at 6 weeks of age. While there is individual variation in the timing of the cry peak, this developmental cry curve has been consistently demonstrated in both Western and non-Western societies (see Barr, 2000; cf. St. James Roberts & Plewis, 1996). One way of determining what, if any, parental characteristics influence their assessments and/or complaints of colic is to examine these characteristics prior to the peak of excessive crying rather than during the colic period. Measuring parent characteristics during the time infants are crying and fussing excessively would likely be confounded by the stress of caring for an
inconsolable child. Moreover, delineating the direction of effects would be difficult. To date, only a handful of studies have examined the antecedents of colic or excessive crying and these were limited primarily to maternal attributes (Carey, 1963; Cuisinier et al., 1998; Miller et al., 1993; Papousek & von Hofacker, 1995; Rautava et al., 1993; Stifter & Brangart, 1992). While maternal stress and anxiety have been shown to be related to the emergence of colic in some studies, others have found no difference between parents of colic and non-colic infants on these measures. For example, in one study maternal affective distress measured prenatally was unrelated to colic, although the distress of mothers with colic infants was higher at 5 weeks postpartum than that of mothers of non-colic infants (Miller et al., 1993). The findings of these studies are difficult to integrate, not only because the results are inconsistent but also because the studies differed significantly on the antecedent measures, subject recruitment method, and colic identification. Finally, only one study considered father characteristics (Rautava et al., 1993). In an attempt to further identify whether parental characteristics are related to the emergence of excessive crying and fussing behaviour, the present study assessed both mothers and fathers prior to the 6 week period when some infants are crying in excess of the expected cry peak.

Another important aspect of parents that may influence their reports or complaints of colic would be their conceptualization of colic. If we rely on parents to refer their infants for colic or to make judgements about whether a cry bout is colicky or not, then it would be essential to understand the criteria they use to differentiate colic from typical crying. Thus far, no study has examined parents’ conceptualization of infant colic prior to its onset. In the present study we attempt to fill this gap by asking mothers to define/explain what is meant by colic when their infants were 2 weeks of age.

The goal of the present study was to clarify some of the influences on parent report of infant excessive crying at 6 weeks of age by examining parental characteristics and conceptualizations. Toward that end, a prospective longitudinal study that identified infants with colic from a community sample was conducted. Parent personality, social support, marital satisfaction, and stress as well as parents’ conceptualizations of colic were obtained at 2 weeks of age. To identify infants with colic a 4 day, 24 hour cry diary was kept by parents. Using the Wessel criteria infants who cried and fussed excessively across this period were categorized as having infant colic.

**Methods**

**Subjects**

Subjects were 128 families initially recruited through a local community hospital and a university medical centre. Leaflets asking for volunteers to participate in a study of infant crying were distributed to all new parents. Once the study was explained and consent given for participation, a 2 week home visit was scheduled. Infants recruited into the study were of normal gestational age and birthweight and did not suffer from any prenatal or perinatal complications. Characteristics of the study sample are summarized in Table 1.

**Two week home visit**

Mothers and infants were visited in their home on or around 2 weeks after the child’s birth ($M=18$ days, $+2$ days). Both parents were given several questionnaires to
complete which included a personality questionnaire, a social support instrument, a marital satisfaction questionnaire, and an assessment of the parents’ current level of stress. Finally, in an interview to obtain demographic information mothers were asked an open-ended question on how they would define ‘infant colic’. Their verbatim response was noted by the interviewer.

**Personality inventory.** The Jackson personality questionnaire is comprised of 40 descriptive statements to which respondents are to answer ‘true’ or ‘false’ (Jackson, 1976). Two dimensions, interpersonal affect and self-esteem, are derived from this questionnaire.

**Social support questionnaire.** This questionnaire (Uden & Orth-Gomer, 1989) is a shortened version of the Interview Schedule for Social Interaction. Two scales were produced using the questionnaire: (1) the availability of family members and friends; and (2) satisfaction with support from family members and friends. The abbreviated form has demonstrated good reliability and validity (Uden & Orth-Gomer, 1989).

**Marital satisfaction scale.** This scale asks respondents to rate on a 9-point scale the degree to which they experience certain aspects of their marital relationship (Braiker & Kelly, 1979). Four scales were derived from this questionnaire from which two dimensions were composites; a positive dimension (love and maintenance) and a negative dimension (ambivalence and conflict). This scale has been used in several studies examining marital satisfaction during the transition to parenthood (e.g. Cox et al., 1999).

<table>
<thead>
<tr>
<th></th>
<th>Colic</th>
<th>Non-colic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mothers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>30.2 (3.5)</td>
<td>30.2 (5.0)</td>
<td>0.99</td>
</tr>
<tr>
<td>Education</td>
<td>16.9 (2.2)</td>
<td>15.7 (2.6)</td>
<td>0.04</td>
</tr>
<tr>
<td>Years married</td>
<td>4.4 (2.5)</td>
<td>5.8 (3.1)*</td>
<td>0.04</td>
</tr>
<tr>
<td><strong>Fathers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>32.4 (4.7)</td>
<td>32.0 (5.5)</td>
<td>0.73</td>
</tr>
<tr>
<td>Education</td>
<td>17.1 (2.3)</td>
<td>16.1 (2.9)</td>
<td>0.14</td>
</tr>
<tr>
<td><strong>Infants</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gestational age</td>
<td>39.5 (1.5)</td>
<td>39.6 (1.4)</td>
<td>0.74</td>
</tr>
<tr>
<td>Birthweight (grams)</td>
<td>3562 (398)</td>
<td>3509 (530)</td>
<td>0.66</td>
</tr>
<tr>
<td>Gender (% male)</td>
<td>72</td>
<td>55</td>
<td>0.12</td>
</tr>
<tr>
<td>Ethnicity (% white)</td>
<td>100</td>
<td>98</td>
<td>0.81</td>
</tr>
<tr>
<td>Parity (% firstborn)</td>
<td>36</td>
<td>38</td>
<td>0.90</td>
</tr>
</tbody>
</table>

*117 parents were married at the 2 week assessment.
Parental stress questionnaire. This questionnaire was adapted from the Parental Stress Index (Abidin, 1983) specifically for the present study. Thirty-six statements regarding the effect of having a new child on the family and household (e.g. ‘Since having a baby, money has become a concern’) along with statements on parental feelings of efficacy (e.g. ‘I find it difficult to make child care decisions without help’), and parental feelings of spousal distance (e.g. ‘My spouse is showing too little attention to me’) were endorsed using a 5-point rating scale from ‘strongly disagree’ to ‘strongly agree’. Alphas for each scale for each parent at 2 and 6 weeks ranged from 0.61 to 0.82. Because the alphas for spousal distance were low (0.61–0.72) this scale was not considered further. Two scales, one reflecting the impact of the baby on the family and one indicating level of parenting self-efficacy, were retained for analysis. Ratings from each question were summed and averaged. High scores represent high degrees of stress.

Parent definitions of colic. Parents’ definitions of colic ranged from descriptions of cry duration to hypothesized organic causes. From these verbatim responses we were able to generate and agree upon eight descriptive categories: (1) cry duration, (2) inconsolability, (3) quality of cries (e.g. screams, high-pitched), (4) fussy, (5) self-limiting (e.g. only in the evening; ends at 3 months), (6) physiological symptoms (e.g. gas), (7) physical descriptions (e.g. legs drawn up), and (8) ‘no known reason’. In addition, if the parent said she had never heard of colic or did not know what colic was, this was also noted. These categories were generated prior to the creation of the colic groups; thus, the researchers were blind to colic group membership. A third researcher, also blind to infant colic group, categorized the parent responses for 10% of the sample. Inter-rater reliability resulted in a Cohen’s kappa of 0.82.

Six week home visit

A second home visit was scheduled when infants were approximately 6 weeks of age. During that visit the cry diary was explained to the parent. Parents were given the same stress questionnaire they had completed at 2 weeks.

Cry diary. The 4 day, 24 hour diary has been used extensively in research on infant colic and gives a reliable portrait of the infants’ cry behaviour (Barr et al., 1988; St. James Roberts et al., 1993). Parents were given crayons that matched five different infant states which they were to record in 5 minute intervals: awake and content, sleeping, feeding, fussing, and crying. In addition, parents reported who was with the child at the time of each of the states (mother, father, both, or other). To insure compliance, a research assistant called parents 2 days into the diary to answer any parental questions/concerns. Upon receipt, the cry diaries were entered into a computer programme which derived the measures of mean fuss bout frequency, mean fuss bout length, total duration of fussing per day (averaged over the 4 days), mean cry bout frequency, mean cry bout length, and total duration of crying per day (averaged over the 4 days). Bouts were defined as the length of time between the onset and offset of crying or fussing. Because the minimum interval was 5 minutes bout length was equal to or greater than 5 minutes. Parent presence during fuss and cry bouts was calculated by dividing the total time each parent was
with the child when the child was crying or fussing by the total time their infant was either fussing or crying. This resulted in four variables: proportion of time fussing with mother present; proportion of time fussing with father present; proportion of time crying with mother present; and proportion of time crying with father present.

Results

The results are presented in two parts. Prior to addressing the main focus of the present study, it was necessary to categorize infants as colic or non-colic using quantitative techniques. We then proceeded to confirm that those infants with colic were excessive in both crying and fussing by comparing the groups on their average cry and fuss durations, as well as the average number and duration of cry bouts and fuss bouts. The primary questions were addressed by comparing colic infants to non-colic infants on parental presence during cry and fuss bouts, maternal definitions of colic, and the parent variables. Analyses on categorical data were performed with chi-square analyses and analyses with continuous variables were performed using t-tests. Not all subjects had complete questionnaire data; therefore, the Ns varied across analyses.

Identification of infants with colic

Because of the difficulty of applying Wessel et al.’s (1954) criteria to the 4 day diary completed by parents, we averaged the total amount of crying and fussing across the 4 days. Then by applying the standard of more than 3 hours of crying/fussing per day we categorized infants into two groups, those who cried/fussed for over an average of 180 minutes per day and those who cried/fussed for equal to or less than 180 minutes per day. This resulted in 22 infants (17%) categorized as having infant colic while the remaining 106 infants were categorized as non-colic.

Although the infants were categorized based on their average daily crying and fussing, the intense nature of the colic infants’ behaviour is best illustrated by the degree of difference on several diary parameters that considered crying and fussing separately. t-tests were performed on the mean duration of crying and fussing per day, the frequency of crying and fussing, and the mean cry and fuss bout length as the dependent measures and revealed significant differences in the expected direction. Colic infants cried more per day (total duration) than non-colic infants, \( t(1,126) = 5.69, p = 0.0001 \). In addition, infants with colic had greater total fuss durations/day, \( t(1,126) = 7.77, p = 0.0001 \). Table 2 presents the means and standard deviations for these data.

Infants with colic had significantly more cry bouts, \( t(1,126) = 4.25, p = 0.001 \), and more frequent fuss bouts, \( t(1,126) = 5.28, p = 0.0001 \), per day than infants who did not have colic. Finally, while the mean cry bout lengths for colic infants were slightly longer, \( t(1,123) = 1.90, p = 0.07 \), than those for non-colic infants, there was no difference between colic infants and non-colic infants on length of their fuss bouts, \( t(1,126) = 0.86, p = 0.39 \) (see Table 2).

Parent presence during crying and fussing

To determine whether parents differed on the amount of time caring for their children when they were either fussing or crying, t-tests were performed and the results indicate that the amount of time mothers and fathers spent with their infants when they were
crying was only different for mothers, \( t (1,123) = 2.52, p = 0.01 \). Mothers of colic infants spent 47% of the infants’ crying time with their infants while mothers of non-colic infants were with their crying infants 34% of the time. Fathers of colic infants spent slightly more time with their crying children than fathers of non-colic infants, 20% vs. 15%, but this difference was not statistically significant (\( p > 0.10 \)). The results also showed that time spent with their child when he/she was fussing was slightly different for parents of colic infants. Mothers of colic infants tended to spend more time with their infants (47% vs. 39%) when they were in a fussy state than mothers of non-colic infants, \( t (1,126) = 1.76, p = 0.08 \). Fathers of colic infants also tended to spend more time with their fussing infants (20% vs. 14%) than fathers of non-colic infants, \( t (1,126) = 1.81, p = 0.07 \).

Parental definitions of colic

As can be seen in Table 3, two thirds of mothers used a cry duration description in their definition of colic. That is, ‘crying for long periods of time’, or ‘crying for more than 3 hours’ was used by the majority of mothers to define colic. The second most

<table>
<thead>
<tr>
<th>Table 2. Means and standard deviations for crying and fussing parameters (from diaries) for colic and non-colic infants.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Colic</strong></td>
</tr>
<tr>
<td>---------------------------------</td>
</tr>
<tr>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Total cry duration/day (minutes)*</td>
</tr>
<tr>
<td>Total fuss duration/day (minutes)</td>
</tr>
<tr>
<td>Frequency of cry bouts/day</td>
</tr>
<tr>
<td>Frequency of fuss bouts/day</td>
</tr>
<tr>
<td>Cry bout length/day (minutes)</td>
</tr>
<tr>
<td>Fuss bout length/day (minutes)</td>
</tr>
</tbody>
</table>

*All parameters averaged over 4 days.

Table 3. Percent (number) of mothers within each group using the following characteristics to define colic.

<table>
<thead>
<tr>
<th><strong>Colic</strong></th>
<th><strong>Non-colic</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>% (number)</td>
<td>N</td>
</tr>
<tr>
<td>Cry duration</td>
<td>64 (14)</td>
</tr>
<tr>
<td>Cry quality</td>
<td>27 (6)</td>
</tr>
<tr>
<td>Inconsolability</td>
<td>68 (15)</td>
</tr>
<tr>
<td>Self-limiting</td>
<td>23 (5)</td>
</tr>
<tr>
<td>Fussy</td>
<td>14 (3)</td>
</tr>
<tr>
<td>Physiological</td>
<td>50 (11)</td>
</tr>
<tr>
<td>Physical</td>
<td>23 (5)</td>
</tr>
<tr>
<td>Cries no reason</td>
<td>14 (3)</td>
</tr>
<tr>
<td>Do not know</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

*Chi-square test.
prevalent description to be endorsed by mothers was that colic was associated with
inconsolability (51%), stating that the inability to soothe, or difficulty with soothing,
was a characteristic of colic. An equal number of parents also endorsed physiological
symptoms (49%), the majority of whom mentioned gassiness or stomach distress.

For each colic characteristic, the number of mothers of colic infants who endorsed
that characteristic were compared to the number of mothers of non-colic infants using
chi-square analyses. Several differences emerged. Mothers of colic infants were more
likely to endorse cry quality as a characteristic of colic compared to parents of non-
colic infants, $\chi^2 (1) = 5.30, p = 0.02$. Moreover, physical characteristics such as legs
drawn up and a ‘tight’ stomach were more likely to be endorsed by mothers of colic
infants than mothers of non-colic infants, $\chi^2 (1) = 6.76, p = 0.009$. Finally, while the
majority of mothers of infants with colic endorsed inconsolability as a characteristic of
colic, fewer than half of mothers of infants who did not have colic endorsed this
quality, $\chi^2 (1) = 3.22, p = 0.07$ (see Table 3).

Two week variables

Demographic variables. The age of the parents, their years of education and their
years of marriage were examined for differences between the two groups. No
differences in maternal or paternal age were found nor were differences in paternal
education revealed. Mothers of colic infants, however, had more years of education
than mothers of non-colic infants, $t (1,126) = 2.09, p = 0.05$ (see Table 1). On the
other hand, parents of non-colic infants were married longer than parents of colic
infants, $t (1,115) = -2.05, p = 0.05$.

Parent personality. A comparison between colic and non-colic infants on the parent
personality questionnaire that included dimensions of self-esteem and interpersonal
affect revealed only a trend for mothers. As can be seen in Table 4, mothers of
non-colic infants rated themselves as higher on interpersonal affect than mothers of
colic infants, $t (1,125) = -1.77, p = 0.08$.

Social support. The only difference to emerge on reports of social support was for
maternal satisfaction with support from family and friends. Mothers of colic infants
tended to report less satisfaction with support from family members and friends
than mothers of non-colic infants, $t (1,126) = -1.71, p = 0.09$ (see Table 4).

Marriage satisfaction. The analyses examining differences in both the positive and
negative aspects of marriage revealed that shortly after birth mothers and fathers of
colic infants rated their marriages as more negative than mothers and fathers of
non-colic infants: mothers—$t (1,124) = 1.89, p = 0.06$; fathers—$t (1,116) = 2.03,$
$p = 0.05$ (see Table 4).

Parenting stress. Differences in parenting stress were identified for mothers only.
Specifically, mothers of infants who developed colic felt a greater impact of having
a child than mothers of infants who did not develop colic at both 2 weeks,
$t (1,125) = 2.12, p = 0.04$, and 6 weeks, $t (1,123) = 2.92, p = 0.004$. At 6 weeks
mothers of colic infants also reported lowered parenting efficacy. (Note that higher
scores on parenting self-efficacy represent greater feelings of ineffectiveness.) Fathers did not differ on their level of stress at 2 or 6 weeks. Table 4 presents the means and standard deviations for these data.

### Discussion

The results of the present study confirm earlier studies on the excessive fussing and crying of colic infants and provide new evidence on parents whose infants developed colic. As expected, infants who were identified as having colic cried and fussed longer and more frequently than infants who did not have colic. Interestingly, while the frequency of fussing bouts was significantly different between colic and non-colic infants the length of the fussing bouts was the same. Our findings also showed that mothers of colic infants were with their crying and fussing child more often than mothers of non-colic infants. Fathers, on the other hand, spent less time overall than mothers, and fathers of colic infants spent more time than fathers on non-colic infants when their colicky infants were fussing but not crying. The results also revealed that parents were relatively consistent in their conceptualizations of infant colic with some exceptions. Finally, our results extend previous research by demonstrating that parental characteristics measured 2 weeks after birth were modestly related to the reporting of excessive crying and fussing at 6 weeks of age.

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**Table 4. Means and standard deviations for the parent variables.**

<table>
<thead>
<tr>
<th></th>
<th>Colic</th>
<th>Non-colic</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>N</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Mothers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parenting stress (2 week)—impact</td>
<td>3.25 (0.61)</td>
<td>22</td>
<td>2.97 (0.56)</td>
</tr>
<tr>
<td>—self-efficacy</td>
<td>2.46 (0.49)</td>
<td>22</td>
<td>2.30 (0.43)</td>
</tr>
<tr>
<td>Parenting stress (6 week)—impact</td>
<td>3.40 (0.62)</td>
<td>22</td>
<td>2.99 (0.62)</td>
</tr>
<tr>
<td>—self-efficacy</td>
<td>2.38 (0.53)</td>
<td>22</td>
<td>2.16 (0.42)</td>
</tr>
<tr>
<td>Self-esteem</td>
<td>1.36 (0.26)</td>
<td>22</td>
<td>1.37 (0.26)</td>
</tr>
<tr>
<td>Interpersonal affect</td>
<td>1.32 (0.19)</td>
<td>22</td>
<td>1.39 (0.18)</td>
</tr>
<tr>
<td>Social support—available</td>
<td>2.64 (0.46)</td>
<td>22</td>
<td>2.76 (0.50)</td>
</tr>
<tr>
<td>Social support—satisfaction</td>
<td>1.72 (0.24)</td>
<td>22</td>
<td>1.82 (0.26)</td>
</tr>
<tr>
<td>Marital satisfaction—positive</td>
<td>7.40 (0.67)</td>
<td>22</td>
<td>7.22 (0.86)</td>
</tr>
<tr>
<td>Marital satisfaction—negative</td>
<td>3.33 (1.1)</td>
<td>22</td>
<td>2.92 (0.86)</td>
</tr>
<tr>
<td>Fathers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parenting stress (2 week)—impact</td>
<td>2.81 (0.52)</td>
<td>21</td>
<td>2.74 (0.51)</td>
</tr>
<tr>
<td>—self-efficacy</td>
<td>2.26 (0.38)</td>
<td>21</td>
<td>2.20 (0.40)</td>
</tr>
<tr>
<td>Parenting stress (6 week)—impact</td>
<td>2.92 (0.50)</td>
<td>22</td>
<td>2.79 (0.53)</td>
</tr>
<tr>
<td>—self-efficacy</td>
<td>2.24 (0.43)</td>
<td>22</td>
<td>2.19 (0.45)</td>
</tr>
<tr>
<td>Self-esteem</td>
<td>1.26 (0.19)</td>
<td>21</td>
<td>1.31 (0.20)</td>
</tr>
<tr>
<td>Interpersonal affect</td>
<td>1.52 (0.21)</td>
<td>21</td>
<td>1.57 (0.21)</td>
</tr>
<tr>
<td>Social support—available</td>
<td>2.65 (0.56)</td>
<td>21</td>
<td>2.66 (0.54)</td>
</tr>
<tr>
<td>Social support—satisfaction</td>
<td>1.87 (0.18)</td>
<td>21</td>
<td>1.86 (0.19)</td>
</tr>
<tr>
<td>Marital satisfaction—positive</td>
<td>7.08 (0.92)</td>
<td>21</td>
<td>6.99 (0.74)</td>
</tr>
<tr>
<td>Marital satisfaction—negative</td>
<td>3.35 (0.96)</td>
<td>21</td>
<td>2.93 (0.84)</td>
</tr>
</tbody>
</table>

*p*-test.
Cry characteristics

Whereas our results are consistent with the outcomes of previous studies on the temporal characteristics of cry behaviour in early infancy (Barr, 1990; Barr et al., 1988; St. James Roberts, 1989) there was an important notable difference. Wessel et al. (1954) and subsequent colic researchers combined crying and fussing behaviour in their assessments of colic, as was done in the present study. Though potentially difficult to discriminate (St. James Roberts et al., 1993), we chose to further analyse parent diary reports by examining crying and fussing separately. Consequently, we found that whereas colic infants were distinguished by the length and frequency of their crying and fussing, the duration of fuss bouts was the same for the colic and non-colic infants. This finding provides additional support for considering the two qualities of distress separately (Hopkins, 2000) and suggests that infants with colic are most distinguished by their crying, particularly its daily duration, rather than their fussing behaviour (Barr et al., 1992). Assessing these two types of distress is also important toward understanding colic as distinct from temperament (Barr & Gunnar, 2000; Stifter & Braungart, 1992). Frequent fussing is thought to characterize ‘difficult’ temperament which differs from colic in that it is considered more stable and enduring beyond the infants’ first 3 months (Rothbart & Bates, 1998). Finally, studies on the acoustic characteristics and subjective assessments of the crying of infants with colic suggest that there is a basis for this distinction (Barr et al., 1992; Lester et al., 1992; Stifter & Braungart, 1992; Zeskind & Barr, 1997). For example, Zeskind and Barr (1997) found that infants with colic had higher-pitched cries after feeding than non-colic infants and those thought to have problematic crying. This emphasis on crying is further illustrated when considering parents’ conceptualizations of infant colic.

Parental definitions of colic

Parents were relatively consistent with paediatricians and infant researchers in their conceptualizations of colic. The majority of mothers, 65%, endorsed ‘crying for long periods of time’ as a characteristic of colic and one-half (51%) mentioned inconsolability. Whereas, excessive crying has been the prevalent feature of the colic definition for researchers, difficulty in soothing is increasingly being accepted as an important characteristic (Lester et al., 1990; Stifter & Braungart, 1992; St. James Roberts & Haili, 1991). It is interesting to note that the colic characteristic most highly endorsed by mothers of infants who developed colic was inconsolability (68%), which may have influenced their reactions to the emergence of this condition in their infants (see below). Another frequently mentioned feature of colic was physiological symptoms (49%). Statements such as ‘gassiness’, ‘stomach upset’ and ‘stomach pain’ were used by mothers to describe colic. It has been widely held that infant colic has an organic origin, primarily allergies to cow’s milk, which may explain why parents include these symptoms in their definition of colic. This hypothesis, however, has not received much support and at least one group of researchers has proposed that only 5% of colic cases are due to some underlying organic disease (Gormally & Barr, 1997, cf. Lindberg, 1999). As this information becomes more public, parents may alter their ideas about the causes of colic.

Contrary to the historical definition of infant colic, only 21% of mothers used ‘fussing’ when asked about their ideas about this condition. So while researchers consider both types of distress to identify colic, parents may be more focused on the
intense features of crying. This finding has implications for those studies in which parents self-identified their infants as having colic. These investigations either relied on parents to refer their infants for ‘problematic crying’ or asked them whether or not their infants had ‘colic’. If some parents are focused only on the excessive crying of their infants and not on the fussing, the incidence of colic may be underreported. Interestingly, it was mothers of infants with colic who were more likely to endorse the quality of the cry as a feature of colic. Responses such as ‘screams’ or ‘cries intensely’ were used to describe colic by these mothers. This conceptualization may have contributed to the higher level of crying recorded by parents of colic infants and/or influenced them to be more sensitive to the distinction between crying and fussing. Infants referred for problematic crying in the Zeskind and Barr study (1997) had cries that were higher in dysphonation and dominant frequency, acoustical characteristics that make cries loud and aversive.

Parents of infants who developed colic were also more likely to state that an infant with colic demonstrates physical symptoms. Features such as a ‘tight stomach’ or ‘legs drawn up to the stomach’ often accompany infant colic cry bouts (Stifter & Braungart, 1992; St. James Roberts et al., 1996). Hopkins (2000) has suggested that crying is a complex act and that ‘nonvocal accompaniments’ may clarify the distinctions between crying and fussing. Parents of colic infants in the present study, therefore, may have been more sensitive to these characteristics which in turn helped them distinguish crying from fussing when completing the cry diary.

Although the results indicate that mothers of infants who cried excessively at 6 weeks of age conceptualized infant colic differently, it may be that their infants were crying excessively at the period during which their conceptualizations were gathered. In a recent longitudinal study of crying and fussing over the first 40 weeks of age, infants cried and fussed longer at 2 weeks than at any consecutive age (St. James Roberts & Plewis, 1996). This was true for the normative sample as well as a subsample of excessive criers and fussers. In addition, crying and fussing was stable from 2 to 6 weeks. Thus, the infants in the present study who cried excessively at 6 weeks may have already been demonstrating such behaviour at 2 weeks thus influencing the mother’s conceptualizations. Future research examining the parental conceptualizations of infant colic may need to assess them prior to birth.

Parent characteristics

The findings of the present study suggest that parent characteristics were related to the development of colic, although many of the analyses indicated a trend. All five 2 week variables (demographics, parenting stress, personality, social support, marriage satisfaction) were associated to some degree with whether an infant developed colic or not. For example, parents of colic infants were married for fewer years than parents of non-colic infants. It may be that these parents have less experience balancing household demands with the demands of a young infant and as such would be less effective in their parenting ability. Such inexperience could result in increased crying. This conclusion, however, is countered by the fact that the majority of the colic infants (64%) were not first born infants and that parity was unrelated to the reporting of crying and fussing behaviour ($p > 0.10$).

The most significant findings with regard to parent characteristics were for the mother. Mothers of infants with colic reported more parenting stress (2 and 6 weeks), lower parenting self-efficacy (6 weeks), and less satisfaction with marital and family
support (2 weeks) than mothers of infants who did not develop colic. The 6 week findings were expected (Stiffer & Bono, 1998). Caring for a crying infant who is inconsolable likely intensifies the stress of having a new baby in the home. Likewise, a crying/fussing infant that cannot be soothed might be expected to affect a mother’s self-perceptions as one of the criteria for parenting self-efficacy is the ability to care for one’s child, including being able to effectively soothe him or her. Interestingly, a longitudinal study on mothers of colic and non-colic infants found that feelings of low parenting self-efficacy persisted 2 months after the colic had ended (Stifter & Bono, 1998).

The results for the 2 week measures support previous research linking parent characteristics to infant colic (Carey, 1963; Cuisinier et al., 1998; Miller et al., 1993; Papousek & von Hofacker, 1995; Rautava et al., 1993). For example, two studies have linked marital dissatisfaction with colic (Papousek & von Hofacker, 1995; Rautava et al., 1993). It may be that high levels of stress combined with marital and family support dissatisfaction predisposed mothers to act in ways that increased the amount of crying in early infancy. Alternatively, feeling distressed by having a new baby and a troubled marriage may have influenced mothers to perceive typical crying as excessive. A study that examined mothers’ ability to detect subtle differences in cry patterns found that mothers who reported low levels of marital satisfaction were less sensitive to these differences (Donovan et al., 1998). A third explanation is the possibility that the colic infants’ increased crying and fussing emerged at 2 weeks of age rather than at 6 weeks (St. James Roberts & Plewis, 1996). Thus, mothers’ feelings of stress and marital dissatisfaction may have come directly from having to cope with an infant who has begun to cry more.

Mothers of colic infants also tended to rate themselves lower on interpersonal affect than non-colic mothers. How might low interpersonal affect influence parents to report their child as colicky? One explanation may be that parents who endorse such personality questionnaire items as ‘I am not a very emotional person’ and, especially, ‘I prefer not to spend a lot of time worrying about a person whose condition can’t be helped’ might be less emotional about their infants’ crying and thus may not respond in sensitive or appropriately contingent ways. As this result was just a trend further research is necessary to confirm this personality difference.

Finally, it is important to comment on the lack of findings for fathers of colic infants. Only one significant finding emerged: fathers of colic infants reported their marriages as more negative at 2 weeks than fathers of non-colic infants. On the other hand, fathers of infants who cried excessively did not report feeling more stressed or less self-efficacious than their counterparts. This may be due to the fact that fathers spent less time with their fussing and crying infants than mothers (20% vs. 47%). Consequently, fathers of colic infants may have had fewer opportunities to experience, and be affected by, their child’s inconsolability.

Conclusion

The results of the present study are consistent with those of previous studies that demonstrate that colic is characterized by greater amounts of crying as well as long cry bouts. It also appears that crying and fussing excessively in the first 3 months is related to several parental attributes. Developmentally, all infants begin to increase their crying across the first 3 months of life. If mothers of infants who develop colic are more stressed by having a new child and this feeling is combined with their
dissatisfaction with their marriages and level of family support, their low interpersonal affect, and lack of physical support of their husbands in caring for their crying infant, then these mothers may have more difficulty dealing with an infant who exhibits excesses in crying at 6 weeks of age. As many of these findings were trends and infant crying was not assessed at 2 weeks of age when increased crying may be emerging further research is needed to validate these conclusions.

Our findings have implications for research as well as clinical practice. The most frequent complaint brought to paediatricians by parents in the infant’s first months of life is crying (St. James Roberts et al., 1993). Based on our findings, clinicians and researchers may want to inquire into parents’ conceptualizations of infant colic. This question should prove helpful in understanding the bases for their complaint of problematic crying and their reports of excessive crying.

Note

1. A total of 144 infants were originally recruited into the study but only 128 had completed diary data; thus 16 subjects were not available for classification into colic or non-colic groups. The participants who did not complete the diaries were compared to those who did complete the diaries on the study variables. No significant differences were revealed.

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References


