A REALIST EVALUATION OF THE PROCESSES AND OUTCOMES OF INFANT MASSAGE PROGRAMS

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ABSTRACT: The sensitivity of early interactions conveyed through eye contact, voice tone, facial expression, and gentle touch plays a crucial role in healthy development. Recognition of the importance of parent–infant interaction for later attachment has underpinned the search for innovative ways of promoting sensitive parent–infant interaction. One such early intervention is infant massage, but a recent meta-analysis found no evidence of its effectiveness in population samples. This points to the need to identify which parent–infant dyads are potentially able to benefit from such an intervention. This study aimed to identify the contextual factors and program mechanisms that were associated with different outcomes for a group of mother–infant dyads who attended infant massage programs. A Realist mixed-methods research design was used to identify the context, mechanism, and outcome (CMO) patterns across a sample of 39 mother–infant dyads attending infant massage programs. A range of quantitative measures (Working Model of the Child Interview, Edinburgh Postnatal Depression Scale, and video recordings of mother–infant interaction coded with the CARE-Index) were administered pre- and post-intervention, alongside qualitative observations and interviews with a range of stakeholders. Three key CMO patterns were identified. Women categorized as “low” risk on the whole showed no change in parent–infant interaction (i.e., because they were already in the adequate range) and limited change in levels of depression, irrespective of the quality of the program attended. Mothers who were categorized as being at “moderate” risk (i.e., they had one to two risk factors over and above their demographic risk) appeared to require “good” quality programs (seven or more program mechanisms) for change to occur. Mothers categorized as being at “high risk” showed no benefits irrespective of the quality of the program, and there was evidence of unresponsive mothers becoming more intrusive. These findings suggest that infant massage programs should be targeted at parents experiencing moderate problems in terms of parent–infant interaction, and that primary care professionals working in a range of settings need the skills to identify such compromised parenting to do this. High-risk mothers appear unlikely to benefit from infant massage alone. Rigorous randomized controlled trial (RCT) evidence is needed to test the hypotheses raised by this study.

Infant massage is a traditional care practice in many parts of the world (Field, 2000) and in India, for example, daily massage routines begin shortly after birth with systematic stretching and vigorous rubbing before infants are swaddled (Field, 2000; Mullany, Darmstadt, Khatry, & Tielsch, 2005). Although there are no published studies of the effects of infant massage in India (Bennett, Underdown, & Barlow, 2013), therapists anecdotally claim that the practice promotes children’s motor development. In Nepal, considerable force is used to stretch infants’ arms and legs during massage because this is considered important for strengthening bones, cleaning skin, and heat regulation (Mullany et al., 2005). Other benefits are said to include the relieving of colic and wind, easing of congestion and pain, promotion of sleep and relaxation, and “parent–infant bonding and warm and positive relationships” (Field, 2000, p. 494). It has been suggested that the absence of studies into traditional infant massage is due to the practice being an accepted cultural routine and because it is perceived to be enjoyable and “good for babies” (Field 2000) (p. 495).

The use of infant massage has increased in Western countries during the past decade, mostly with the aim of either increasing the weight of preterm infants (Vickers, Ohlsson, Lacy, &
Horsley, 2004), or promoting parent–infant interaction, particularly in high-risk populations such as women experiencing postnatal depression (O’Higgins, St. James Roberts, & Glover, 2008; Onozawa, Glover, Adams, Modi, & Kumar, 2001). This reflects an increasing recognition of the importance of sensitive early interactions, conveyed through eye contact, voice tone, facial expression, and gentle touch in terms of infants’ capacities to regulate their emotions (Belsky, 2001; Fonagy, Gergely, Jurist, & Target, 2004; Panksepp, 1998; Schore, 1994; Sroufe, 1995; Stern, 1998), particularly in terms of the attachment relationship with the primary caregiver (Beebe & Lachmann, 2002; Bowlby, 1988; Tronick, 2007; Slade, 2005); and the evolving structure and functioning of the infant’s brain (Gunnar, 1998; Schore, 1994). In healthy parent–infant dyads, the contingent responses and sensitive containment of ruptures happen frequently and increase the infant’s sense of efficacy, enhancing coping capacities and enabling him or her to feel that repair is possible (Beebe & Lachmann, 2002). The sensitivity of split-second interactions, where parents acknowledge infant cues by responding contingently, elaborating infant expressions and adjusting the timing to hold attention and affect, support the infant in the key developmental task of learning to regulate his or her emotions and behavior (Brazelton, Koslowski, & Main, 1974; Gergely & Watson, 1996; Stern, 1977; Trevarthen, 1979).

The potential importance of “dyadic” approaches such as infant massage has been highlighted by recent developments in the field of infant mental health, which have focused attention on the importance of parent–infant communication as an interactive, moment-to-moment process occurring across multiple modalities (Beebe, 2010), alongside increasing recognition of the importance of whole-body kinesthetic patterns during parent–infant interactions (Shai & Belsky, 2011).

The dyadic systems approach of researchers such as Beebe et al. (2010) has broadened the focus in terms of parental regulation of infant emotional distress to include multiple communication modalities including affect (facial and vocal), visual attention (gazing and looking away), touch (maternal touch, infant-initiated touch), spatial orientation (mother orientation from sitting upright to leaning forward to looming in; infant head orientation from vis-a-vis to arch); and a composite variable of facial–visual engagement (Beebe et al., 2010, p. 9). This approach recognizes that with disturbed communication, different modalities can convey discordant information that can be difficult for the infant to coordinate, and that may be the basis of later problems such as “disorganized” attachment (Beebe et al., 2010, p. 9). Beebe et al. (2010) distinguished between “self” and “interactive” contingency, and focus not only on “content” in terms of the qualitative features of behavior (i.e., such as whether a mother is intrusive) but also on temporal process measures of contingency. This research showed that maternal contingent coordination with the infant was not the best predictor of attachment at 12 months but rather that insecure attachment was associated with both higher and lower 4-month self- and interactive contingency while secure attachment was associated with “midrange” contingency. Specifically, dyadic interaction of future “resistant” infants was characterized by dysregulated tactile and spatial exchanges, generating approach-withdrawal patterns, while the interaction of future “disorganized” infants was characterized by intrapersonal and interpersonal discordance or conflict in the face of intense infant distress (Beebe et al., 2010, pp. 6–7).

Similarly, recent attempts to operationalize the concept of “mentalization” have recognized the limitations of current metacognitive approaches with their emphasis on the explicit reflection of emotional experiences as indicated by the linguistic and declarative capacity of parents (Fonagy & Luyten, 2009; Shai & Belsky, 2011). In contrast, parent embodied mentalization (PEM) refers explicitly to the quality of dynamic, moment-to-moment changes in whole-body kinesthetic patterns during parent–infant interactions (Shai & Belsky, 2011), and aims to measure the parent’s capacity to (a) implicitly conceive, comprehend, and extrapolate the infant’s mental states (e.g., wishes, desires, or preferences) from the infant’s whole-body kinesthetic expressions; and (b) adjust their own kinesthetic patterns accordingly (Shai & Belsky, p. 175). The evidence suggests that whole-body kinesthetic communicative processes may be an important influence on parent–infant interaction, independent of facial expressions (Fraiberg, Adelson, & Shapiro, 1975; Stack & Muir, 1992), and the focus of PEM is on “how” interactive bodily actions are performed rather than ‘what’ actions are performed, and as such includes both spatial and temporal dynamic contours. As with the work of Beebe (Beebe, Jaffe, Markese, Buck, Chen, Cohen, et al., 2010; Beebe, Steele, Jaffe, Buck, Chen, Cohen, P. et al., 2011), this approach treats the “dyad” as the unit of action, and the moment-to-moment exchanges as being bidirectional in terms of their mutual influence. There also is recognition of the importance of interactive repair, but with a particular focus on the parents’ contribution in terms of their kinesthetic adjustment.

Infant massage offers a unique opportunity to support parents to communicate not only verbally with their infants but also through the quality of touch, movement, rhythms, and sensations. A number of studies have identified evidence suggestive of improved mother–infant interaction (Oonozawa et al., 2001), sleep and relaxation (Field, Schanberg, Duvalos, & Malphurs, 1996), and reduced crying (Field et al., 1996), and some of the underpinning biological mechanisms have been identified (Underdown, Barlow, & Stewart-Brown, 2010). For example, Field et al. (1996) found evidence of an impact of infant massage on catecholamine (norepinephrine and epinephrine) and cortisol excretion, and Goldstein Ferber (Goldstein-Ferber, Laudon, Kuitt, Weller, & Zisapel, 2002) showed an impact on melatonin levels (which are involved in the adjustment of circadian rhythms). Infant sleep difficulties are common, and infant massage may be an effective, practical way of helping parents to support infants in establishing sleep patterns. These also are potentially important findings given what is now known about the damaging effects of high levels of stress hormones on the development of pathways in the infant brain (Gunnar & Quevedo, 2007).

However, a recent meta-analysis of 34 RCTs of the effectiveness of infant massage in population samples of infants less than 6 months of age has found that the only evidence of a statistically
significant impact on any outcome was obtained from a group of studies that were at high risk of bias (Bennett et al., 2013). The authors concluded that the available evidence is, on the whole, poor, and that insufficient attention has been given to the underpinning mechanisms by which change is achieved, or indeed, the groups for whom such massage may be most effective.

The current article summarizes the results of a study that was designed to explore which parent–infant dyads are best able to benefit from infant massage and the program mechanisms that need to be present to facilitate change.

**METHODS**

**Study Design**

A Critical Realist research design was used to explore the context, mechanism, and outcome (CMO) patterns for a group of mother–infant dyads attending infant massage programs (Pawson & Tilley, 1997). This design involved the use of a mixed-methods, one-group, pre- and post-measures methodology and the collection of quantitative outcomes as well as qualitative observations and interviews, and enabled us to explore in detail the context of each mother and infant alongside the mechanisms that were available at each program. A range of mixed-methods approaches have been developed during the last decade, with Critical Realism offering one of the few theory-driven methodologies. A Critical Realist approach combines elements of both Constructivist and Positivist epistemologies, with the aim of identifying “what works for whom in which circumstances,” by tracking the mechanisms that support ordinary behavior (regularities) and identifying those that may be triggered within certain contexts to produce change (Pawson & Tilley, 1997). Pawson and Tilley (1997) used a simple explanatory formula to depict the Critical Realist research approach: “regularity = mechanism + context” (p. 56), as depicted in Figure 1.

The mixed-methods approach underpinning this Critical Realist epistemology involved the separate, but concurrent, collection of qualitative and quantitative data, which was triangulated at the interpretation stage.

**Intervention**

The intervention for mother–baby dyads involved attendance at an infant massage program offered at a Children’s Centre. Mothers sat on the floor in an informal circle with their babies on mats in front of them. The facilitator gave the mothers suitable massage oil, and the mothers copied the facilitator who demonstrated the massage strokes on a doll. Babies were systematically massaged, and mothers were encouraged to respond to their babies’ needs.

Eight infant massage programs, each comprising between four and six 90-min sessions delivered weekly, were led by 10 facilitators to mother–infant dyad groups ranging in size from 1 to 20. Each group session was led by one facilitator, but some 6-week programs did not have the same facilitator throughout and the number of facilitators was therefore greater than the number of programs. Mothers generally booked for a 6-week program, and the majority attended most group sessions. However, not every mother on the program attended every group session; therefore, a program which generally had 2 mothers attend occasionally had only 1. While seven of the eight programs offered closed groups with only the dyads who had booked able to attend, one “rolling” program allowed mother–infant dyads from outside of the recruitment area to join sessions. In Programs 1 to 7, with a few exceptions, all mothers were recruited to the research, and the mean size of the programs was five dyads. In Program 8 only 2 dyads from the local disadvantaged area attended, both of whom were recruited to the study, but groups were regularly overcrowded, with up to 18 additional mothers coming from the surrounding affluent areas outside of our recruitment zone.

The trained infant massage facilitators consisted of a range of professionals and included health visitors, midwives, drug and alcohol workers, nursery nurses, and independent massage teachers. Programs 1 to 6 were led by facilitators who had received a 2- or 3-day training from Peter Walker (PW) (training provider), and Programs 7 and 8 were led by International Association of Infant Massage (IAIM) trained facilitators who had received a 4-day training. The trainings differed in orientation, with IAIM trainers focusing on communication cues and baby emotional and behavioral states, and PW facilitators focusing more on flexibility and movement (Underdown & Barlow, 2011).

**Participants**

The study sample consisted of 39 mother–infant dyads who planned to take part in a 6-week infant massage program being delivered in participating Children’s Centres.

**Recruitment Procedure**

All mothers were routinely invited to the infant massage program by their midwife or health visitor, and those who were interested in attending were also given an information sheet and told about the research. Consent-forming mothers then signed a form agreeing to their contact details being passed to the researcher. Any consenting, invited mothers with babies under 6 months were included if they lived in the recruitment areas.

The women were recruited from two areas described by the Office for National Statistics (2007) as extremely deprived and a third area that was more mixed. Midwives and health visitors...
TABLE 1. Demographic Characteristics of Infants and Mothers

<table>
<thead>
<tr>
<th>Variable</th>
<th>Study Group (n = 39)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnicity</td>
<td>White British 72% (n = 28)</td>
</tr>
<tr>
<td></td>
<td>Other 28% (n = 11)</td>
</tr>
<tr>
<td>Maternal Age (years)</td>
<td>16–20 13% (n = 5)</td>
</tr>
<tr>
<td></td>
<td>21–25 10% (n = 4)</td>
</tr>
<tr>
<td></td>
<td>26–30 31% (n = 12)</td>
</tr>
<tr>
<td></td>
<td>31–35 25% (n = 10)</td>
</tr>
<tr>
<td></td>
<td>36–40 13% (n = 5)</td>
</tr>
<tr>
<td></td>
<td>41–45 8% (n = 3)</td>
</tr>
<tr>
<td>Age Education Completed</td>
<td>≥ 16 48% (n = 19)</td>
</tr>
<tr>
<td>(years)</td>
<td>≥ 18 20% (n = 8)</td>
</tr>
<tr>
<td></td>
<td>≥ 21 32% (n = 12)</td>
</tr>
<tr>
<td>Highest Qualification</td>
<td>None 5% (n = 2)</td>
</tr>
<tr>
<td></td>
<td>General Certificate 39% (n = 15)</td>
</tr>
<tr>
<td></td>
<td>of Secondary Education</td>
</tr>
<tr>
<td></td>
<td>General National</td>
</tr>
<tr>
<td></td>
<td>Vocational Qualification</td>
</tr>
<tr>
<td></td>
<td>“Advanced” Level 13% (n = 5)</td>
</tr>
<tr>
<td></td>
<td>Degree 28% (n = 11)</td>
</tr>
<tr>
<td>Relationship Status</td>
<td>Living With Partner 77% (n = 30)</td>
</tr>
<tr>
<td>Infant Sex</td>
<td>Male 49% (n = 19)</td>
</tr>
<tr>
<td></td>
<td>Female 51% (n = 20)</td>
</tr>
<tr>
<td>Infant Age (weeks)</td>
<td>M = 10.4 Mode 7</td>
</tr>
<tr>
<td>Birth Order</td>
<td>Firstborn Infant 56% (n = 22)</td>
</tr>
</tbody>
</table>

approached all mothers in the three areas, but no information was collected about mothers who declined. Recruitment across the three sites took place over a 14-month period.

The demographic distribution of the participants in terms of marital status, ethnicity, education, and infant age and gender is described in Table 1. The majority attending the program were White and British, but a large minority (28%; n = 11) originated from other ethnic groups. Maternal age ranged from 16 to 41 years, and 13% (n = 5) were 20 years of age or less. Forty-eight percent (n = 19) of the 39 mothers participating in the study had received education beyond the age of 16 years, and 28% (n = 11) of mothers in the study had achieved degree-level education. Just under a quarter of mothers were living alone (n = 9). All infants (n = 39) were between 5 and 26 (M = 10, Mdn = 9) weeks of age. The study group comprised an almost identical number of male (n = 19; 49%) and female (n = 20; 51%) infants. Fifty-six percent (n = 22) of infants in the study group were firstborn.

The sample also included 10 trained infant massage facilitators, described previously.

Risk Score

An overall risk score was generated for each of the mothers using the following six factors: (a) a Working Model of the Child Interview (WMCI; Zeanah & Benoit, 1995) classification of “distorted” or “disengaged,” (b) Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987) score ≥ 9, (c) CARE-Index (Crittenden, 2001) score ≥ 6, (d) maternal age < 21, (e) single parenthood, or (f) low socioeconomic status (SES).1 All factors were considered to increase risk.

Dropout

Of the sample of 39 mothers and infants who consented to the research, 4 did not manage to get to the first session2, and 2 attended only one session; their profiles are depicted in Table 2.

One low-risk dyad (DO1) dropped out of a high-quality program (10 mechanisms) because of illness. The remaining 5 dyads who dropped out were high risk. One high-risk dyad (DO6) attended a low-quality program once and did not enjoy it. Other reasons for non-attendance included being overtaken by other life events and programs being at an inconvenient time.

Measures

The structured WMCI explores the richness of the parental perceptions about their child, and questions are designed to elicit the parents’ sense of “who” the child is as an individual (Zeanah & Benoit, 1995). The interview can be scored to classify parental responses into one of three broad attachment classifications: balanced, disengaged, and distorted (Zeanah, Benoit, Hirshberg, Barton, & Regan, 1994). Interviews are rated on richness of perception, openness to change, intensity of involvement, coherence, caregiving sensitivity, and acceptance. The WMCI classifications have concordance with attachment categories. Balanced representations are concordant with secure attachment, and disengaged and distorted with insecure attachment. The interviews are characterized as follows:

- **Balanced representations** are characterized by narratives that convey a rich impression of who the infant is and the caregiver’s relationship with the infant.
- **Disengaged representations** are characterized by the caregiver’s aloofness or emotional distance from the infant and may highlight an emotionally impoverished relationship with the infant.
- **Distorted representations** are characterized by confused or contradictory accounts where the caregiver may have difficulty in remaining focused on the infant (Zeanah & Benoit, 1995).

All WMCI interviews were first coded independently by a trained, experienced coder. Interrater reliability was calculated for

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1The SES of each program participant was estimated by assessing three characteristics: age at which education was completed, qualifications, and housing. The highest SES is represented by a score of 1, and the lowest by a score of 3.
2The high percentage of attendance may reflect that once mothers had committed to join the research, they also had made the decision to attend the IM program.
TABLE 2. Baseline Details of Mothers and Infants Who Did Not Attend or Only Attended One Session of the Program

<table>
<thead>
<tr>
<th>ID</th>
<th>WMCI</th>
<th>EPDS ≥9</th>
<th>CARE-Index</th>
<th>SES &gt; 2</th>
<th>Maternal Age &lt;21</th>
<th>Partner</th>
<th>Risk Level</th>
<th>No. of Sessions Accessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>DO1</td>
<td>Disengaged</td>
<td>Yes</td>
<td>At-Risk</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>DO2</td>
<td>Disengaged</td>
<td>Yes</td>
<td>At-Risk</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>DO3</td>
<td>Distorted</td>
<td>Yes</td>
<td>Inept</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>DO4</td>
<td>Distorted</td>
<td>Yes</td>
<td>At-Risk</td>
<td>Yes</td>
<td>No</td>
<td>4</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>DO5</td>
<td>Distorted</td>
<td>Yes</td>
<td>At-Risk</td>
<td>Yes</td>
<td>No</td>
<td>5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>DO6</td>
<td>Distorted</td>
<td>Yes</td>
<td>At-Risk</td>
<td>Yes</td>
<td>No</td>
<td>5</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>


34 valid cases using a κ measure (Pallant, 2007) which produced a value of .78, representing a good agreement (Peat, 2001).

The EPDS (Cox et al., 1987) is a standardized instrument designed to measure maternal depression during the postnatal period. It comprises 10 items that explore feelings in the past 7 days. The maximum score is 30, and Holden (1994) recommended an EPDS threshold score of 13 to identify women with symptoms of depression. However, a cutoff of 9 or 10 has been found to identify women with minor depression (Gerrard et al., 1993).

The CARE-Index (CI; Crittenden, 2001) is a validated method of measuring three aspects of maternal behavior (sensitivity, covert and overt hostility, and unresponsiveness) and four aspects of infant behavior (cooperativeness, compulsive compliance, diffi-
cultness, and passivity). These scales are highly correlated with the infant Strange Situation assessment pattern of attachment and also differentiate abusing from neglecting, abusing and neglecting, marginally maltreating, and adequate dyads. Scores range from 0 to 14; higher scores indicate better sensitivity and/or cooperation. The CI Sensitivity scale categorizes maternal scores ranging from 14 (mutual delight) through 7 to 10 (adequate), 5 to 6 (inept), and 0 to 4 (at risk). The CI was used to identify the dyads’ interactional status and any support needs. Interrater reliability was calculated for 36% (n = 12) valid cases using a κ measure (Pallant, 2007) of agreement, which produced a value of .73.

In-Depth Interviews

In-depth, semistructured interviews were conducted by the first author, with all participating mothers, and program facilitators post-intervention. The focus of the interviews was (a) to elicit mothers’ views about attending an infant massage program and (b) facilitators’ perceptions about leading such a program. The interview was based on 12 questions that included topics such as what mothers liked best and least about the sessions, whether they did anything differently after the program, and what things they would tell a friend about the program. The facilitators’ semistructured interview contained questions relating to their professional background and infant massage facilitator training, their views on the advantages and disadvantages of the intervention, and their opinions about how infant massage might impact on infant–mother relationships.

Video and Audio Recordings

Interview data were supplemented with videotape observations of program sessions aimed at capturing the processes and mechanisms involved in the delivery of infant massage, including practitioner skills. “Teacher talk” that took place during the sessions was audio recorded.

Procedure

Mothers who agreed to take part signed a consent form to allow their contact details to be passed to the researcher. Consenting mother–infant dyads were visited at home by the researcher prior to the first attendance at the infant massage program. Demographic details were collected, the WMCI was conducted, and mothers completed the EPDS questionnaires. A 3-minute video clip of mothers and infants playing “as they normally do” was recorded and analyzed using the CARE-Index. The EPDS and the video clip were repeated again following completion of the infant massage program.

All massage programs were attended and videotaped by the researcher with the consent of participating parents.

Data Analysis

Quantitative data were entered directly into SPSS along with the demographic details, WMCI classifications and EPDS and CI scores. Data were also assembled to enable case-by-case profiles. Appropriate statistical t tests were performed to compare the means for quantitative data collected before and after the program. However, qualitative data indicated that there was a large amount of heterogeneity between programs, and so the quantitative results were further examined by location and program and this data was then examined alongside the qualitative data, to explore both program mechanisms and outcomes.

Qualitative data were also entered into NVIVO, which is a qualitative data-analysis computer-software package, and analyzed thematically.

Research Governance

The research was conducted in accordance with the U.K. Depart-
ment of Health research governance procedures, and Research
TABLE 3. Summary of Baseline Measures

<table>
<thead>
<tr>
<th>Baseline Measures Categories</th>
<th>n</th>
<th>Balanced</th>
<th>Disengaged</th>
<th>Distorted</th>
</tr>
</thead>
<tbody>
<tr>
<td>WMCI</td>
<td>36</td>
<td>63%</td>
<td>31%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Baseline Measures Range | n | Minimum | Maximum | Mean  | S.D.  |
<table>
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<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EPDS</td>
<td>0–30</td>
<td>39</td>
<td>0</td>
<td>24</td>
<td>7.18 (5.12)</td>
</tr>
<tr>
<td>C/I – Mat Sensitivity</td>
<td>0–14</td>
<td>39</td>
<td>0</td>
<td>13</td>
<td>7.57 (3.1)</td>
</tr>
</tbody>
</table>

WMCI = Working Model of the Child Interview; EPDS = Edinburgh Postnatal Depression Scale; C/I = Care Index

Ethics Committee approval was secured from the Bedfordshire Local Research Ethics Committee.

RESULTS

We present the results of (a) the baseline (contextual) measures, (b) the identified program mechanisms, and (c) key identified CMO patterns.

Baseline Measures

Table 3 shows the distribution of scores for the quantitative measures collected at baseline. Thirty-six of 39 mothers completed the WMCI at baseline; 63% (n = 23) had balanced perceptions of their infant’s individual characteristics and their relationships; 31% (n = 11) had disengaged classifications, and 6% (n = 2) were classified as having distorted perceptions.

CARE-Index scores of 6 or less for maternal sensitivity indicate that interactions fall within the intervention range, and 32% (n = 12) of interactions were classified as being in the inept or at-risk range.

Thirty-one percent (n = 12) of women had EPDS scores ≥9; 8% (n = 5) of these scored ≥13 (i.e., above the upper threshold).

Of a total of six potential risk factors, 48% (n = 19) had at least one risk factor (Single parenthood or low SES was not included unless there were other risk factors), with just under one quarter (22%; n = 8) having three or more risk factors.

Nineteen of the 33 dyads had one or more risk factors. Table 4 shows the risk and contextual patterns for the 19 women who obtained a score of 1 or more.

PROGRAM MECHANISMS

Theory, research, observation, and stakeholder interviews were used to identify the key mechanisms necessary for infant massage programs to be effective in terms of supporting and/or bringing about change in the development of sensitive reciprocal interactions in the carer–infant dyad (Underdown & Barlow, 2011). Table 5 summarizes the key mechanisms that were identified.

For example, theory/research has highlighted the importance of containment for mothers and infants (M5) (Bion, 1962), the teaching of infant massage strokes (M6), infant states (M12), and infant cues (M13) (Brazelton et al., 1974; Stern, 1985; Tronick, 2007).

In addition to the use of theory to identify potential mechanisms, interview data with mothers served to draw our attention to the potential importance of mechanisms not referred to in the literature. For example, lack of continuity of facilitators (M3: consistent facilitator) in one program meant that there was less “ownership”

**TABLE 4. Risk Patterns for the Nineteen Women With A Risk Score >=1 (not including demographic factors unless there were also other risk factors present)**

<table>
<thead>
<tr>
<th>ID</th>
<th>WMCI Classification</th>
<th>EPDS ≥ 9</th>
<th>CI ≤ 6</th>
<th>SES &gt; 2</th>
<th>Age &lt; 21</th>
<th>Partner</th>
<th>Risk Level</th>
<th>Program Attended</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1A</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Disengaged</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3A</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
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<td>4</td>
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<td>1</td>
<td>7B</td>
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</tbody>
</table>

Unknown = Three WMCI’s could not be coded due to recording equipment failure or their not wishing to be recorded.

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of the whole program and that the qualities and skills of the facilitators varied from one session to the next. One mother described how she had considered whether to return to the group after her first experience:

The first session was really poor, it was a different lady doing it, it wasn’t (facilitator) . . . to be honest if I’d have gone and was a bit dubious about it, because I knew I wanted to do it, if I was a bit dubious about it. I wonder if I would have gone back. I thought they should have just cancelled and started the week after when HV could be there to introduce it properly and also (baby) had just had her injections and this lady didn’t say anything about that whereas HV said that you shouldn’t do it if you’d just had injections and she’d had them the day before and she didn’t even mention the injections and I think that was quite . . . I was quite disappointed it’s obviously HV’s thing, she is comfortable in it and sort of . . . whereas the other lady was a bit . . . Oh this isn’t really my thing” so . . . “it’s not really what I do.” It was almost like a little side thing like . . . do you understand what I mean? Just a bit erm . . . I’m trying to think of how to describe it. A bit like it was a bit of an inconvenience like “I don’t normally do this but I’m just doing it today just to cover.”

One popular independent massage facilitator frequently had 17 to 20 mothers and infants attend the classes (M7: optimum group size). (Numbers in program sessions varied because some participants missed sessions and, occasionally, mothers from out of the study area attended sessions). One mother talked about this as follows:

I think the over-crowdedness really. That it was just too many people, too much going on you know to . . . it wasn’t . . . you know you think of massage as kind of . . . I mean I think (facilitator) was fantastic because she . . . she really kind of kept it . . . going . . . but yeah I found it a bit kind of . . . I couldn’t . . . and me being quite sociable and noisy as well I couldn’t . . . I wanted to be looking around and also you find yourself . . . wanting to chat, do you know what I mean it’s a sociable thing and then . . . and the massage is almost a secondary thing I felt quite a bit of the time.

Having a well-prepared environment that meets the needs of the mothers (M4: setting meets physical needs) indicates to mothers that their infants’ needs are understood and held in mind (Winnicott, 1960). When basic elements of the planned accommodation were not met, dyads felt unvalued and few attended:

It was freezing all the time. In a way, even though I knew it wasn’t the people who were running its fault, I thought it was badly run because of the room being so cold all the time, and to be honest, with the amount of people maybe they should have just cancelled the course and waited for the next lot of babies.

The teaching of infant cues (M13) was identified by some mothers in terms of how it had made them more observant about this aspect of their interaction:

I tend to notice it because he tends to stretch out more, he still doesn’t like me doing his arms but his legs he will almost stretch them out for me now, but he still doesn’t like me doing his arms. So I know he is enjoying it because he gives me, you know, like (facilitator) says, he gives you . . . the, it’s like sort of asking for permission, he gives me the part he would like me to do. When I go to do his arms, he doesn’t like it and I know that he is not enjoying it, I can tell by the posture of his body really, whether he is enjoying it.

Some mothers identified the limited scope for social engagement (M8), which may be particularly important for socially isolated mothers and a key mechanism in reducing depression:

I don’t think there was . . . there wasn’t much encouragement or much opportunity necessarily to sort of . . . to socialise, it was very much go there, do that and off we go. I know there were the drinks at the end but then that’s . . . I don’t know whether that’s always the best time to do it anyway because everybody’s doing different things or again if the ladies (facilitators) are standing in for somebody else that are running it and they’ve got to be somewhere else obviously they’ve got to clear up and go quicker. If you don’t know what the plan is, if you’ve gone there for massage then you think “OK I’ve done my massage now I’ll go.” You don’t want to be the one that sort of lingers all the time.

Several mothers indicated that they were keen to socialize, suggesting that knowing the expectation or “plan” in terms of social activities would have helped them feel more confident to do this.

The importance of the facilitator modeling sensitive interaction using the doll (M11) was identified from the observation of the classes. Model babies (i.e., dolls) are important to the teaching of such skills, and IAIM-trained facilitators had their own dolls that they brought to each session and introduced by name. This appeared to be part of their IAIM training, and facilitators talked about “bonding” with their dolls. IAIM facilitators used dolls to indirectly support mothers. For example, one facilitator noticed during a session that a mother was upset because her infant was crying throughout the massage. The facilitator said: “I think (doll’s name) has had enough, you guys carry on I’m just going to give him a little cuddle for a minute.” The facilitator picked up her doll and held him close with her right hand firmly supporting his head while she whispered gently to him. This was conducted in
a natural way, and while most of the mothers carried on massage-
ing their babies, the mother with the distressed infant picked up
her crying baby and followed the facilitator’s soothing techniques.
When the baby was quiet, the mother commented on how the baby
liked to look around. The facilitator smiled at the baby and said
how much the group liked to look at her, too. This was affirming
for the infant and the mother, who now looked much more relaxed.
This short sequence was an example of Stern’s (1998) motherhood
constellation, where a more experienced woman (the facilitator)
seamlessly comes alongside in a nondirective way to support and
affirm a new mother. Giving the doll an identity was an important
part of conveying value and respect. In contrast, the PW-trained
facilitators had not named their dolls and shared a pool of dolls
kept in the cupboard at the Children’s Centre. This resulted in some
facilitators being more self-conscious when they worked with their
model doll, which was evident in their explanations to mothers:

This is a dolly remember it doesn’t move quite the same as a baby. Just try
and open up the pelvis, get the legs round . . . that’s it just give baby a nice
cuddle, maybe little kisses, make it feel nice and comfortable [kissing
noises] kiss him. I’m glad people can’t see me kissing dollys actually
[laughs].

The number of mechanisms present in each of the eight par-
ticipating infant massage classes was assessed. While some mech-
anism were easy to identify, such as whether singing was part
of the program (M14) and whether the same person facilitated all
the sessions (M3), other mechanisms were more difficult to assess
because they comprised a number of components. For example,
whether the setting met the physical needs of mother–infant dyads
(M4) could be assessed in terms of a number of factors such as
levels of crowding, room temperature, available facilities etc. some
of which were present and some not. If a program was in a com-
fortable setting that mostly met participants’ physical needs, M4
was considered to be available, even if a component such as clear
directions to the program was missing. Weighting of individual
mechanisms was considered inappropriate because it was not poss-
able to prioritize some mechanisms over others in terms of their
potential impact.

Fifty percent (n = 4) of the programs had five or fewer mecha-
nisms present, 25% (n = 2) had six to nine mechanisms present,
and only 25% had 10 or more mechanisms present.

CMO PATTERNS

Table 6 summarizes the CMO patterns for the 33 mothers who
attended the eight infant massage programs in terms of the two pri-
mary outcome measures: parent–infant interaction (CARE-Index)
and maternal postnatal depression (EPDS). These results show that
overall, there were no significant changes for either outcome in any
of the eight programs.

### TABLE 6. Context, Mechanism, and Outcome Patterns

<table>
<thead>
<tr>
<th>N = 33</th>
<th>Context</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Baseline WMCI</td>
<td>Baseline EPDS M (SD)</td>
</tr>
<tr>
<td>1 (n = 5)</td>
<td>Bal = 2</td>
<td>11.60 (3.50)</td>
</tr>
<tr>
<td>Dis = 2</td>
<td>Un = 1</td>
<td></td>
</tr>
<tr>
<td>2 (n = 7)</td>
<td>Bal = 4</td>
<td>4.29 (2.98)</td>
</tr>
<tr>
<td>Dis = 2</td>
<td>Un = 1</td>
<td></td>
</tr>
<tr>
<td>3 (n = 4)</td>
<td>Bal = 2</td>
<td>4.50 (1.73)</td>
</tr>
<tr>
<td>Dis = 2</td>
<td>.31</td>
<td></td>
</tr>
<tr>
<td>4 (n = 4)</td>
<td>Bal = 3</td>
<td>7.25 (7.18)</td>
</tr>
<tr>
<td>Un = 1</td>
<td>n.s.</td>
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</tr>
<tr>
<td>5 (n = 2)</td>
<td>Bal = 2</td>
<td>4.50 (6.36)</td>
</tr>
<tr>
<td>6 (n = 2)</td>
<td>Bal = 1</td>
<td>10.50 (3.54)</td>
</tr>
<tr>
<td>Dis = 1</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>7 (n = 7)</td>
<td>Bal = 4</td>
<td>6.86 (3.62)</td>
</tr>
<tr>
<td>Dis = 3</td>
<td>n.s.</td>
<td></td>
</tr>
<tr>
<td>8 (n = 2)</td>
<td>Bal = 2</td>
<td>5.50 (2.12)</td>
</tr>
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</table>

WMCI = Working Model of the Child Interview; Bal = balanced WMCI; Dis = disengaged WMCI; Ununknown WMCI; EPDS = Edinburgh Postnatal Depression Scale; CI = CARE-Index.

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TABLE 7. Key Context, Mechanism, and Outcome Patterns

<table>
<thead>
<tr>
<th>Context (Risk Level)</th>
<th>Mechanisms (Program Quality)</th>
<th>Outcome (Change)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Risk (n = 14)</td>
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<td>No Change</td>
</tr>
<tr>
<td>Balanced WMCI</td>
<td>Good Program (n = 4)</td>
<td>No Change</td>
</tr>
<tr>
<td>Sensitive Interactions</td>
<td>Poor Program (n = 3)</td>
<td>No Change</td>
</tr>
<tr>
<td>EPDS Below or Close to Threshold</td>
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<tr>
<td>Moderate Risk (n = 11)</td>
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<td></td>
</tr>
<tr>
<td>Balanced or Disengaged WMCI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequate or Inept Interactions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPDS on or Above Threshold</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Risk (n = 8)</td>
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</tr>
<tr>
<td>Disengaged or Distorted WMCI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inept or At-Risk Interactions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elevated EPDS</td>
<td></td>
<td></td>
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</tbody>
</table>

Poor > 4 mechanisms, Fair ≥ 5–9 mechanisms, Good ≥ 10 mechanisms. WMCI = Working Model of the Child Interview; EPDS = Edinburgh Postnatal Depression Scale.

Table 7 depicts the key CMO patterns that were identified across the 33 cases. It shows that for women in the low-risk category (i.e., balanced WMCI, sensitive interactions, and EPDS normal; n = 14), no change occurred irrespective of the quality of the program in terms of the number of mechanisms present. For the moderate-risk group (i.e., disengaged WMCI, adequate or inept interactions, and/or EPDS on or above threshold; n = 11), the number of mechanisms present appeared to have an impact on the outcome (i.e., only women attending “good” or “fair” programs achieved change); and for women categorized as high risk (i.e., disengaged or distorted WMCI, inadequate interactions, elevated EPDS; n = 8), no positive change was identified, but one deleterious outcome occurred in a high-quality program.

Three case studies (see Tables 8–10, respectively) are depicted next to illustrate these scenarios in more detail.

CASE 1. Moderate-Risk Dyad Attending a Good Program

This primipara had a WMCI categorization of disengaged, but her CARE-Index score was just in the “adequate” range, and her EPDS reached the screening threshold. This professional woman in her late 30s and her partner had waited a long time to conceive this much-wanted baby, and she had good support from her mother. The initial baseline CI video clip showed the mother interacting tentatively with her son, and she was unclear about the baby’s characteristics and personality. This mother was struggling to adapt to her new role and to get to know her baby. She explained that her mother had visited and that the baby had “kept all his early smiles for her”. The mother was concerned that her stress levels might be affecting her son:

I don’t know if he finds it unsettling that I’m . . . you know I’m stressed and maybe he feels more unsettled you know, I don’t know whether he’s picking up on the vibes, I don’t think he’s doing it to annoy me [laughs] you know or anything like that I think he’s just picking up on my vibes and not feeling as secure because I’m feeling more stressed.

The mother attended the four available IM sessions and engaged fully, although she sometimes appeared “overbright” with her infant, which may have been masking depression.

This dyad attended a high-quality program with 11 mechanisms. There was no provision for social engagement (M8) because the Children’s Centre room was available for only a short period. M1 and M2, which also were absent, refer to the invitation process, which again was not necessary for this mother because she received a text from a friend to inform her about the program.

There was little change in quantitative measures, but after the program, the mother seemed more in tune with her baby’s strengths and sensitivities. During the post-intervention interview, the mother described her baby’s likes and dislikes:

He loves it, he gets so excited, yeah it’s . . . the only problem I have now is if I change his nappy and I don’t do it, I do get a bit of a strop you know. He likes his legs being . . . because I only do his legs then, I don’t do the whole of him and he kind of likes that and he sort of you know . . . you get all excited don’t you? When I put him on his mat, . . . certainly I think that it’s supposed to improve the bonding and I certainly think that it helped him . . . you know quite a bit . . . Really just you know that . . . I suppose it’s taught me to watch his face and watch what he wants you know and try and learn from what he’s trying to tell me, you know rather than just kind of thinking “Right what will we do with you now?” I’m certainly actually kind of trying . . . trying to see what he wants a bit more . . . possibly before I probably wouldn’t have maybe noticed so much because I wasn’t really . . . I don’t know I didn’t really think they’d communicate that much you know. I suppose all the rest of the day there’s always something else going on in your mind . . . whereas that is the time where you concentrate . . . so I suppose you notice the little signals more.

The post-intervention video indicated that she was more engaged with her infant and had become more adept at picking up on his cues. She was using massage at home (M6). Although the CI had only increased by 1 point, interactions were now firmly in the adequate range for sensitivity. It was a pity that this high-quality program did not offer time for mothers to socialize because this may have impacted on this mother’s mood.
CASE STUDY 2. Moderate-Risk Dyad Attending a Fair Program

<table>
<thead>
<tr>
<th>ID</th>
<th>Context</th>
<th>Mechanisms</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Disengaged</td>
<td>M1 &amp; M4–M9</td>
<td>6 19</td>
</tr>
</tbody>
</table>

WMCI = Working Model of the Child Interview; CI = CARE-Index; EPDS = Edinburgh Postnatal Depression Scale.

This next mother was experiencing financial hardship and living in overcrowded circumstances in a high-rise flat. She had a high level of support needs, and her raised EPDS scores suggest that she was experiencing depression. Her CARE-Index score was in the intervention range.

The mother was exposed to a program that was rated as “average” (i.e., a total of seven mechanisms identified). She received a personal invitation (M1) to the program, and the second facilitator developed a respectful and affirming relationship with the mothers. She had 100% attendance and spoke positively about the program:

> It was very informative, when we did the massage it was very informative and what we were doing to the babies and how we were doing it and what it … you know what the benefits would be yeah, it was very good yeah … it really it was nice to get out and have bonding time with my daughter and also to learn about massage for babies and also to meet other mothers as well yes so … yeah.

This mother continued to massage her infant at home (M6) and felt that she had an increased understanding of her infant’s needs, which was reflected in a marginal increase in the CI score, which remained within the intervention range. Having only 2 mothers and infants in the group resulted in a “low-energy” atmosphere, and mechanisms such as the introduction of singing or rhymes, as noted in other groups, would have enhanced the group dynamics and modeled a stimulating activity. Her high EPDS score reflected the impact of living in disadvantaged circumstances, and her positive comments indicate that she was grateful for any provision, even if it was less than optimal. The small size of this group (M7) resulted in this mother regularly meeting only one other mother, and because they had little in common, they did not pursue meeting outside of the program.

CASE 3. High-Risk Dyad Attending a Good-Quality Program

<table>
<thead>
<tr>
<th>Risk score</th>
<th>SES</th>
<th>WMCI</th>
<th>CI</th>
<th>EPDS</th>
<th>Mechanisms</th>
<th>CI</th>
<th>EPDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3</td>
<td>Disengaged</td>
<td>1 8</td>
<td>M3–M7, M9–M14</td>
<td>1 0</td>
<td></td>
<td></td>
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</table>

SES = socioeconomic status; WMCI = Working Model of the Child Interview; CI = CARE-Index; EPDS = Edinburgh Postnatal Depression Scale.

This high-risk, primipara teenage mother was of low SES, and at baseline, her WMCI was classified as disengaged, and her narrative was impoverished by a lack of detail about her infant’s personality. During the first CI video clip, the mother sat silently beside her baby, occasionally prodding him or replacing his pacifier, and interaction was ranked as being within the at-risk range.

The program facilitator had developed a trusting relationship with this high-risk mother during pregnancy. She worked hard to address barriers to attendance and to ensure that this dyad felt welcome in the group. Only M8, relating to time for social interaction, was missing from the program for this dyad. During each session, the facilitator worked hard to encourage the mother to notice her infant’s cues and signals. The mother enjoyed singing at the group and asked the facilitator to write the words down so that she could sing at home. The mother had followed the massage strokes, but she was not in synchrony with her baby, and her timing was misattuned.

Post-intervention, the CI score remained in the high-risk range, and while the score for maternal sensitivity was unchanged (i.e., remaining in the at-risk range), the video clip showed change. In the first clip, the mother sat beside her baby on the couch. There was a space between them, and the mother’s limited response to the baby was to occasionally reach out to replace his pacifier. Post-intervention, the video showed that the mother now held her baby on her knee, facing outward while she actively and intrusively moved his limbs.

The mother said that she had enjoyed spending time with her baby and that “It could have gone on a bit longer ‘cos it’s quite calming.” She said she did not know how much her baby had enjoyed it because sometimes he had cried. This dyad had serious relationship problems, and the mechanisms appeared to have shifted this mother from being very passive to being very intrusive. The video clip showed that the mother was unable to reflect on her infant as in terms of his internal states, and suggests that she needed an intervention that could help her make this connection with her baby.

DISCUSSION

A mixed-methods Critical Realist research design was used to explore which mother–infant dyads could potentially benefit from participation in infant massage programs through the identification of the contextual factors of the participating mother–infant dyads (particularly those that increase the risk of poor parent–infant interaction), along with the program mechanisms to which they were exposed.

The results showed that although the programs were being provided in disadvantaged areas of the country, nearly one fourth of the participating women had degrees, reflecting the fact that they had heard about the offer of high-quality infant massage programs in two locations, and were effective in availing themselves of services that they felt would be good for their babies.

Overall, around half of the total sample had factors (over and above social disadvantage) that placed them at risk of compromised
mother–infant interaction; the most significant of which were distorted or disengaged WMCI scores, CARE-Index scores rated as inept or at risk, and/or postnatal depression. These results suggest that risk for compromised parent–infant interaction in socially disadvantaged women was high.

The logic model or mechanisms for change underpinning intervention programs have been identified as key to their effectiveness (Mayeske & Lambur, 2001). Fourteen such mechanisms were identified as potentially being important in terms of the effectiveness of infant massage programs (Underdown & Barlow, 2011), such as the use of personal invitations, delivery by the same facilitator, the setting meeting the physical needs of the mother–infant dyads, the facilitator having the necessary qualities and skills, and the teaching involved learning about infant states and cues. Support from other mothers and having an opportunity to discuss issues with peers and the facilitator were important to program participants, many of whom were socially isolated. Based on the presence (or absence) of these mechanisms, we found that half of the programs were categorized as poor or average, and some dyads at risk of compromised parent–infant interaction received poor quality programs in terms of the provision of mechanisms that could bring about change.

Key factors that appeared to be associated with program quality in terms of the number of mechanisms identified were the training and experience of the facilitators and their personal commitment to the delivery of infant massage programs. The findings have suggested that IAIM-trained facilitators supported mothers to perceive infants as socially interactive beings and to recognize their role as regulators of infant states whereas the PW-trained facilitators’ focused on movements and infants as passive recipients. Perhaps of most significance, the majority of mothers with inept or at-risk interactions did not access the teaching about infant cues and signals because they attended programs facilitated by PW-trained facilitators.

The identification of CMO patterns enabled us to identify which group of women was best placed to benefit from infant massage. The 14 low-risk women experienced a range of programs, but overall showed no change in parent–infant interaction and a small change in already low levels of depression, mostly irrespective of the quality of the program attended. These findings may be due to “ceiling effects,” such that there was little scope to show improvement because most were already within the optimal range. This is not to suggest that these women and their infants did not benefit from attending an infant massage program, as was indicated by the qualitative data, but that the massage may have been useful in reinforcing and promoting well-being. Ironically, this group of women appeared to be best able to access the highest quality groups, as was evidenced by their effective texting of one another to advertise the program.

The findings regarding the mothers who were categorized as being at “medium” risk (i.e., they had one to two risk factors over and above their demographic risk) appeared to have the most potential for change in terms of an infant massage program. It is hypothesized that women with raised EPDS scores would benefit from time for social interaction and support from peers, and women who are disengaged from their babies’ experiences benefit from learning to observe their emotional states and cues. This group on the whole required more intensive input to ensure that they accessed the program (i.e., personal invitations, consistent facilitators, etc.) with a focus on interaction and teaching about infant cues. The mother–infant dyads who were rated as average risk and who showed little change on the whole attended poor-quality programs with little provision in terms of the mechanisms that could potentially facilitate change in interaction.

The findings in relation to the mothers categorized as being at high risk (i.e., had risk factors over and above their demographic risk) are suggestive that infant massage programs that are delivered without other forms of support may be ineffective for this group of dyads and also may produce adverse changes. Case Study 3 shows that participation in an infant massage program resulted in a mother moving from being extremely passive pre-intervention to being extremely intrusive post-intervention. The CARE-Index score for this mother placed her in the “child protection” range, and the findings of this study suggest that these mother–infant dyads should be identified early and provided with a package of support of which infant massage maybe just one component.

**LIMITATIONS**

The findings of this study were limited by the diverse range of infant massage practices observed within an intervention that aimed broadly to “improve bonding and attachment” between parents and infants. Our previous publication (Underdown & Barlow, 2011) identified the mechanisms that need to be present in a program aiming to support early interactions. This article illustrates how the context of mother–infant dyads and these mechanisms might lead to specific outcomes. A Critical Realist approach does not require a control group because it explores what happens for whom in what circumstances; a crucial part of this Realist evaluation involved systematically tracking the way in which context and mechanisms influenced outcomes. This research provides a number of hypotheses that should now be tested in future research, such as for example, evaluation of the impact of high quality massage programs provided to mother–infant dyads experiencing moderate interactional difficulties.

**CONCLUSIONS**

These findings point to the need for primary care practitioners across a range of healthcare and early education settings to be able to identify parent–infant interaction that is outside the optimal range and to offer appropriate methods of support in terms of the level of need identified. They suggest that parents with medium-level risk should be offered the opportunity to attend an infant massage program that has a significant number of key mechanisms present, and that parents rated as high risk should be offered more intensive support than infant massage programs alone are able to provide.
Further rigorous research is needed to test some of the hypotheses that have been developed by this research. This should involve the conduct of well-powered RCTs to evaluate the effectiveness of good-quality massage programs directed at parents identified as potentially able to benefit.

REFERENCES


