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The nature of touch in mothers experiencing maternity blues: the contribution of parity

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Abstract

Background: Maternal touch (MT) is an essential part of the initial contact between the mother and her newborn and has developmental effects on the child. MT is known to be reduced in postpartum depression (PPD). The nature of MT in mothers experiencing maternity blues and the effect of parity are still unknown.
Study design: Seventy-five mothers were recruited from the ongoing series of deliveries.
Subjects: The participating mothers were observed during interaction with their newborns on the second-day postpartum. Touching behavior was scored on-line according to the Touch Scoring Instrument, which includes nine types of MT. Mothers were categorized as exhibiting maternal blues according to Stein's depression scale.
Outcome measure: Touch Scoring Instrument.
Results: Primiparous mothers with blues avoided all types of touch whereas multiparous mothers with blues provided firm touch and holding. All mothers with blues avoided proprioceptive touch. Multiparous mothers without maternal blues provided various types of touch including affectionate holding and matter-of-fact touch whereas primiparous mothers without blues mostly provided holding.
Conclusions: Mothers with maternity blues on day 2 exhibited a pattern of MT similar to that known to characterize postpartum depression. Mothers without blues are able to provide developmental touch in a manner known to facilitate CNS stability and newborn adjustment to the extra-uterine world. Parity modulates the effect of maternity blues on MT and buffers the withdrawal effect of depression. Maternal touch could be used as a diagnostic tool for detection of mothers at risk in a

Abbreviations: PPD, Postpartum depression; MT, maternal touch.

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timely manner. Touch interventions, which were previously demonstrated in PPD mothers, may be utilized in an earlier stage postpartum.

Keywords: Baby blues; Maternity blues; Maternal touch

1. Introduction

The puerperal period is regarded as a time of particularly drastic change in the life of women, affecting both body and mind. Along with the radical alteration accompanying delivery, they are required to adopt a new role as a mother of the new child, reorganize marital and family relationships and experience profound hormonal fluctuations [1]. Thus, this period is a time in which psychiatric symptoms readily appear. Maternity blues is a transitional depressive state that can be viewed as a highly prevalent mental health problem. This phenomenon is characterized by depressed mood, fatigue and tearfulness as well as mild insomnia. It occurs during the first days postpartum and may last for about 2 weeks. Cox et al. [2] noted that women with severe maternity blues are at greater risk for persistent depression beyond the initial few weeks postpartum. In addition, there are reports on less than optimal maternal attachment in cases of maternity blues [1].

The newborn undergoes similar dramatic processes after birth. The transition from fetal to neonatal life represents one of the most dynamic and potentially hazardous events in the human life cycle and consists of tremendous efforts of the infant to self-regulate neurobehavioral systems and adjust to the extra-uterine environment [3–5]. Touch, the earliest sense to develop embryologically [6], which uses the largest organ in humans, the skin, seems to be of great clinical importance to mother–infant interaction. Touch is considered to be the initial mode of the mother–infant dialogue in the early postnatal period [7] since Gottlieb [8,9] contended that it precedes the other modes of communicative sensory development, visual and audition. Holding, touching, stroking and caressing the baby are part of the sensitive and responsive maternal behaviors required for healthy infant cognitive and social development [10,11]. Recent studies showed that maternal touch enhances survival, maturation and growth in both pre-term and full term infants (e.g. Refs. [12–17]). These studies showed effects of maternal touch, close skin-to-skin contact, and tactile stimulation on physiological, social and cognitive development of the infant in the early postnatal period and during the first half of the first year of life. Hofer [18,19] suggested that maternal touch establishes a protective function by raising the infant's tolerance to aversive stimuli in the environment and this protective function in turn promotes attention and exploration. This later results in improved language acquisition and the organization of cognitive and affective experience [20]. In this developmental effort, maternal support, especially through maternal touch, is of utmost importance. Maternal touch also improved maternal competence and decreased maternal depression [13,17,21,22].

The nature of maternal touch in mothers experiencing maternity blues, who are potentially less available for their infants, has not received much research interest. In contrast, an extensive amount of research has been devoted to maternal depression

postpartum and its effects on the child. This research, reviewed by Weinberg and Tronick [23] and others [24,25], indicates that in each communicative domain—face, voice and touch—the quantity, quality, and timing of depressed mothers' social and affective behavior is distorted in ways that contrast sharply with the behavior of non-depressed mothers. These affective characteristics compromise infant social, emotional and cognitive functioning (e.g. Refs. [26,27]). The well-established knowledge regarding the different touching behavior of mothers diagnosed with PPD compared to non-depressed mothers calls for the assessment of this important mode of mother–infant contact in the case of maternity blues.

Mercer and Ferketich [28], like Walker et al. [29], found differences between experienced and inexperienced mothers in accordance with the notion that the internalization of the maternal role is a developmental process that occurs during the first months postpartum. However, Kaitz et al. [30] found no parity effects in the effectiveness of mothers in soothing their babies on the second-day postpartum. Others found no parity effects in feeding behavior as well as in responsiveness to infant cues [31,32]. Interestingly, first-time mothers were able to recognize their infants by smell and touch as well as multiparae [33,34]. These discrepancies require an assessment of the quantity and quality of maternal touch as one important aspect of the maternal role, in experienced and inexperienced mothers in the early postpartum days.

Thus, the aims of this study were to compare quality of maternal touch after delivery (1) between mothers with and without severe maternity blues and (2) between experienced and inexperienced mothers.

2. Methods

2.1. Participants

This study was conducted with 75 middle-class mothers and their infants born in spontaneous vaginal deliveries. The participants were recruited from a large medical center in northern Israel and were randomly assigned to the study from the successive rate of deliveries during the period of study. Mother's age ranged from 18 to 42 years. Infant birth weight ranged from 2500 to 4000 g and gestation ranged from 38 to 42 weeks. The Institutional Review Board for Human Experimentation in the participating medical center approved the protocol and all parents provided written informed consent. Refusal rate was 5%.

Exclusion criteria were: (1) Genetic anomalies, congenital heart malformations, gastrointestinal disturbances and central nervous system dysfunction in infants; (2) maternal age <18 years; (3) infant considered medically unstable.

2.2. Procedure

2.2.1. Measures

Stein's Maternity Blues Scale [35] consists of a 13-symptom, self-rating scale. The symptoms listed are depression, crying, anxiety, tension, restlessness, exhaustion,

dreaming, appetite, headache, irritability, poor concentration, forgetfulness, and confusion. Stein's scale provides a severity score for each day. For the first eight symptoms, the number circled indicates the score. The number of choices for the symptoms varies. For example, the choices for the symptom of tension ranges from 0 to 2, with 0 indicating "I feel calm and relaxed; (1) "I feel somewhat tense; and (2) "I feel very tense". The choices of the symptom of crying range from 0 to 4 with 0 indicating "I do not feel like crying"; (1) "I feel as if I could cry, but have not actually cried"; (2) "I have shed a few tears today"; (3) "I have cried for several minutes today but for less than half an hour"; (4) " I have cried for more than half an hour". Each of the last five symptoms is given a score of 1 if it is present and 0 if it is not. The sum of scores for all the symptoms provides the daily score, which can range from 0 to 26. A daily score of 0 to 2 indicates the absence of maternity blues, 3 to 8 is reflective of mild to moderate blues, and 9 or higher indicates severe maternity blues. Acceptable levels of reliability and validity for this scale have been reported [35]. First, the English version was translated into Hebrew by two maternity clinicians from Rambam Medical Center, Department of Obstetrics and Gynecology, Israel. Thereafter, the translation was reevaluated by four other clinicians. The Hebrew version was corrected according to the above readers' comments and concerns. A clinical psychologist from University of Haifa then back-translated the Hebrew version into English, and an independent staff member from the University of Haifa made the comparison between the original English version and the translation.

The Touch Scoring Instrument [36] consists of nine categories of touch quality: (1) firm touch, defined as firm patting, stroking, or massaging with the whole hand; (2) proprioceptive stimulation, defined as flexion–extension–flexion of the child's limbs by the mother. Specifically, this kind of maternal behavior, often observed, involves folding, then extending and folding again the infant's limbs when the last positioning will be close to the infant's body, e.g. stopping the stimulation when the baby is in a flexed position and not in an extended one, such as occurs when dressing the child; (3) vestibular stimulation, defined as movements that change the body's orientation in space, including repositioning by lifting, sliding, or rotating the child's body, or swaying or rocking; (4) light active touch, defined as affectionate kissing, or caressing, stroking or tickling with the fingertips; (5) holding, defined as affectionately comforting holding or hugging in ventral–ventral, ventral–dorsal, or other positions; (6) awkward holding, defined as holding the child in an uncomfortable or precarious manner with an uninterested or neglectful quality; (7) rough handling, defined as exercising forceful or abrupt restraint or physical control of the child with an angry or punitive quality; (8) matter-of-fact touch, defined as purposeful utilitarian contacts, such as wiping the child's mouth, guiding the child's hand to a toy, etc.; and (9) passive or accidental touch, defined as passive contact, such as resting the hand in contact with the infant, brushing by other types of fortuitous physical contact. This instrument has been shown to differentiate between mothers of FTT (Failure to Thrive) children and controls, particularly on the matter-of-fact, unintentional and proprioceptive types of maternal touching [36].

2.2.2. Detection of maternity blues

After providing informed consent, mothers were asked to complete the Stein's scale. This scale was completed on the second-day post delivery. For the purpose of statistical

analysis, mothers who scored above 9 points and higher were considered to be suffering from mild to severe maternity blues. Mothers who scored 8 points or less were considered to be without maternity blues.

2.2.3. Observation

All three observers were blind to maternity blues scores and to parity status. All mothers were seen for 10 min separately with their infants in a private room designated for the purpose of study in the maternity hospital during the second-day postpartum. Each mother was instructed to feel comfortable with her infant and relate to him or her in any way she feels appropriate for the moment either with nurturing behaviors, feeding, playing changing clothes or just being together. The infant was placed in a mobile bassinet and the mother was allowed to hold him or her if she felt that it is appropriate for the infant. The mother sat on an armchair and the observer was seated on a chair at a distance of 100 cm. (The possibility of videotaping the observation was excluded due to maternal personal reasons and a high refusal rate in the pilot study.) Observations were conducted while the infants were awake, approximately 1 h before feeding and diaper change. (The nursery operated on a 4-hour feeding schedule.)

2.2.4. Coding

Ten minutes of mother–infant interaction were scored according to the Touch Scoring Instrument [36]. The observer divided the 10 min of each observation period into 20 contiguous 30-s intervals using a stop-watch. The mother continued her interaction with her infant without interruption. The frequency of occurrence of each of the touch categories was scored at the end of each time interval on a grid. *Inter-rater reliability*: The three observers in this study were trained on 10 videotaped mother–infants dyads and tested for inter-rater reliability throughout the study. Initial agreement was 96% on each touch category. Levels of agreement were consistently higher on each category in the following reliability sessions throughout the study.

2.3. Statistical analysis

Multivariate analysis of variance (MANOVA) was conducted on the different touch types, as a function of maternity blues and parity status. Univariate analyses of variance were used to reveal the contribution of each touch type to the differences between groups.

3. Results

Distribution of mothers between groups was as follows: 35 primiparous and 33 multiparous mothers of whom 53 showed no sign of maternity blues and 15 (9 primiparous mothers and 6 multiparous mothers) scored above the cutoff point for maternity blues. No significant differences were found between groups in infants' birth weight and gestational age or in maternal age. MANOVA revealed significant main effects of parity [Wilk's lambda (9,56)=3.685, $p<0.001$)] and maternity blues [Wilk's lambda (9,56)=8.630, $p<0.001$)] and an interaction effect [Wilk's lambda (9,56)=2.671, $p=0.01$)]. Univariate

analyses of variance revealed that firm touch [$F(1,64)=11.47$, $p<0.001$], light touch [$F(1,64)=11.18$, $p>0.001$] and affectionate comforting holding [$F(1,64)=8.48$, $p<0.005$] were significantly different between primiparous and multiparous mothers, apart from maternity blues. Firm touch [$F(1,64)=40.52$, $p<0.001$], proprioceptive stimulation [$F(1,64)=16.13$, $p<0.001$], vestibular stimulation [$F(1,64)=15.36$, $p<0.001$], light touch [$F(1,6)=11.35$, $p<0.001$], affectionate comforting holding [$F(1,64)=33.97$, $p<0.001$], and matter-of-fact touch [$F(1,64)=15.11$, $p<0.0001$] were significantly different between mothers with or without maternity blues irrespective of parity status. Firm touch [$F(1,64)=7.10$, $p<0.05$], proprioceptive stimulation [$F(1,64)=5.86$, $p<0.01$], affectionate comforting holding [$F(1,64)=5.36$, $p<0.05$], matter-of-fact touch [$F(1,64)=10.75$, $p<0.01$), and passive touch [$F(1,64)=10.66$, $p<0.05$] were the main sources of the interaction effect.

As shown in Fig. 1, primiparous mothers exhibited less firm touch and light touch and more affectionate comforting holding than multiparous mothers, apart from maternity blues. Mothers with blues showed less firm touch, proprioceptive and vestibular stimulation, light touch, matter-of-fact touch and holding irrespective of parity status. Primiparous mothers with blues showed the lowest level of firm touch, and multiparous mothers without blues showed the highest level. Multiparous mothers with blues showed the lowest frequency of proprioceptive stimulation and the multiparous mothers without blues showed the highest level. Affectionate comforting holding was apparent most frequently in multiparous mothers without blues and least frequently in primiparous mothers with blues. Multiparous mothers without blues showed more matter-of-fact touch compared to the other groups and multiparous mothers with maternity blues showed the lowest amount of this type of touch. Multiparous mothers with blues showed the lowest level of passive touch and the multiparae without blues showed the highest. Primiparous

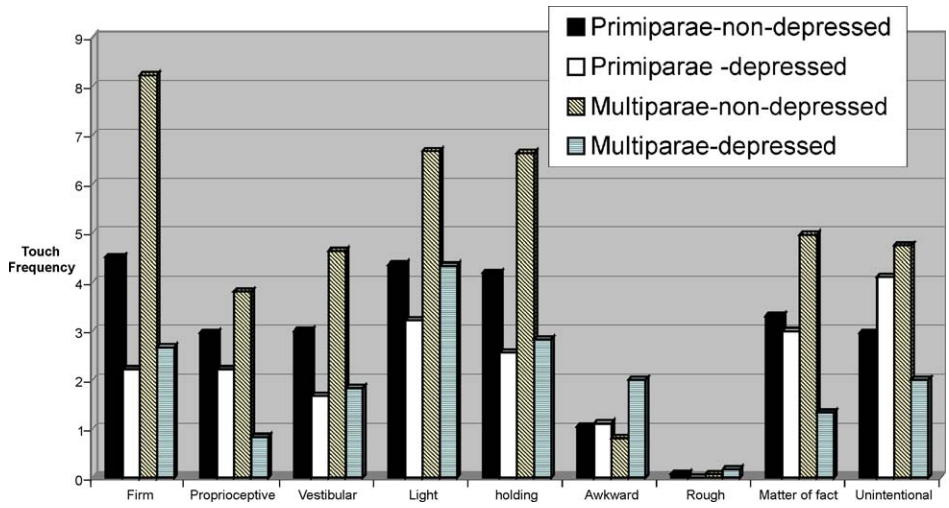

Fig. 1. Distribution of maternal touch in mothers with maternity blues vs. non-depressed mothers and primiparous vs. multiparous mothers.

mothers with blues showed more passive and proprioceptive touch than multiparous mothers with blues.

4. Discussion

The results of this study indicate that both parity and maternity blues affect the quantity and quality of maternal touch during one of the initial interactions with the newborn 2 days after birth. Multiparous mothers provided more frequent and variant modes of physical contact whereas primiparous mothers tended to touch their infants at lower levels compared to experienced mothers, probably due to inexperience and lack of self-confidence in the maternal role. Multiparous mothers without blues were able to achieve the highest level of both affectionate holding and proprioceptive stimulation as well as on several other measures. Affectionate holding resembles the Kangaroo Care position without the skin-to-skin component, but it is the normal mammalian positioning for newborns, which was reported to enhance arousal modulation in preterm infants at term age [12] and decrease the amount of purposeless movements, which are considered a sign of stress in the newborn [37]. As more extended movements were found in newborns as an expression of pain during invasive procedures likely to evoke distress [38], proprioceptive stimulation and especially flexion of limbs is considered soothing at early stages of development resulting in lower levels of stress and more stability of the CNS [39–41]. Thus, mothers without blues and especially the experienced mothers without blues were able to provide their infants with the most appropriate developmental care as well as unreserved matter-of-fact touch when needed, in contrast to the other groups.

Mothers with maternity blues irrespective of parity status provided less touching of all kinds including affectionate and matter-of-fact modes, which may be due to their withdrawal state. This significant difference between mothers with or without maternity blues on day 2 postpartum reflects the similarities between the mood disturbance shortly after delivery and the major affective disorder known as postpartum depression, which usually appears later at up to 1 year after the delivery [42]. The similarities in the withdrawn state between mothers with maternity blues and mothers diagnosed as suffering from PPD point to the possibility that both phenomena are related and may be derived from the same emotional incapability and low psychological resourcefulness in the process of becoming accustomed to the maternal role during the postpartum period, including dealing with the challenge of soothing and getting to know the infant and becoming involved in the emerging relationships. The results of this study are in accordance with previous reports on the prevalence of touching behavior in depressed mothers at later postpartum stages [25,27]. It appears that the tactile aspect of mother–infant interaction is impaired from early stages of maternal blues, and it is suggested that depressed mood may have the same effect on maternal touch in maternity blues and postpartum depression cases.

However, blues resulted in different modes of touch in multiparous and primiparous women. While inexperienced mothers with blues were relatively restricted and withdrawn, except for providing a slight higher amount of proprioceptive and matter-of-fact touch and passive stimulation, experienced mothers with blues engaged more often in all the other

modes of touch, but at lower levels compared to mothers without blues. This touching behavior of the experienced mothers with blues probably was a combination of their experience as caregivers and their lower levels of tension. The only three modes of touch given by primiparous mothers with blues above the rate of multiparous mothers with blues were proprioceptive, matter-of-fact touch and passive stimulation. However, their level of touching in these three types was still lower compared to mothers without blues. This implies that primiparae with blues know naturally what kind of touch is supportive for their infants (i.e. proprioceptive stimulation) and what care for the infant entails (i.e. matter-of-fact touch) but they were unable to provide it at a normative rate. In addition, the fact that primiparous mothers with blues provided more passive touching (e.g. resting a hand on the infant) compared to experienced mothers with blues implies that they were trying to avoid the implications of depression but they fail to do so in an organized and supportive way for the infant.

Our findings support one of the models that have been proposed to explain the effect of maternal depression on the child, the Mutual Regulation Model. According to Tronick and Gianino's [43] model, the infant of a depressed mother experiences inappropriate stimulation and inadequate arousal modulation. Our results show that in each parameter of touch mothers with blues were not providing the same level of stimulation as provided by mothers without maternal blues. Unfortunately, examination of infant self-regulation in response to maternal touch was beyond the scope of this study.

It has been proposed that experienced and inexperienced mothers differ in their adaptation to the maternal role, especially at the beginning of their infant's life. Maternal role, the attainment of role identity, was thought to underlie maternal behaviors and emotional state such as responsiveness, sensitivity and competence including touching behaviors as well as subjective maternal well being [44,45]. This role was found by several investigators to be established between 4 and 8 months postpartum [28,29], although others have contended that the mother undergoes a process of adopting a specific maternal role for each new baby she is raising [46]. A different perspective, outlined earlier, suggested no parity effects in acquisition of maternal role components [33,34]. Our findings support the view that mothers acquire the maternal role primarily after giving birth to the first child. Experienced mothers in our study used various modes of touch whereas inexperienced mothers used mostly holding and light touch. This result suggests that primiparous mothers still need to develop their sense of self-confidence in the maternal role in order to touch the newborn freely in more than one way. Holding and light touch are probably the most secure ways of showing attachment to the child a few days after birth in the case of transition to motherhood.

Although in the cases of multiparous mothers with blues one could suspect previous events of maternity blues after earlier deliveries or antenatal depression [44–49], these mothers used more touching in various ways compared to the primiparous mothers with maternal blues on day 2. This result suggests that through added experience in the caregiver role, parity is an asset for the mother with blues by partly preventing the hazardous effects of depression on maternal touch, i.e. mostly its withdrawal.

Maternity blues are usually considered different from postpartum depression in timing of onset and manifestation [1]. However, the findings of the current study show that maternal touch in the cases of maternity blues resembles the description of maternal touch

in cases of postpartum depression. In depressed mothers, touch is greatly reduced due to their withdrawn condition [50]. Interventions conducted to instruct and enhance maternal touch showed positive results in both infants and their depressed mothers, and on their interaction [51–55]. The studies cited above were conducted after onset of postpartum depression at the age of a few weeks through a few months post delivery. The similar pattern of maternal touch in maternity blues and postpartum depression indicates the need for implementation of touch-promoting approaches immediately after delivery in the cases of maternity blues.

Limitations of this study lie mainly in the short observation time, absence of follow-up and infant self-regulation data as well as in the lack of information regarding antenatal depression and previous events of maternity blues in multiparous mothers. Furthermore, maternal blues reach peak levels typically on day 5, while the current participants were studied on day 2 [55]. Note, however, that postnatal adaptation of the newborn [41] and the bonding process [17] starts from the very first hours after birth. Thus, data on the impact of early stages of maternal blues shortly after birth are of clinical and scientific importance. Some of the new mothers may have experienced some postpartum pain or have felt uncomfortable due to parturition at the time of assessment. However, level of maternal blues was not significantly higher in this group compared to multiparae. Although the number of women with maternal blues was relatively small, their touching was significantly and dramatically different from women without maternal blues.

In sum, the results of this study suggest that maternity blues are almost as powerful as postpartum depression in preventing the mother from assisting her newborn through touching in his or her struggles to self-regulate at the beginning of life. Thus, touch is not only a communicative developmental tool in the hands of the mother but also a way to observe and diagnose the state of maternal availability in the beginning of the early postnatal period. This in turn could serve medical teams and professionals as an additional tool for detecting women at risk and providing help in a timely manner.

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References

[1] Nagata M, Nagai Y, Sobajima H, Ando T, Nishide Y, Honjo S. Maternity blues and attachment to children in mothers of full-term normal infants. Acta Psychiatr Scand 2000;101:209–17.
[2] Cox YL, Holden JM, Sagovsky R. Detection of postnatal depression: development of the 10-item Edinburgh Postnatal Depression Scale. Br J Psychiatry 1987;150:782–6.
[3] Cooper R, Goldenberg R. Catecholamine secretion in fetal adaptation to stress. J Obstet Gynecol Neonatal Nurs 1990;19:223–6.
[4] Bland RD. Formation of fetal lung fluid and its removal near birth. In: Polin RA, Fox WW, editors. Fetal and neonatal physiology. Philadelphia: Saunders; 1992.
[5] Taylor A, Fisk NM, Glover V. Mode of delivery and subsequent stress response. Lancet 2000;355:120.
[6] Montagu A. Touching: the human significance of the skin. New York: Columbia Univ. Press; 1971.

[7] Feldman R, Weller A, Sirota L, Eidelman AI. Testing a family intervention hypothesis: the contribution of mother–infant skin-to-skin contact (Kangaroo care) to family interaction, proximity, and touch. J Fam Psychol 2003;17:94–107.
[8] Gottlieb G. Conceptions of prenatal development: behavioral embryology. Psychol Rev 1976;83:215–34.
[9] Gotttlieb G. Experiential canalization of behavioral development theory. Dev Psychol 1991;27:4–13.
[10] Hertenstein MJ, Campos JJ. Emotion regulation via maternal touch. Infancy 2001;2:549–66.
[11] Geldard FA. Some neglected possibilities of communication. Science 1960;131:1583–8.
[12] Feldman R, Weller A, Sirota L, Eidelman AI. Skin to skin contact (Kangaroo care) promotes self-regulation in premature infants: sleep–wake cyclicity, arousal modulation, and sustained exploration. Dev Psychol 2002;38:194–207.
[13] Feldman R, Eidelman AI, Sirota L, Weller A. The effects of skin-to-skin contact (Kangaroo care) on parenting and infant development in premature infants. Pediatrics 2002;110:16–26.
[14] Ferber SG, Kuint J, Weller A, Feldman R, Dollberg S, Arbel E, et al. Massage therapy by mothers and trained professionals enhances weight gain in preterm infants. Early Hum Dev 2002;67:37–45.
[15] Ferber SG, Laudon M, Kuint J, Weller A, Zisapel N. Massage therapy by mothers enhances the adjustment of circadian rhythms to the nocturnal period in full-term infants. J Dev Behav Pediatr 2002;23:410–5.
[16] Anderson GC. Current knowledge about skin-to-skin (kangaroo) care for preterm infants. J Perinatol 1991;11:216–26.
[17] Tessier R, Cristo M, Velez S, Giron M, de Calume ZF, Ruiz-Palaez JG, et al. Kangaroo mother care and the bonding hypothesis. Pediatrics 1998;102:e17.
[18] Hofer MA. Relationships as regulators: a psychobiological perspective on bereavement. Psychosom Med 1984;46:183–97.
[19] Hofer MA. Hidden regulators: implication for a new understanding of attachment, separation and loss. In: Golberg S, Muir R, Kerr J, editors. Attachment theory: social developmental, and clinical perspectives. Hillsdale, NJ: Analytic Press; 1995. p. 203–30.
[20] Lester BM, Hoffman J, Brazelton TB. The rhythmic structure of mother infant interaction in term and preterm infants. Child Dev 1985;56:15–27.
[21] Affonso D, Bosque E, Wahlberg V, Brady JP. Reconciliation and healing for mothers through skin-to-skin contact provided in an American tertiary level intensive care nursery. Neonatal Netw 1993;12:25–32.
[22] Neu M. Parents' perception of skin-to-skin care with their preterm infants requiring assisted ventilation. J Obstet Gynecol Neonatal Nurs 1999;28:157–64.
[23] Weinberg MK, Tronick EZ. Maternal depression and infant maladjustment: a failure of mutual regulation. In: Noshpitz J, editor. The handbook of child and adolescent psychiatry. New York: Wiley; 1996.
[24] Downey G, Coyne JC. Children of depressed parents: an integrative review. Psychol Bull 1990;108:50–76.
[25] Field T. Infants of depressed mothers. Inf Behav Dev 1995;18:1–13.
[26] Cohn J, Campbell SB, Matias R, Hopkins J. Face-to-face interactions of postpartum depressed and nondepressed mother–infant pairs at 2 months. Dev Psychol 1990;26:15–23.
[27] Field T, Healy B, Goldstein S, Guthertz M. Behavior-state matching and synchrony in mother–infant interactions of nondepressed versus depressed dyads. Dev Psychol 1990;26:7–14.
[28] Mercer RT, Ferketich SL. Experienced and inexperienced mothers' maternal competence during infancy. Res Nurs Health 1995;18:333–43.
[29] Walker LO, Crain H, Thompson E. Mothering behavior and maternal role attainment during the postpartum period. Nurs Res 1986;35:352–5.
[30] Kaitz M, Chriki M, Bear-Scharf L, Nir T. Effectiveness of primiparae at soothing their newborn infants. J Genet Psychol 2000;161:203–15.
[31] Thoman EB, Turner AM, Leiderman PH, Barnett CR. Neonate–mother interaction: effects of parity on feeding behavior. Child Dev 1970;41:1103–11.
[32] Thoman EB, Leiderman H, Olson JP. Neonate–mother interaction during breast-feeding. Dev Psychol 1972;6:110–8.
[33] Kaitz M, Good A, Rokem AM, Eidelman AI. Mothers' recognition of their newborns by olfactory cues. Dev Psychobiol 1987;20:587–91.
[34] Kaitz M, Lapidot P, Bronner R, Eidelman AI. Parturient women can recognize their infants by touch. Dev Psychol 1992;28:35–9.

[35] Stein G. The pattern of mental change and body weight change in the first postpartum week. J Psychosom Res 1980;24:165–71.
[36] Polan HJ, Ward MJ. Role of the mother's touch in failure to thrive: a preliminary investigation. J Am Acad Adolesc Psych 1994;33:1098–105.
[37] Ludington-Hoe SM, Swinth JY. Developmental aspects of kangaroo care. J Obstet Gynecol Neonatal Nurs 1996;25:691–703.
[38] Grunau RE, Holsti L, Whitfield MF, Ling E. Are twitches, startles, and body movements pain indicators in extremely low birth weight infants? Clin J Pain 2000;16:37–45.
[39] Duffy FH, Als H, McAnulty GB. Behavioral and electrophysiological evidence for gestational age effects in healthy preterm and fullterm infants studied two weeks after expected due date. Child Dev 1990;61:1271–86.
[40] Mouradian LE, Als H, Coster WJ. Neurobehavioral functioning of healthy preterm infants of varying gestational ages. J Dev Behav Pediatr 2000;21:408–16.
[41] Ferber SG, Makhoul RI. The effect of skin-to-skin contact (Kangaroo care) shortly after birth on the neurobehavioral responses of the full-term newborn: a randomized controlled trial. Pediatrics 2004;113: 858–865.
[42] Chaudron LH. Postpartum depression: what pediatricians need to know. Pediatr Rev 2003;24(5):154–61.
[43] Tronick E, Gianino A. The transmission of maternal disturbance to the infant. In: Tronick E, Filed T, editors. Maternal depression and infant disturbance. New York: Jossey-Bass; 1986. p. 5–13.
[44] Mercer RT. A theoretical framework for studying factors that impact the maternal role. Nurs Res 1981;30:73–7.
[45] Mercer RT. The process of maternal role attainment over the first year. Nurs Res 1985;34:198–204.
[46] Rubin R. Maternal identity and maternal experience. New York: Springer; 1984.
[47] Pajulo M, Savonlahti E, Sourander A, Helenius H, Piha J. Antenatal depression, substance dependency and social support. J Affect Disord 2001;65:9–17.
[48] Evans J, Heron J, Francomb H, Oke S, Golding J. Cohort study of depressed mood during pregnancy and after childbirth. BMJ 2001;323:257–60.
[49] Josefsson A, Angelsioo L, Berg G, Ekstrom CM, Gunnervik C, Nordin C, et al. Obstetric, somatic, and demographic risk factors for postpartum depressive symptoms. Obstet Gynecol 2002;99:223–8.
[50] Weinberg MK, Tronick EZ. Emotional care of the at-risk infant: emotional characteristics of infants associated with maternal depression and anxiety. Pediatrics 1998;102:1298–304.
[51] Field T. Early interventions for infants of depressed mothers. Pediatrics 1998;102:e1305–10.
[52] Field T, Pickens J, Prodromidis M, Malphurs J, Fox N, Bendell D, et al. Targeting adolescent mothers with depressive symptoms for early intervention. Adolescence 2000;35:381–414.
[53] Onozawa K, Glover V, Adams D, Modi N, Kumar RC. Infant massage improves mother–infant interaction for mothers with postnatal depression. J Affect Disord 2001;63:201–7.
[54] Glover V, Onozawa K, Hodgkinson A. Benefits of infant massage for mothers with postnatal depression. Semin Neonatol 2002;7:495–500.
[55] Harris B, Lovett L, Newcombe RG, Read GF, Walker R, Riad-Fahmy D. Maternity blues and major endocrine changes: Cardiff puerperal mood and hormone study II. BMJ 1994;308(6934):949–53.