

*Early Child Development and Care*  
Vol. 177, No. 5, July 2007, pp. 521–532



# Mother-to-infant and father-to-infant initial emotional involvement

Bárbara Figueiredo<sup>a\*</sup>, Raquel Costa<sup>a</sup>, Alexandra Pacheco<sup>a</sup> and Alvaro Pais<sup>b</sup>

<sup>a</sup>University of Minho, Portugal; <sup>b</sup>Júlio Dinis Maternity Hospital, Portugal

While infant attachment has been largely studied, parental attachment is still relatively unknown, especially when referred to fathers. However, it is mainly recognised that parents' emotional involvement with the newborn contributes to the quality of the interaction and the care they provide. The aim of this study was to study mother-to-infant and father-to-infant initial emotional involvement; namely, differences between mothers and fathers and changes in mother's emotions toward the neonate within the first days after delivery. The Bonding Scale, an extended Portuguese version of the 'New Mother-to-Infant Bonding Scale', was administered during the first two days after childbirth to a sample of 315 mothers and 141 fathers ( $n = 456$ ), at the Júlio Dinis Maternity Hospital (Portugal). Most mothers and fathers show positive emotions and only a few of them showed negative emotions toward the infant. Maternal and paternal emotional involvement toward the newborn tend to be similar; nevertheless, fathers show less fear and better emotional involvement with the neonate, while mothers are sadder and show more emotions not related to bonding. During the first days following delivery, emotions not related to bonding, such as fear, seem to decrease in mothers.

Keywords: *Bonding; Emotional involvement; Father; Infant; Mother*

## Introduction

Several authors have observed a specific repertoire of emotions and behaviours toward the newborn in most mothers, as early as immediately after delivery, designated as primary maternal preoccupation (for example, Winnicott, 1964), bonding (for example, Klaus & Kennell, 1976) or maternal attachment (for example, George & Solomon, 1999).

---

\*Corresponding author. Department of Psychology, University of Minho, Campus de Gualtar, 4700-320 Braga, Portugal. Email: [bbfi@iep.uminho.pt](mailto:bbfi@iep.uminho.pt)

Progressively during pregnancy, the mother usually constructs the necessary psychological availability for an adequate neonatal interaction and care after childbirth; namely, she creates an internal world to receive the infant that promotes her emotional involvement with him/her (Ammaniti, 1991; Stern, 1995). Hormonal changes and first contacts with the neonate also benefit the mother-to-infant emotional involvement and adjusted interaction (Klaus & Kennell, 1976), promoting the correct identification and response to the child's needs (maternal sensitivity), and guaranteeing the essential proximity to the infant survival (Bowlby, 1958). Shortly after being born, the infant shows certain behaviours such as crying, smiling and visual following, which also stimulates mother-to-infant bonding (Bowlby, 1958).

Bonding has generally been described as a gradual process of emotional involvement that is progressively established during pregnancy and, more specifically, during childbirth (for example, Fleming *et al.*, 1997). The first moments following delivery are critical for the bonding (for example, Klaus & Kennell, 1976; Troy, 1993, 1995; Klaus, Kennell & Klaus, 1995), which is later stimulated as more specific infant social skills emerges (for example, Bowlby, 1958; Richards, 1971; Eibl-Eibesfeldt, 1989). Bonding is also linked with mothers' previous experiences (Krupan *et al.*, 2005) and early mood; for example, depressed mothers have worse bonding, contrary to mothers with elevated mood after delivery (Kumar, 1997; Feldman *et al.*, 1999; Taylor *et al.*, 2005).

In fact, mother's emotional involvement gradually improves during pregnancy, between pregnancy and the delivery, but essentially after the first contacts with the newborn (Fleming *et al.*, 1997). A considerable number of mothers feel a special affection toward the child during pregnancy (41%); nevertheless, for most of them, affection only appears in the presence of the infant (24%) or during the week following delivery (27%), and some mothers (8%) still do not feel any particular affection regarding the neonate a week after (MacFarlane *et al.*, 1978). Newton and Newton (1962) observe that only 25% of the mothers are extremely happy, while 11% feel indifferent or dissatisfied with the newborn. The lack of initial positive involvement is more frequent in mothers with lower socio-economic status and educational level, as well as in mothers who experienced less collaboration and intense pain during delivery. Other studies also observe that some mothers feel indifference when holding the infant for the first time; that is more common in primiparous (40%) than in multiparous (25%) cases, and especially when the delivery was very difficult or painful (Robson & Kumar, 1980). It is also more difficult to bond with a premature (Feldman *et al.*, 1999) or a difficult neonate (Robson, 1967; Robson & Moss, 1970).

However, according to other authors, maternal bonding emerges as soon as the first contact with the newborn happens (Troy, 1995; Chalmers *et al.*, 1998). As soon as the mother holds the infant in her arms for the first time, an emotional involvement between them can be observed (Troy, 1993, 1995). Almost all mothers report feelings of affection toward the infant immediately after they begin to interact with him/her (77.9%), either on the childbirth day or on the following one (20.5%); some days after childbirth, only few mothers report these feelings as absent (1.6%) (Chalmers *et al.*, 1998).

One therefore concludes that there are controversial empirical results regarding the fact that maternal bonding is (for example, Troy, 1993, 1995; Chalmers *et al.*, 1998) or is not (for example, Newton & Newton, 1962; Robson & Kumar, 1980; Kumar, 1997) always present after delivery. Several authors agree that bonding does not immediately establish for all mothers, and intensifies with time—as a better bonding can be observed some months later as opposed to soon following childbirth (for example, Taylor *et al.*, 2005). Bonding may not always be established as soon as the first contact with the newborn, and can be a more gradual and constructive process, that intensifies with time. Considering that the child's behaviour stimulates the mother's attachment, this is not a unidirectional event but rather an interactive process (Figueiredo, 2003).

Researchers and health professionals have pointed out the importance of studying attachment in the parents', and not only in the child's, perspective (George & Solomon, 1999). Parental emotional involvement is a decisive element to the quality of the care and interaction provided by them, and therefore a determinant factor for infant development and well-being (for example, Robson & Moss, 1970; Klaus & Kennell, 1976; Brazelton & Cramer, 1990; Klaus *et al.*, 1995; Stern, 1995). Paradoxically, very little is known about the emotions parents generally have toward the newborn, about how bonding usually emerges and develops, as well as about the differences and similarities between mothers and fathers through this process. To collect data about these aspects is the main interest of the present study. Existing empirical evidences show that maternal attachment during pregnancy (for example, Fuller, 1990; Kemp *et al.*, 1990) or immediately after delivery (for example, Cernadas *et al.*, 2003) is associated with the quality of the mother-to-infant interaction and care (namely breastfeeding), which interfere in the child development (for example, Wiberg *et al.*, 1989). Few are the studies that focus on the parent's emotional involvement with the newborn, and almost all are about mothers, so practically no information exists about fathers (Robson & Mandel, 1985). Nevertheless, authors suggest that father bonding develops in the same way as mother bonding (Snow & McGaha, 2002).

The present study aims to investigate the initial emotional involvement with the newborn, during the first after delivery week, focusing on three main objectives: description of mother-to-infant and father-to-infant initial emotional involvement, differences between mothers and fathers in terms of their initial emotional involvement, and changes in mother-to-infant emotional involvement after the first delivery days.

## Methods

### *Participants*

The sample is composed of 456 participants, 315 mothers and 141 fathers, recruited at the Júlio Dinis Maternity Hospital (Porto, Portugal), between November 2001 and March 2003. All the participants were contacted during the first two days after delivery; the exclusion criterion were not being able to read Portuguese, not being able to write due to some medical reason and having twins.

The mothers' age ranges from 15 to 44 years, most of them between 19 and 28 years old (average age 26.6 years). The fathers are from 17 to 50 years old, almost one-half of them 29–39 years old (mean age 28.8 years) (cf. Table 1). Almost all mothers and fathers are Caucasian (98.7% and 97.2%), Catholic (89.3% and 82.7%) and were born in Portugal (91.9% and 91.9%). Only one-half of the participants have completed grade nine (with an average years of school of 9.3 for the mothers and 8.8 for the fathers). Most mothers are employed, the remainder being unemployed, students or housewives. The great majority of the fathers are employed, but some are students or unemployed. Most mothers are married or living with the partner; only few of them are not living with the partner, separated/divorced or single. Almost all women live with a partner (with an average of 4.0 years of joint life), usually without other relatives but some with. Most fathers are married or in a cohabitation regimen, living alone with the mother or also with relatives; therefore, some live without the partner, and are single or divorced.

Infants are of both genders and the majority was born with a normal gestational age of 37–40 weeks; nevertheless, a significant percentage is premature (<37 weeks of

Table 1. Socio-demographics: mothers and fathers

	Mothers ( <i>n</i> = 315) (%)	Fathers ( <i>n</i> = 141) (%)
<b>Age</b>		
15–18 years	7.0	2.6
19–28 years	57.9	44.3
29–39 years	34.2	48.0
≥40 years	0.9	5.1
<b>Education</b>		
<Grade nine	46.0	47.5
≥Grade nine and ≤grade 12	41.5	43.9
>Grade 12	12.5	8.6
<b>Occupation</b>		
Employed	71.4	92.5
Unemployed	18.3	5.6
Student	4.0	1.9
Housewife	6.3	0
<b>Marital status</b>		
Married	68.3	68.2
Living with partner	17.6	17.8
Separated/divorced	0.4	0.4
Single	13.7	13.6
<b>Cohabitation status</b>		
Only with the partner	67.1	69.1
With the partner and other relatives	19.0	18.1
Without the partner	13.9	12.8

Table 2. Socio-demographics: newborns

	Newborn ( <i>n</i> = 315) (%)
Gender	
Female	52.4
Male	47.6
Gestational age	
<37 weeks	11.1
≥37 and ≤41 weeks	86.9
>41 weeks	2.0
Birth weight	
<2500 g	8.6
≥2500 and ≤4000 g	86.7
>4000 g	4.7
Neonatal state	
Special care	7.4
Intensive care	6.4
Antibiotics	7.8
Apgar Score, 1 minute (5 minutes)	
≤7	27.8 (3.8)
≥8	72.2 (96.2)

gestation) or postmature (>40 weeks of gestation) (cf. Table 2). The great majority of the sample was born with a normal range weight (between 2.5 and 4 kg); even so, part of the sample was born with low weight (<2.5 kg) or with a weight more than 4 kg. The minute 1 and 5 Apgar scores varied in the sample between three (moderate asphyxia) and 10 (without asphyxia). Although some infants received low Apgar scores (≤7), the majority of them presented normal range Apgar scores (≥8) at minutes 1 and 5. Some newborns had been medicated with antibiotics, received special care or were admitted to the Neonatal Intensive Care Unit.

### *Procedures*

All participants (*n* = 456) were contacted at least once, during the first two days after delivery, at the Júlio Dinis Maternity Hospital (Porto, Portugal). The aims and procedures of the study were explained and confidentiality guaranteed. After informed consent, an interview was performed to collect social and demographic data. In a subsample of 150 mothers, the Bonding Scale was administrated twice, at 24 and 48 hours after delivery, and also to the father of their infant (*n* = 141). All the contacted parents agreed to participate, and only 6.5% of the fathers did not fill in the scale (either because they did not visit during the first 48 hours of the child's life or because the mother did not have a relationship with the infant's father). Ethical permission was obtained from the Maternity Hospital Ethical Commission.

### *Statistical analysis*

The first objective of the present study considers the mother-to-infant and the father-to-infant emotional involvement at 48 hours after delivery. For this purpose, a descriptive analysis of the mother ( $n = 315$ ) and father ( $n = 141$ ) bonding scale results was conducted, considering the items, subscales and total scale.

The second objective of this study was to analyse differences between mothers' and fathers' initial emotions toward the newborn. For this purpose, given the characteristics of the considered variables, the Mann–Whitney test for independent samples was conducted for differences between mothers and fathers in the bonding scale items results, and a  $t$ -test for independent samples was conducted for differences between mothers and fathers in the bonding subscales and total scale results.

The third objective of this study was to investigate changes in the mother's emotions toward the newborn between 24 and 48 hours after delivery. For this purpose, differences in mother ( $n = 150$ ) Bonding Scale results at 24 and 48 hours after delivery were tested, according to the variable characteristics: the Wilcoxon test was used for related samples for differences in item results and the  $t$ -test for paired samples for differences in subscales and total scale results.

### *Measures*

The Bonding Scale (Figueiredo *et al.*, 2005), a validated and extended Portuguese version of the 'New Mother-to-Infant Bonding Scale' (Taylor *et al.*, 2005), contains 12 self-report items in a four-point likert scale, from 0 to 3, according to the intensity of the emotion toward the newborn ('very much', 'a lot', 'a little' or 'not at all'). Three subscales were identified: 'Positive Bonding', composed of three items (Loving, Protective and Joyful) and measuring the positive emotional involvement; 'Negative Bonding', composed of six items (Mad, Aggressive, Sad, Resentful, Dislike, Disappointed) and evaluating the negative emotional involvement; and 'Bonding Not Clear', composed of three items (Fearful, Possessive, Neutral or Felt Nothing) and signalling the presence of emotions not clearly related to the parent's emotional involvement with the infant. This instrument showed reasonable scores of internal consistency (Cronbach alpha = 0.5256), and of test–retest reliability (Spearman correlation = 0.491) (Figueiredo *et al.*, 2005).

## **Results**

### *Mother-to-infant and father-to-infant initial emotional involvement: description*

The majority of the mothers and fathers scored 'very much' positive emotions toward the neonate 48 hours after delivery: 'Loving' (respectively 71.2% and 68.8%), 'Protective' (respectively 67.1% and 66.0%) and 'Joyful' (respectively 75.4% and 82.3%). Almost all mothers and fathers also reported not feeling at all 'Disappointed' (respectively 96.2% and 96.5%), 'Resentful' (respectively 90.1% and 98.6%), 'Dislike' (respectively 97.0% and 98.6%), 'Mad' (respectively 94.2% and 95.7%),

‘Aggressive’ (respectively 94.6% and 92.9%), ‘Sad’ (respectively 89.5% and 97.2%) nor ‘Neutral’ (respectively 96.5% and 92.9%) toward the newborn. Nevertheless, only one-half of the participants replied not having at all ‘Possessive’ (respectively 39.3% of the mothers and 52.5% of the fathers) or ‘Fearful’ (respectively 44.7% and 53.9%) emotions toward the neonate; 33.2% of mothers and 28.4% of the fathers feel at least a little ‘Possessive’, and 45.7% of the mothers and 41.1% of the fathers at least a little ‘Fearful’ in the presence of the infant.

However, some mothers and fathers feel not at all or only a little ‘Loving’ (respectively 6.1% and 6.3%), ‘Protective’ (5.8% and 5.6%) or ‘Joyful’ (4.1% and 0.7%); and reveal feeling at least a little ‘Disappointed’ (3.2% and 3.5%, respectively), ‘Resentful’ (8.6% and 4.3%), ‘Dislike’ (2.0%, 0.7%), ‘Mad’ (3.8% and 6.4%), ‘Aggressive’ (3.8% and 6.4%), ‘Sad’ (9.6% and 2.8%), or ‘Neutral’ (2.6% and 5.0%) toward the child. Some mothers and fathers felt very much ‘Disappointed’ (0.6% and 0%, respectively), ‘Resentful’ (1% and 1.4%), ‘Aggressive’ (1% and 0%), ‘Mad’ (1.3% and 0%), ‘Sad’ (0.3%, 0%), ‘Possessive’ (14.1% and 12.1%), ‘Neutral’ (0.3% and 0.7%) or ‘Fearful’ (3.5% and 2%) with the neonate.

Forty-eight hours after childbirth a high positive emotional involvement with the newborn is present in most mothers and fathers who participated in this study: in 71% of the mothers and in 73% of the fathers. However, for some mothers (25.4%) and fathers (24.1%) the positive emotional involvement is only moderate, and a poor positive emotional involvement was observed in 3.6% of the mothers and in 2.9% of the fathers. In no case was a null positive emotional involvement verified. A negative emotional involvement with the newborn was absent in the majority of the sample (in 78.9% of the mothers and in 83.7% of the fathers). However, the presence of at least some negative emotional involvement is observed in a significant number of mothers (21%) and fathers (16.3%): 20.3% of mothers and 15.6% of the fathers show some negative emotional involvement, although few parents report moderate or high negative emotional involvement 48 hours after childbirth (only 0.4% of the mothers and 0.7% of the fathers).

Unclear bonding-related emotions were shown to be current in the sample during the first days of the child life, therefore its absence is only observed in 24% of mothers and in 29.1% of the fathers, while most parents (76% mothers and 70.9% fathers) had at least one emotion not clearly related with bonding regarding the newborn. The presence of some emotionality not clearly related to bonding was observed in 73.2% of mothers and 68.8% of the fathers. Nevertheless, it is very rare that unclear bonding-related emotions are intense (observed in only 0.4% of the mothers and in 0.7% of the fathers) or moderate (referred by only 2.4% of mothers and 1.4% of the fathers).

Finally, the bonding is high in more than one-half of the mothers (65.9%) and of the fathers (71.6%) that participated in the study; even so, it was only moderate in a significant number of mothers (29.4%) and of fathers (26.2%). We also observed some cases of mothers (4.0%) and of fathers (2.2%) with poor bonding, but only few cases of mothers (0.7%) and no fathers with total absent reported bonding.

Table 3. Differences between mothers and fathers: Mann–Whitney non-parametric test for independent samples

Item	Mothers after 48 hours ( <i>n</i> = 315), mean rank	Fathers after 48 hours ( <i>n</i> = 141), mean rank	<i>Z</i>	<i>p</i>
Loving	229.19	223.74	−0.514	0.607
Protective	228.26	225.82	−0.222	0.824
Joyful	222.26	239.14	−1.748	0.080
Disappointed	227.72	227.01	−0.161	0.872
Resentful	230.43	220.99	−1.461	0.144
Dislike	172.60	169.93	−0.940	0.347
Aggressive	226.38	229.99	−0.662	0.508
Mad	228.57	225.13	−0.666	0.505
Sad	232.95	215.40	−2.783	0.005
Neutral	224.97	233.11	−1.680	0.093
Possessive	237.37	205.60	−2.542	0.011
Fearful	235.08	210.68	−2.043	0.041

*Mother-to-infant and father-to-infant initial emotional involvement: differences between mothers and fathers*

Mothers' and fathers' emotions toward the infant tend to be similar, as no significant differences were found between them either for most items or for the positive and negative subscales (cf. Table 3). Nevertheless, mothers are significantly sadder, more possessive and more fearful with the newborn than fathers; and, compared with mothers, fathers show less emotions not related to bonding and have a better bonding with the infant 48 hours after delivery.

Also, 48 hours after childbirth, mothers have a more intense unclear bonding and less intense global 'bonding' toward the infant when compared with fathers (cf. Table 4).

*Mother-to-infant bonding within the first week: differences between 24 and 48 hours*

As we can see in Table 5 no significant differences were found in mother's items results between 24 and 48 hours, with the exception of 'Fearful': a significantly lower

Table 4. Differences between mothers and fathers: Student *t*-test for independent samples

Scale	Mothers after 48 hours ( <i>n</i> = 315), mean (standard deviation)	Fathers after 48 hours ( <i>n</i> = 141), mean (standard deviation)	<i>T</i>	<i>p</i>
Positive bonding	7.92 (1.54)	7.99 (1.39)	0.429	0.668
Negative bonding	0.48 (1.19)	0.31 (1.06)	1.497	0.135
Unclear bonding	1.75 (1.44)	1.43 (1.38)	2.277	0.023
Total bonding	5.69 (2.72)	6.25 (2.28)	2.121	0.034



Table 5. Differences between mothers after 24 and 48 hours: Wilcoxon non-parametric test for paired samples

Item	Mothers after 48 hours > mothers after 24 hours ( <i>n</i> )	Mothers after 48 hours < mothers after 24 hours ( <i>n</i> )	Mothers after 48 hours = mothers after 24 hours ( <i>n</i> )	<i>Z</i>	<i>p</i>
Loving	22	19	108	-0.509	0.611
Protective	28	21	100	-1.167	0.243
Joyful	16	19	114	-0.147	0.883
Disappointed	2	4	143	-0.816	0.414
Resentful	6	6	137	0.000	1.00
Dislike	2	1	146	-0.816	0.414
Aggressive	8	2	139	-1.897	0.058
Mad	5	2	142	-0.632	0.527
Sad	9	5	135	-1.355	0.175
Neutral	2	9	138	-1.765	0.078
Possessive	31	23	95	-0.832	0.406
Fearful	19	41	89	-2.854	0.004

number of mothers feel more fearful after 48 hours than 24 hours compared with those that feel less fearful after 48 hours than 24 hours after delivery.

No significant differences in mother's subscales and total scale results 24 and 48 hours following childbirth were obtained. However, as is shown in Table 6, a greater tendency for emotions not clearly related to bonding were more present 24 hours rather than 48 hours after childbirth was observed.

## Discussion and conclusion

This study provides evidence that parents usually show a high positive emotional involvement with the newborn, as early as the first day after delivery—considering, for example, that most mothers (71.2%) and fathers (82.3%) feel very 'Joyful' with the neonate. However, evidence also provides only moderate positive emotional

Table 6. Differences between mothers after 24 and 48 hours: Student *t*-test for independent samples

Scale	Mothers after 24 hours ( <i>n</i> = 150), mean (standard deviation)	Mothers after 48 hours ( <i>n</i> = 150), mean (standard deviation)	<i>T</i>	<i>P</i>
Positive bonding	7.80 (1.43)	7.88 (1.64)	0.653	0.515
Negative bonding	0.22 (0.67)	0.30 (0.84)	1.164	0.246
Unclear bonding	1.75 (1.38)	1.55 (1.38)	-1.854	0.066
Total bonding	5.83 (2.20)	6.03 (2.30)	1.045	0.298

involvement in some parents (as we can see in 29% of mothers and 27% of fathers 48 hours after childbirth), and a poor positive emotional involvement in some parents (present in 3.6% of the mothers and 2.9% of the fathers) 48 hours after delivery—as, for example, 6.1% of the mothers and 6.3% of the fathers do not feel ‘Loving’ the newborn at all or only a little.

The results also allow us to conclude that parents usually have some emotions not clearly related to bonding toward the child in the days that follow childbirth, considering, for example, that almost one-half of the mothers (45.7%) and fathers (41.1%) feel at least a little ‘Fearful’ in the presence of the newborn.

Indications that negative emotional involvement with the infant is usually absent in parents were also obtained. Although some negative emotional involvement is usual (in 21% of mothers and 16.3% of the fathers) (e.g. 9.6% of the mothers feel at least a little ‘Sad’ and 6.4% of the fathers at least a little ‘Aggressive’), some parents—yet rarely—show intense negative emotions toward the newborn (1% of mothers and 1.4% of the fathers are very much ‘Resentful’).

We can still conclude that, as soon as the first day after childbirth, a strong bond with the neonate can be observed in most parents (in 65.9% of the mothers and 71.6% of the fathers). However, a significant number of mothers (29.4%) and fathers (26.2%) is only moderately bonded, and some mothers (4%) and fathers (2%) have poor or no bonding with the infant.

In agreement with other studies (for example, Chalmers *et al.*, 1998), our results give empirical support to the hypothesis that bonding is relatively well and immediately established in the first contacts with the neonate for the majority of the parents. However, they equally support the idea that there is an important variability regarding how and when parents’ bonding with the newborn occur, as for an important number of mothers and fathers the emotional involvement with the infant is not so clearly established or so positive immediately after delivery, according to what was also pointed out in other studies (for example, MacFarlane *et al.*, 1978; Fleming *et al.*, 1997). Although difficulty in bonding was observed in some parents, the frequency of negative or absent emotional involvement is not as high as it was observed by other researchers (for example, Newton & Newton, 1962; Robson & Kumar, 1980). The reasons why such difficulty in the mother-to-infant and in the father-to-infant bonding may occur will be reported later.

The results obtained in this study support some authors’ suggestions of there being no differences between mother-to-infant and father-to-infant bonding (for example, Snow & McGaha, 2002), in the sense that fathers are as able as mothers of immediate bonding with the neonate. However, they also show important differences in this process that need to be pointed out. In fact, mothers feel significantly sadder, more possessive and more fearful, and in general have more intense unclear bonding and poorer bonding than fathers. The childbirth is a difficult event for most mothers, frequently involving high levels of pain that can compromise their interaction with the newborn. Mothers are also subject to important hormonal changes between pregnancy and the postpartum period, which negatively affect their mood and can influence the way they feel toward the newborn (Taylor *et al.*, 2005). On the other hand, the care

of the child is generally a mother's responsibility, which offers good opportunities for bonding, but also opens a field of possible difficulties. Consequently, following childbirth, all mothers may not be so available for bonding with the newborn, and mothers and fathers bonding circumstances may be somewhat different.

Finally, the results of this study allow us to conclude that between 24 and 48 hours after childbirth changes occur in the quality of the mothers' emotions toward the newborn. Mothers are significantly less fearful and emotions not clearly related with bonding tend to diminish. This result must be interpreted in the light of the mother's circumstances we mentioned before, and supports the idea in the literature that bonding intensifies gradually during the first weeks of life (Taylor *et al.*, 2005).

In conclusion, it is important to enhance the variability in the process of how and when parents bond with the infant and to alert the necessity to respect the ways that lead them to get emotionally involved with the child. Some parents have difficulty in getting emotionally involved with the newborn; health professionals should be able to identify such cases (the Bonding Scale can be used with this purpose) in order to offer support and to guarantee different and better conditions so that all parents have the opportunity to bond and provide adequate care to the infant.

Limitations of this study are that it is based on the parents' emotions' report, which may be influenced by social desirability. We also do not have the data of 6.5% of the fathers, so we do not know whether differences between mothers and fathers would remain significant if these fathers were included in the analyses.

### Acknowledgements

This article was made possible by a grant from the Human Development and Health Service of the Calouste Gulbenkian Foundation (number 48914) and a grant from the Bial Foundation (number 58/02). The authors want to thank all the mothers and fathers that participated in this study.

### References

- Ammaniti, M. (1991) Maternal representations during pregnancy and early infant–mother interactions, *Infant Mental Health Journal*, 12(3), 246–255.
- Bowlby, J. (1958) Natureza da ligação da criança à mãe, in: L. Soczka (Ed.) *As ligações infantis* (Lisboa, Livraria Bertrand), 105–153.
- Brazelton, T. B. & Cramer, B. (1990) *Earliest relationship: parents, infants, and the drama of early attachment* (Cambridge, MA, Perseus).
- Cernadas, J. M., Noceda, G., Barrera, L., Martinez, A. M. & Garsd, A. (2003) Maternal and perinatal factors influencing the duration of exclusive breastfeeding during the first 6 months of life, *Journal of Human Lactation*, 19(2), 136–144.
- Chalmers, B., Samarskaya, M. E., Tkatchenko, E. & Wallington, T. (1998) Women's experiences of birth in St. Petersburg, Russian Federation, *Journal of Reproductive and Infant Psychology*, 16, 243–258.
- Eibl-Eibesfeldt, I. (1989) *Human ethology* (New York, Aldine de Gruyter).
- Feldman, R., Weller, A., Leckman, J. F., Kuint, J. & Eidelman, A. (1999) The nature of the mother's tie to her infant: maternal bonding under conditions of proximity, separation and potential loss, *Journal of Child Psychology and Psychiatry*, 40(6), 929–939.

- Figueiredo B. (2003) Bonding: understanding dimensions involved in initial maternal bonding with the infant, *International Journal of Clinical and Health Psychology*, 3(3), 521–539.
- Figueiredo, B., Marques, A., Costa, R., Pacheco, A. & Pais, A. (2005) Bonding: escala para avaliar o envolvimento emocional dos pais com o bebé, *Psychologica*, 40, 133–154.
- Fleming, A. S., Rubble, D., Krieger, H. & Wong, P. Y. (1997) Hormonal and experiential correlates of maternal responsiveness during pregnancy and the puerperium in human mothers, *Hormones and Behavior*, 31, 145–158.
- Fuller, J. R. (1990) Early patterns of maternal attachment, *Health Care for Women International*, 11(4), 433–446.
- George, C. & Solomon, J. (1999) Attachment and caregiving: the caregiving behavioral system, in: J. Cassidy & P. Shaver (Eds) *Handbook of attachment: theory, research and clinical applications* (New York, The Guilford Press), 649–670.
- Kemp, V. H., Sibley, D. E. & Pond, E. F. (1990) A comparison of adolescent and adult mother on factors affecting maternal role attainment, *Maternal Child Nursing Journal*, 19(1), 63–75.
- Klaus, M. & Kennell, J. (1976) *Maternal–infant bonding* (Saint Louis, MO, The C.V. Mosby Company).
- Klaus, M. H., Kennell, J. H. & Klaus, P. H. (1995) *Bonding: building the foundations of secure attachment and independence* (New York, Addison-Wesley).
- Krpan, K. M., Coombs, R., Zinga, D., Steiner, M. & Fleming, A. S. (2005) Experiential and hormonal correlates of maternal behaviour in teen and adult mothers, *Hormones and Behavior*, 47(1), 112–122.
- Kumar, R. (1997) Anybody's child: severe disorders of mother-to-infant bonding, *British Journal of Psychiatry*, 171, 175–181.
- MacFarlane, J. A., Smith, D. M. & Garrow, D. H. (1978) The relationship between mother and neonate, in: S. Kitzinger & J. A. Davis (Eds) *The place of birth* (New York, Oxford University Press).
- Newton, N. & Newton, M. (1962) Mothers' reaction to their newborn babies, *Journal of the American Medical Association*, 181, 206–210.
- Richards, M. P. M. (1971) Social interaction in the first weeks of human life, *Psychiatria, Neurologia, Neurochirurgia*, 74, 35–42.
- Robson, B. & Mandel, D. (1985) Marital adjustment and fatherhood, *Canadian Journal of Psychiatry*, 30(3), 169–72.
- Robson, K. S. (1967). The role of eye-to-eye contact in maternal-infant attachment, *Journal of Child Psychology and Psychiatry*, 8(1), 13–25.
- Robson, K. S. & Kumar, R. (1980) Delayed onset of maternal affection after childbirth, *British Journal of Psychiatry*, 136, 347–353.
- Robson, K. S. & Moss, H. (1970) Patterns and determinants of maternal attachment, *Journal of Pediatrics*, 77, 976–985.
- Snow, C. W. & McGaha, C. G. (2002) *Infant development* (Englewood Cliffs, NJ, Prentice Hall).
- Stern, D. (1995) *The motherhood constellation* (New York, Harper Collins).
- Taylor, A., Atkins, R., Kumar, R., Adams, D. & Glover, V. (2005) Mother-to-infant bonding scale: links with early maternal mood, *Archives of Women's Mental Health*, 81, 45–51.
- Troy, N. W. (1993) Early contact and maternal attachment among women using public health care facilities, *Applied Nursing Research*, 6(4), 161–166.
- Troy, N. W. (1995) The time of first holding of the infant and maternal self-esteem related to feelings of maternal attachment, *Women Health*, 22(3), 59–72.
- Wiberg, B., Humble, K. & de Château, P. (1989) Long-term effect on mother-to-infant behaviour of extra contact during the first hour post partum. Follow-up at three years, *Scandinavian Journal of Social Medicine*, 17(2), 181–191.
- Winnicott, D. (1964) *The child, the family, and the outside world (classics in child development)* (Cambridge, MA, Perseus).