Attachment relationships and psychosomatic development of the child in families with a preterm baby.  
A study in DMM perspective.

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Abstract 2nd Biennial Conference of International Association for the Study of Attachment (IASA) 
(St. John’s College, Cambridge, UK, August 29-31 2010), pp. 9-10.

Abstract

The aim of this study is to assess attachment and the role of Mother-Father-Child relationship in the family with preterm born child (≤ 1500 gr) from 3 months to 1 year corrected age compared with a control group of families with term-born children (≥ 2500 gr).

20 preterm and 20 term couples with their babies were studied (120 subjects). Mother-Child and Father-Child couples were subjected to CARE-Index and both parents to AAI, Dyadic Adjustment Scale (DAS), CES-D and STAI Y-2. The child’s psychomotor development was assessed by the Bayley Scales of Infant Development (BSID II). Attachment assessment followed the DMM criteria.

Preterm mothers presented high risk interactive behaviors at CARE-Index (low scores at Dyadic Sensibility Scale, p<.002) and high anxiety (p<.01). Preterm fathers presented low scores at Dyadic Sensibility Scale (p<.004) and depressive symptoms (p<.009). In interaction, attachment forerunners suggest an insecure attachment in preterm mothers (p<.008) and fathers (p<.006) and in preterm children in the interaction with the mother (p<.05). These risk factors were correlated, in both parents, with low performance of the child at Bayley Scales (p<.04). Preterm mothers presented risk factors as difficulties with their original family and a high anxiety for the death of the child. Fathers of preterm children frequently have a negative perception of the child and uncomfortable feelings with it, stressful events in the last year and an unsatisfied perception of the hospital care.

The results show in the preterm family insecure forerunners of attachment and high risk interactive behaviors with the baby. In particular, mothers and fathers with insecure attachment and psychological difficulties (unresolved losses or traumas, anxiety, depression), could influence the psychomotor development of the preterm child. These data will be useful for the organization of specific programs for prevention and treatment of psychological difficulties in the preterm child and in its family.
Data from the World Health Organization show how premature birth is a very frequent phenomenon and on the increase in recent years: from 10 to 15% on international estimates and from 8 to 9% in Italy. Technological progress in medicine has enhanced longer survival in children born with very low birth weight (VLBW) and consequently subject to greater neonatal complications and somatic and developmental pathologies. In the treatment of newborns and assistance to parents, this has meant a gradual shift from a healing objective to that of taking care and promoting quality of life of the whole family (Jackson et al., 2003). To this end, collaboration is needed among the various specialists (gynaecologists, neonatologists, psychologists, physiotherapists, etc.) (Missionier, 2005; Soubieux, Soulè, 2007).

In the family with a preterm birth child, the couple interaction and the relationship between parents and children are complex. Studies in this field have investigated in detail the influence of preterm birth on the psychological and somatic development of the baby, on the emotional state of the mother and on her complex relation with the child. In the literature, frequent psychological problems have been imputed to the baby’s immaturity (Goldberg, Di Vitto, 1995), early separation experiences and emotional difficulties of the mother (Negri, 1998; Monti, 2000; Tracey, 2000, Poehlmann, Fiese, 2001; Muller-Nix et al., 2004). In some of these women a rigid attitude in interaction and in stimulation of the baby and a specific inhibition of affect expression have been described. These behaviours have been interpreted as adaptive defences towards the preterm child’s difficulties, but they have been also considered intrusive, controlling and potentially dangerous patterns for the child (Greenberg et al., 1992; Minde, 2000; Coppola, Cassiba, 2004). Quality of interactive exchanges between mother and child in the first months of life has been revealed to be the most efficient predictor of cognitive, linguistic development and general adaptation at 6 months (Smith et al., 1996), as well as cognitive, linguistic and psychomotor development at 9 months, and cognitive development at 12 months (Poehlmann, Fiese, 2001). Moreover, an important role seems to be played by parent reaction in front of the premature birth experience: a higher level of stress and maternal depression in child’s first semester of life usually results in a higher incidence of child’s behaviour problems at the age of three (Miceli et al., 2000). Among other risk factors we can list low socio-economic level (Bacharach and Baumeister, 1998), lack of adequate social support (Miceli et al., 2000), a history of infant abuse in the mother (Trickett, 2010) and absence of the paternal figure (Ricciuti, Scarr, 1990).

Recent studies described preterm babies and their mothers as relatively competent in the relation, at least after the first year (Caplan, Mason, Kaplan, 2000). These results contradict past research data and could be the consequence of medical and psychological progress in neonatal care (intensive neonatal operative units development, better nursery operators child care, involvement...
and presence of parents during hospitalization, better psychological aid to the family) (Beltrami et al., 2000; Coppola, Cassibba 2004). A check of past studies validity is important.

It has been evidenced how preterm birth represents a risk factor for the development in the child of insecure attachment and of cognitive, affective-relational and social difficulties (Muller-Nix et al., 2004; Trombini et al., 2008). Premature babies have greater difficulties in regulating their own physiological and emotional functions and in managing their environment and, hence, they depend, all the more than full-terms, on the mother figure: a sensitive caregiver is a determining factor in their development.

Currently, the most recent research is focusing on how preterm birth involves the entire family, and therefore psychological assessment has shifted to study of the mother-father-child triad (Tracey, 2000; Jackson et al., 2003).

Research on families with preterm children evidenced how, in the first years, the style of parental attachment seems especially important in the subgroup of newborns at high risk: a sensitive mother with secure attachment, able to receive and respond to the child’s needs, seems to have a positive influence on the development of these newborns. Likewise, parents who are little responsive and not flexible seem to have negative influence on these preterms at high risk whose linguistic and cognitive capacities, in the first year of life, are lesser than those of term born babies (Minde, 2000; Coppola, Cassiba, 2004).

Empirical research has evidenced how in the perinatal period the mother’s and father’s emotional states are significantly correlated (Harrison, Magill-Evans, 1996; Buist et al., 2002; Kaitz, Katzir, 2004; Paulson, Bazemore, 2010, Baldoni, Ceccarelli, 2010). In particular, fathers whose companions have undergone affective post partum disorders show greater levels of anxiety, depressive symptoms, irritability, and tendency to somatic complaints and worry about their own health and paternal role up to the fifth month of pregnancy (Baldoni, Baldaro, Benassi 2009). Moreover, in the perinatal period, fathers themselves may also suffer from affective disorders similar to post partum depression with a frequency ranging in the world from 2% to 31.3%, with a mean of 10.4 % in 2010 (Paulson, Bazemore, 2010, Baldoni, Ceccarelli, 2010). The symptoms of Paternal Perinatal Depression (PPD) differ from those of Maternal Perinatal Depression (MPD), the symptoms are less severe, the disorders are less definite and range from neurotic reactions of restlessness and sadness to melancholy, through states of impotence, desperation, discomfort and somatic complains. Empirical research has found a significant correlation between PPD and MPD (Soliday et al., 1999; Matthey et al., 2000; Buist et al. 2002).

The traumatic experience of preterm birth, the anxiety for illness and death, and the early and prolonged separation from the baby are psychologically stressful and dangerous events for the
family. In these situations the family attachment system will be activated, specially in the parents who will react on the basis of their Internal Working Models (IWM) (Bowlby 1973). Therefore, they will express adaptive and defensive reactions that could influence the development of infant attachment.

The majority of first-time parenthood research was realized in Anglo-Saxon countries and studied emotional feelings and fantasies of the couple during pregnancy and post-partum period. Only recently were studies conducted on the father’s role into the “transition to parenthood” perspective. Researches on father’s stress and on adaptation factors of the male to fatherhood (Buist et al., 2003), on father’s mental wellbeing during perinatal period (Condon et al. 2004), on male psychological experience in the change from couple to family (Kaitz, Katzir, 2004) and on “secure base” function of the father toward the mother-child dyad (Baldoni, 2005) were conducted.

At present, the development of attachment and the influence of the father on the preterm born child is far from being sufficiently investigated, in particular through longitudinal studies (Tracey, 2000; Miceli et al., 2000; Singer et al., 2003). Among these, Harrison and Magill-Evans (1996) showed lower scores in interaction scale of Nursing Child Assessment Teaching Scale in preterm father in comparison with mothers. Previous works on preterm families by our research group (Baldoni et al., 2007, 2008, 2009) evidenced significant risk factors in parents-child interaction that confirm the importance of the father’s role. In particular, fathers with an insecure attachment style (dismissing or preoccupied) or with psychological difficulties (unresolved losses, significant stressful events in the last year, high anxiety and depression) were significantly correlated with the development of insecure attachment forerunners manifested by the children (at 3 months corrected age) in the interaction with the mother. This could be linked to lesser support and protection by the father towards the companion, which may influence the child to develop insecure attachment representations that could consolidate during growth to adult age, exposing it to manifestation of physiological, psychological or relational disorders (eating, sleep, behavior, learning, sphincter control, emotional regulation).

Thus to assess the development of the relation mother-father-preterm child from admission to the months following discharge is fundamental, and it is necessary to perform specific follow-ups in the critical phases of development and early interventions focused on the prevention or modification of dysfunctional parent-child relations and any subsequent development disorders. (Kaaresen et al., 2006; Van der Pal et al., 2007). In past works (Trombini et al., 2006, 2008) we evidenced how the characteristics of Neonatology Units (in particular the collaboration between neonatologists, nurses, psychologists and physiotherapists, even after discharge of the baby through follow-ups in the first year of life) influence positively the perception levels of stress in mothers,
fostering an adequate consciousness of the cognitive-affective and relational competence of their own baby. Early interventions focused on increasing parental knowledge and competence, and the child’s psychological and physical skills, can be effective for reduction of the psychomotor deficit frequently displayed by very low birth weight children in school age (at 4 years). Confronting these data with those of attachment research, greater psychological and somatic capacities in children with secure attachment patterns are confirmed (Sajaniemi et al., 2001).

Research

The aim of the research unit is to study the development of attachment, the psychological difficulties, the parental couple adjustment quality, the role of father-mother-child relationship and the psychomotor development of the child in the family with preterm birth child from 3 to 30 months corrected age.

The main hypotheses of the research are:

1) preterm birth represents for the family a traumatic and stressful event that involves the whole family and activates the family attachment system. During perinatal period the emotive states of mothers and fathers are connected. In preterm birth, in particular, the parents will display defensive and adaptive behaviours, therefore their attachment styles and psychological characteristics (in terms of dyadic sensitivity and levels of anxiety, depression and stress perception) will influence the quality of the parental couple and mother-child-father relations and the attachment and psychomotor development of the child.

2) In this critical situation, the psychological characteristics of the father are important for the protection of the family and the development of a valid attachment pattern in the child. The father would carry on a secure base function (Bowlby 1988), protecting his partner from too high levels of affective suffering (Baldoni, 2005). Fathers with avoiding attachment patterns (type A) or preoccupied attachment patterns (type C), and those with psychological difficulties (unresolved loss traumas, anxiety, depression) or behavioural problems, are thought to influence the development of their preterm child.

In particular our research unit intend to study:

1. Attachment patterns and dyadic sensitivity of parents in the interaction with preterm child;
2. The couple adjustment and the expression in the parents of eventual psychological suffering (anxiety, depression, behavioural problems) and high perceived stress levels.
3. The psychological characteristics of preterm child’s father (attachment style, dyadic sensitivity, anxiety, depression, stress perception).
4. The connection of these aspects with the development of child’s attachment (assessing attachment forerunners at 3 months, and attachment pattern at 1 year of corrected age) and the psychomotor development of the preterm baby.

Finally, a secondary aim of the study is to confront different models of attachment assessment (DMM, Main and Goldwyn AAI, self-reports questionnaires like ASQ, RQ and PBI) particularly regarding their validity and utility in clinical application (the Bologna Attachment Assessment Project).

**Experimental design**

We are studying an experimental group consisting of 40 families. 20 families with preterm born children (birth weight ≤ 1500 gr, gestational age 24-32) and a control group of 20 families with term-born children (birth weight > 2500 gr, gestational age > 40) for 120 total subjects. Families, once informed on the aim and method of the study, were short-listed exclusively on the basis of their willingness to participate in the research, excluding families whose children present ascertained neurological damage. Listings were made in collaboration with the Neonatal Intensive Care Units of AUSL Bologna, Ospedale S. Orsola-Malpighi (Direttore: Prof. Giacomo Faldella), AUSL Rimini, Ospedale Infermi, Rimini (Director: Dr. Nicola Romeo) and AUSL Brescia, Ospedale (Director: Dr. Gaetano Chirico). The research benefits from the scientific consultation by Prof. Patricia M. Crittenden, Head of Family Relations Institute, Miami, Florida, USA, and President of International Association for the Study of Attachment (IASA).

The aim of the research unit is to assess the mother-father-preterm child triad from the first to the second year of corrected age. The study is based on a longitudinal survey with data collection in four steps (3, 6, 12 and 30 months corrected age of the baby), corresponding to particularly important phases for the child’s psychomotor development and internal representations of attachment (see Tab. 1).

The research plans on providing the following assessment tools:

**To Mother-Child and Father-Child couples:**
- *Child-Adult Relationship Experimental Index* (CARE-Index) (Crittenden, 1979-2004) for assessment of the attachment forerunners and the parental dyadic sensitivity.

**To both parents:**
- *Center for Epidemiologic Studies Depression Scale* (CES-D) (Radloff, 1977) for depressive symptoms assessment;
• State Trait Anxiety Inventory Form Y2 (STAI-Y2) (Spielberger et al., 1983) for the trait anxiety assessment;

• Dyadic Adjustment Scale (DAS) (Spanier, 1976) for quality of couple adjustment assessment;

• Parenting Stress Index (PSI) (Abidin, 1987-2006) for parental stress assessment;

• Adult Attachment Interview (AAI) (George, Kaplan, Main, 1986; Crittenden, 1999);

• Self report questionnaires for adult attachment assessment: Attachment Style Questionnaire (ASQ) (Feeney, Noller, Hanrahan, 1994); Relationship Questionnaire (RQ) (Bartholomew, Horowitz, 1991); Parental Bonding Instrument (PBI) (Parker, Tupling, Brown 1979).

To mother-child:

• Strange Situation (SS) (Ainsworth, Witting, 1969) for assessment of attachment styles in first childhood.

To the child:

• Bayley Scales of Infant and Toddler Development (BSID III) (Bayley, 2006) for child’s psychomotor and linguistic development assessment.

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<tr>
<th>Steps</th>
<th>Time</th>
<th>Tests</th>
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<tr>
<td>1</td>
<td>3 months</td>
<td>CARE-Index, CES-D,</td>
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<td>corrected age</td>
<td>STAI-Y2, PSI</td>
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<td>2</td>
<td>6 months</td>
<td>DAS, AAI, BSID-III</td>
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<td></td>
<td>corrected age</td>
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<td>3</td>
<td>12 months</td>
<td>SS, ASQ, RQ, PBI,</td>
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<td>corrected age</td>
<td>BSID-III</td>
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<tr>
<td>4</td>
<td>30 months</td>
<td>CES-D, STAI-Y2, PSI,</td>
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<td></td>
<td>corrected age</td>
<td>DAS, BSID-III</td>
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Tab. 1 – Research Design

For statistical assessment, subjects were divided in subgroups on the basis of the quality of the father’s attachment and dyadic sensitivity (attachment forerunners and dyadic sensitivity at CARE-Index, attachment pattern at AAI).

Every research step needs from 30 to 120 minutes of total administration time, to be divided in different sessions. The attachment assessment was conducted following the Dynamic-Maturational Model (DMM) criteria (Crittenden 1999, 2000, 2008). The assessment instruments
(CARE index, Strange Situation, AAI) were administered and codified in blind conditions by expert and reliable operators trained in specific courses. Statistical elaboration of data was carried out using parametric (Univaried ANOVA, Bonferroni Post Hoc test) and non-parametric methods (Kruskall-Wallis test).

**Results**

At present, preterm couples and term families were studied from 3 to 12 months corrected age. Data analysis evidenced in mothers of preterm children high risk interactive behaviors at CARE-index (low scores at Dyadic Sensitivity Scale, p \( \leq \) 0.01) (see Figg. 1-2), high levels of anxiety traits at STAI-Y2 (p \( \leq \) 0.01), of parental stress at PSI (p \( \leq \) 0.01) and a lower couple adjustment at DAS, with particular regard to a lower level of consensus in the relation with the partner (Dyadic Consensus scale, p \( \leq \) 0.04).

**DYADIC SENSITIVITY SCALE**

![DYADIC SENSITIVITY SCALE](image1)

- **PRETERM MOTHERS**
  - Adequate: 10%
  - Intervention area: 30%
  - High risk: 60%

- **TERM MOTHERS**
  - Adequate: 40%
  - Intervention area: 30%
  - High risk: 30%

\( (p \leq .01) \)

40% of preterm mothers are at risk vs 5% of controls

**ATTACHMENT FORERUNNERS**

![ATTACHMENT FORERUNNERS](image2)

- **PRETERM MOTHERS**
  - Sensitive: 30%
  - Controlling: 30%
  - Not responsive: 40%

- **TERM MOTHERS**
  - Sensitive: 10%
  - Controlling: 10%
  - Not responsive: 15%

\( (p \leq .008) \)

Fathers of preterm children also manifested low scores at Dyadic Sensitivity scale of CARE-index (p \( \leq \) 0.004) (see Figg. 3-4) and high levels of depressive symptoms at CES-D (p \( \leq \) 0.009).

In interaction with the child, assessed with CARE-Index, attachment forerunners show more frequently an insecure attachment in mothers (p \( \leq \) 0.008) (see Figg. 1-2) and in fathers of preterm children (p \( \leq \) 0.006) (see Figg. 3-4) and in preterm born children in the interaction with the mother (p \( \leq \) 0.05) (see Figg. 5-6).
Moreover, in mothers of preterm children, risk factors were pointed out as difficulties in relation with the origin family and a high anxiety for the death of the children.

Risk factors in fathers of preterm children are even more important than those of mothers. In particular they have frequently: a negative perception of the child, more difficulties in interaction and an intense uncomfortable feeling during the first contact with it, significant stressful events in the last year (work and economic difficulties, health problems, losses) \( (p < 0.02) \) and a less satisfied perception of the hospital care \( (p < 0.00) \).
Dividing the sample on father’s attachment forerunners basis and on their dyadic sensitivity at CARE-Index, univaried ANOVA data evidenced in the insecure fathers group and in the low dyadic sensitive fathers group (independently from the term or preterm birth of their child) significantly high levels of anxiety at STAI (p<0.02), of parental stress (p<0.03) and a negative perception of the child (p<0.000) at PSI. Insecure attachment forerunners, low dyadic sensitivity and high levels of depressive and anxious symptoms were correlated, in both parents, with lower scores of the performance of the child in almost all Bayley scale indexes (p<0.04). In particular, children with fathers with insecure attachment forerunners reported significantly lower scores at all Bayley scales. Post Hoc tests (Bonferroni) confirmed significant differences between fathers with low and high dyadic sensitivity, fathers with secure and insecure forerunners of attachment, but not between individual insecure patterns (controlling, not responsive).

No significant effects of father’s characteristics on child’s development were evidenced in preterm group, perhaps because of the limited sample, but the trend is the same as that of the whole group.

Strange Situation and Adult Attachment Interview codifying is in progress. Preliminary analysis of the AAI data show a correlation with insecure high index patterns (A+ and C+) with a lower psychomotor performance of the child (term and preterm) at Bayley scales.

**Discussion**

These research data show the dyadic sensitivity, and the interactive mother-child and father-child behaviors at three months corrected age are significantly different in the families of preterm born children towards the control group. 40% of mother-preterm child interactions (against 5% of controls) and 75% of father-preterm child interaction (against 30% of controls) are in the “high risk area” suggested by CARE index, an area that often requires psychological and pharmacological treatment. Attachment forerunners in preterm children’s parents, moreover, are significantly different from those of term children’s families.

Psychosocial risk factors evidenced in the preterm child’s parents (lower couple adjustment, high levels of anxiety, depressive symptoms and perceived stress) resulted significantly correlated to a lower psychomotor development of the preterm child assessed at six months of age by Bayley scales.

In our sample, mothers of preterm children are characterized by maternal behaviors apparently affective, but really controlling, intrusive or “not responsive”, i.e. not sensitive towards
the child’s signals, particularly the negative ones. Only few of these mothers showed a sensitive pattern.

The significance of this maternal attitude, for the development of the child, is still unclear.

Regarding the possible effects of an excessive maternal stimulation, studies on premature children show different and frequently contradictory results and hypotheses. Some authors judge negatively an excessive maternal intrusion, considering it implies an overload of stimulations for the baby. Other authors consider it a type of compensation developed by the mother to fill the possible developmental difficulties of the premature baby (Monti, 2000; Riva Crugnola et al., 2004). An analysis in DMM perspective could be useful for understanding the adaptive function of these parental behaviors and fostering the skills of the family. An intrusive and controlling attitude, in fact, could reflect the maternal attitude to adapt flexibly to the requests and developmental rhythms of the child.

An interesting datum evidenced by this study is the high number of fathers of preterm children that show difficulties in interaction with the child (low dyadic sensitivity and insecure attachment forerunners at CARE-index) and other psychological risks factors (negative perception of the child, intense uncomfortable feeling during the first contact with it, depressive symptoms), even more frequent and intense than the mothers’.

Moreover, mothers of preterm children showed a lesser couple adjustment, in particular lower levels of dyadic consensus with the partner (at DAS). These factors may affect negatively the mother-child-father relationship. Research evidenced a positive correlation between satisfaction in couple relation and quality of mother-child relation. Therefore, a valid help supplied by the father to the companion fosters a better mother-child relation (Dickie, 1987; Broom, 1994).

Following attachment theory, an important male function, in perinatal period, seems to supply a secure base for his companion, helping her to overcome the difficulties, keeping the suffering at endurance levels and fostering the conditions by which the special relation between the mother and the baby can develop in an adequate way. In fact, preoccupied, too anxious or depressed fathers, or those with behavioural problems (pathological aggressiveness, alcoholism, addiction disorders) can be a handicap for the emotional equilibrium of their companion and for the good development of the relationship between mother and child (Das-Eiden, Leonard 1996; van IJzendoorn, De Wolff 1997; Luca, Bydlowsky 2001; Baldoni 2005; Baldoni, Baldaro, Benassi 2009; Baldoni, Ceccarelli, 2010). A lack of this protective function can foster an affective disorder in the mother and negatively influence the attachment and psychomotor development of the child.
Lower dyadic sensitivity and insecure attachment forerunners, in fathers, (independently from the term or preterm birth of their child) resulted significantly correlated to a lower psychomotor development at all Bayley scales assessed at six months.

Fathers of preterm children show also more significant stressful events in the last year that can remove them from couple and parental tasks, focusing them on external problems, rather than dedicating themselves to the family (Parke, 1982).

The first data of this research underline the necessity of longitudinal studies on wide samples to assess internal working models (i.e. attachment styles) of preterm born children’s parents, their sensitivity in the relation with the child and the link between parenting stress and quality of family attachment. These researches could check if parental behavior in these families is adaptive and transitory, or a negative trend that will influence the development of the child in the future.

**Conclusions**

This study confirms the research data concerning the influence of attachment style and relational capacities of both parents on psychomotor development of preterm born children and the attachment relationship between this and the mother. In particular, in fathers it shows a correlation between insecure attachment and low dyadic sensitivity with a low adjustment by the couple, the development of an infant’s insecure attachment and a manifestation of psychomotor difficulties in the preterm born child. The research will provide useful data for the development of preventive and treatment interventions, increasingly targeted and sustained over time, considering also the father figure and taking into account the specific developmental needs, the psychological difficulties of the preterm infant and its family, also considering eventual difficulties of the siblings (psychological help from the physician and nurses in the ward, assistance from a psychologist, psychoeducational groups, possible individual, couple or family counselling or therapy) (Baldoni et al. 2009; Facondini et al. 2009; Cena, Imbasciati, Baldoni, 2010). It will be also possible to organize special training seminars and consulting meetings for operators of the Departments of Obstetrics and Gynaecology and Neonatal Intensive Care Unit to ensure a long-term monitoring of psychological and physical health of the premature born child and an appropriate psychological help for its family.

*This study is funded by Italian PRIN 2007 as a nationally relevant research*
References


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