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## Maternal and paternal postpartum early mood and bonding

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### ABSTRACT

**Background:** Whereas the maternal 'blues' has been widely researched, comparatively less is known about the "highs" following childbirth, and the relation between mothers and fathers' mood in this early period. We aimed to investigate the association between maternal 'blues' and 'highs' with paternal postpartum mood (here described as 'lows' and 'highs') in the early postpartum and their associations with the quality of child bonding.

**Methods:** Women and their cohabitating male partners, fathers of the index child (N = 98 couples), attending an obstetric hospital unit completed questionnaires on mood, bonding and socio-demographics between the 3rd and the 5th postpartum day. We used generalised estimating equations to analyse the data.

**Results:** The 'blues' scores were higher in mothers, whereas 'highs' and bonding were higher in fathers. Maternal 'blues' were significantly correlated with paternal 'lows' ( $r_s = .23, p < .05$ ) and maternal 'highs' were also associated with paternal 'highs' ( $r_s = .22, p < .05$ ). Parental 'highs' were significantly associated with better baby bonding ( $B = .13, p = .02$ ).

**Conclusions:** Our study demonstrates moderate associations between both 'blues/lows' and 'highs' in mothers and fathers shortly after the birth of the child. Associations between mood, particularly 'highs', and bonding were similar for mothers and fathers. Greater consideration of 'blues/lows' and 'highs' in both parents is needed to promote adjustment in the postpartum period.

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## 1. Introduction

A spectrum of emotional changes may occur in women in the initial postpartum days, ranging from mild experiences through more overwhelming emotional states (O'Hara & Wisner, 2014; O'Keane et al., 2011). Postpartum 'blues' is typically a transient non-pathological condition during which maternal emotional responses are intensified. Predominant symptoms of the

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blues are tearfulness and depressive mood which may be accompanied by anxiety, irritability, appetite and sleep disturbances (Gerli et al., 2019). The 'blues' onset occurs within the first week to 10 days after delivery, with a characteristic peak between 3 and 5 days postpartum, and decline within 10–12 days thereafter (Bruno et al., 2018; Buttner et al., 2015). The 'blues' prevalence has been found to vary widely in different studies, from 13 to 76% (Hau & Levy, 2003; Nagata et al., 2000; Rezaie-Keikhaie et al., 2020), potentially depending, at least to some extent, on the measurement tool. Evidence has also linked maternal 'blues' with increased levels of cortisol and adrenocorticotrophic hormone (Ehlert et al., 1990; O'Keane et al., 2011). An emotional change that has received much less attention is the postpartum 'highs', in which the predominant mood is euphoria and elation, followed by insomnia and irritability and may be prevalent in approximately 10–20% of women in the first few days after birth (Glover et al., 1994; Heron et al., 2005; Sharma & Burt, 2011; Smith et al., 2009). Mood disturbances shortly after birth deserve clinical attention because early postpartum mood may predict later depressive symptoms (Castle, 2008; Miller et al., 2017). In fact, experiencing *both* the 'blues' and the 'highs' shortly after childbirth has been shown to contribute to later puerperal depression (Chessick & Dimidjian, 2010; Glover et al., 1994).

In the perinatal phase, men have been described as 'invisible victims' because their experiences in the postpartum period are not well known (Bradley & Slade, 2011; Glasser & Lerner-Geva, 2019; Hamilton & Harberger, 1992); particularly missing are reports about paternal 'highs' and 'lows' - defined as early postpartum lowered mood, following childbirth. There is both clinical and scientific values of assessing mood disturbance in both mothers and fathers in the early days after birth. For example, assessing maternal and paternal 'blues/lows' and 'highs' following childbirth might increase understanding of how the partners and family respond to the childbirth event. Although few studies have examined maternal and paternal depressive symptoms in the postpartum period and their overlap (Ramchandani et al., 2008), virtually nothing is known about fathers' 'highs' and 'lows' following childbirth; this is an innovation of this paper.

One potential immediate observable effect of parental perinatal mood is on the quality of parental bonding, which may provide an early indicator of parent–child relationship quality (Bicking Kinsey et al., 2014). Bonding is the response of the parent towards the offspring and may develop over time (Feldman, 2017). Bonding may be encouraged by physical contact (Feldman, 2017; Wittkowski et al., 2007), and its quality can be influenced by several factors including mental health problems (Moehler et al., 2006); much of the published work focuses on deficient bonding patterns associated with postpartum depression (Parfitt et al., 2014; Wilson & Durbin, 2010). Assessing early parental symptoms of the 'blues/lows' and the 'highs' in both mothers and fathers may be an innovative and sensitive approach to determining the couple's response to childbirth and potential early roots of caregiving quality. Therefore, we aim to investigate the correlation between maternal 'blues' and 'highs' with paternal 'lows' and 'highs'; and to examine if parents' early postpartum mood ('blues/lows' and 'highs') is associated with early quality of bonding.

## 2. Material and methods

### 2.1 Sample and procedure

This study is part of a longitudinal cohort recruited between 2003 and 2006, examining biological and psychological aspects of depression during pregnancy (Amiel Castro et al., 2017; Kammerer et al., 2002, 2009, 2011; Taylor et al., 2009). Consecutive eligible women attending the hospital for childbirth who were cohabitating with the father of the index child were invited to take part in this study; 66% accepted to participate. This sample (N = 98 couples) was selected to provide information on mood experienced in early postpartum and on parents' relationship with their babies. Participants were recruited between the 3rd and 5th day postpartum from an obstetric hospital unit. Following recruitment, a trained nurse provided parents with a detailed study explanation; signed written consent was obtained from all participants included in the study. Mothers and fathers filled in the self-reported instruments separately and provided socio-demographic information.

Exclusion criteria for both parents were not being fluent in German, psychotic features, current drug or alcohol addiction, critical medical condition, use of psychotropic medication or taking part in any psychological or psychiatric treatment during the perinatal phase. Additional exclusion criteria were unknown biological father. We also excluded parents with preterm babies (<37 weeks) or whose babies had any current disease. Medical records were consulted to acquire information about the baby's current status. All procedures performed in this study were in accordance with the ethical standards of the local ethical board of the canton of Zurich, Switzerland and with the 1964 Helsinki declaration and its later amendments.

### 2.2 Instruments

The 'Blues' Questionnaire (Kennerley & Gath, 1989) was used to assess maternal postpartum 'Blues' and paternal postpartum 'lows'. This scale is recommended to be completed in the first days postpartum (Kennerley & Gath, 1989) due to the 'Blues' brief duration and for being typically experienced within the first 10 days after delivery (Glangeaud-Freudenthal et al., 1995). The questionnaire is divided into seven sub-scales (Primary 'Blues', Retardation, Hypersensitivity, Decreased Self-confidence, Depression, Despondency and Reservation) consisting on 3–7 items each. A score of 8 or higher was used to detect more severe cases (Glover et al., 1994). In our study, we used the Primary 'Blues' (e.g. 'tearful', 'low spirited') and the Hypersensitivity (e.g. 'restless', 'over-sensitivity') sub-scales, as used by others (Glover et al., 1994), adding up to 11 items. This instrument was successfully used with both mothers and fathers (Edhborg et al., 2005). Our sub-scales presented a Cronbach's alpha of  $\alpha = .80$  and  $\alpha = .86$  for fathers and mothers, respectively, indicating very good reliability.

The 'Highs' scale (Glover et al., 1994) was designed to identify mild hypomania specifically in perinatal women. It is an 8-item self-reported scale (e.g. 'have you felt elated, high or unusually cheerful?') rated on a 3-point Likert scale (0–2; 0 = no, 2 = yes, a lot). A score of 8 or higher is considered a positive screen for hypomania. The 'Highs' were significantly correlated with the mania subscale from the Comprehensive

Psychopathological Rating Scale ( $r = 0.62$ ) (Chessick & Dimidjian, 2010) and with the Altman Self-Rating Mania Scale ( $r = 0.63$ ) (Smith et al., 2009). Cronbach's alpha for this scale in fathers and mothers were, respectively,  $\alpha = .80$  and  $\alpha = .86$ , indicating very good reliability.

The Mother to Infant Bonding Scale (MIBS) (Bienfait et al.; Taylor et al., 2005) is an 8-item self-reported scale (e.g. 'loving', 'resentful') designed to measure quality of the mother-to-infant bonding. Each item is rated on a 4-point Likert scale (0 = very much, 3 = not at all) ranging from 0 to 24. High scores indicate disturbance in the mother–infant bond. To facilitate understanding, we reverse scored this scale; therefore, in our study, high scores indicate better bonding. Construct validity has been reported (Taylor et al., 2005). For example, when compared with a semi-structured interview performed by a paediatric psychiatrist evaluating mother–infant bonding (Bienfait et al., 2011), the MIBS score was significantly higher in the mothers who presented bonding difficulties, according to the interview, than in mothers without difficulties (Closa-Monasterolo et al., 2017). Moderate-high stability over 3 months has been reported from measures obtained in the first few weeks after birth. This measure was successfully validated for use with both parents (Figueiredo et al., 2005).

All questionnaires used in this study were successfully translated to German and back-translated to English by a group of mental health experts experienced in cross-cultural research. We analysed all available covariates (parity – scored as a continuous variable, number of previous children, professional occupation, marital status, age – scored as a continuous variable, delivery mode – categorised as natural birth vs. caesarean and baby sex – coded as male vs. female) and included in our analyses only covariables which significantly correlated with the predictors or outcomes. These were professional occupation (an ordinal variable categorised as senior = 1, technical = 2, intermediate = 3 and other = 4); we also created a binary variable for professional occupation (senior = 1 vs. all other categories = 0), marital status (a binary variable categorised as married = 1 vs. cohabitating = 0) and number of previous children (a continuous variable informing the number of pregnancies).

### 2.3 Statistical analyses

Statistical analyses were performed using the IBM Statistical Package for the Social Sciences (SPSS Version 24 for Windows). Since most variables were non-normal and skewed we applied log transformation using the formula  $\log_{10}(\text{value} + 1)$ ; (Field, 2009). Visual inspections and Kolmogorov–Smirnov tests showed that after log transformation skewness improved (moderately skewed), but variables were still not normally distributed. Therefore, we further used non-parametric tests with non-transformed values (e.g. Spearman correlations). Sample characteristics were summarised. Spearman correlations were conducted between socio-demographic data, maternal and paternal 'blues/lows', 'highs' and bonding. Group (i.e. mothers compared with fathers) differences were analysed with Mann–Whitney U tests (and were substantively identical using paired-samples t-tests). To adjust for the non-independence of data from partners, we conducted generalised estimating equations, including only previously significantly correlated covariates – professional occupation, marital status and number of previous children – in prediction analyses.

Exploratory analyses included parent gender as a potential modifier of symptomatology when predicting bonding. Statistical significance was established at  $p \leq 0.05$ .

### 3. Results

Descriptive statistics of the sample are presented in Table 1. Approximately, 88% of parents were married; the number of previous children differs for mothers and fathers because of different family and marital histories, in some cases, prior to the current union. Fathers were slightly older than mothers, on average. Using the cut-off  $\geq 8$  for both ‘highs’ and ‘blues/low’s’, we found maternal ‘highs’ incidence was 12.4% and paternal ‘highs’ were 19.6%; mothers’ ‘blues’ presented an incidence of 20.6% and fathers’ ‘lows’ were 16.5%. Notably, paternal quality of baby bonding was significantly higher than maternal quality of bonding.

#### 3.1 Associations between socio-demographic characteristics, ‘blues/low’s’, ‘highs’ and bonding

Spearman correlations (Table 2) indicate modest-moderate associations between maternal and paternal ‘blues/low’s’ and ‘highs’ (see Figure 1). Paternal number of previous children ( $r_s = -.20, p \leq .01$ ) and marital status ( $r_s = -.21, p \leq .05$ ) were negatively associated with paternal ‘lows’. Paternal professional occupation (using the binary variable) was significantly associated with paternal bonding ( $r_s = -.29, p \leq .05$ ) and with paternal ‘lows’ ( $r_s = .20, p \leq .05$ ): men who had a higher professional position (i.e. senior manager) reported a higher score on the ‘blues’ questionnaire (Mann–Whitney U-test;  $p = .05$ ) and

**Table 1.** Mothers’ and fathers’ socio-demographic and psychological characteristics.

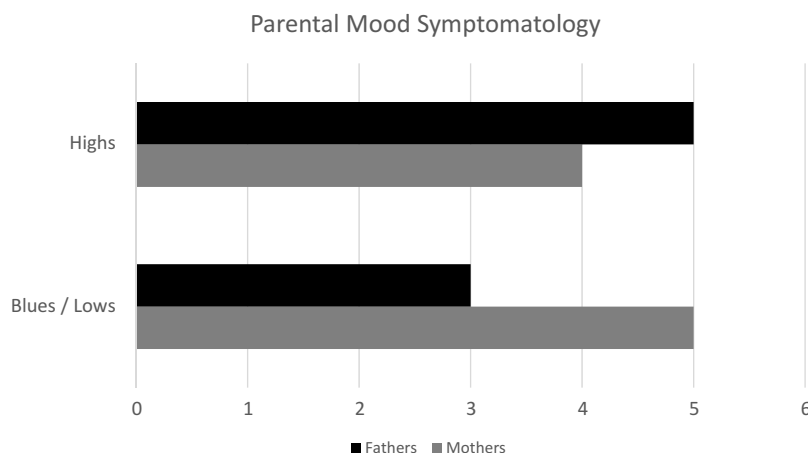
Variables	Mothers			Fathers			U
	N	Mean (SD)	%	N	Mean (SD)	%	
<b>Civil Status</b>	98			97			4251.5
<b>No. previous children</b>	97	1.79 (1.06)		97	1.51 (0.76)		4154.5
<b>Professional Group</b>	97			94			3701.0*
Senior Occupations			48.5			44.7	
Intermediate Occupations			21.6			17.0	
Technical Occupations			2.1			37.2	
Unemployed			27.8			—	
<b>Age</b>	96	32 (4.33)		96	33.73 (5.63)		3674.0*
<b>Baby Sex (M)</b>	98		59.2	98		59.2	
<b>‘Highs’ symptomatology</b>	97	4.35 (2.86)	12.4	97	5.12 (3.10)	19.6	4052.0
<b>‘Blues/Lows’ symptomatology</b>	97	5.64 (4.74)	20.6	97	3.86 (3.79)	16.5	3615.0*
<b>Quality of baby-bonding</b>	98	17.34 (1.53)		98	20.05 (1.57)		1040.0*

SD = standard deviation; M = male; Y = yes; \*significant at the  $p < 0.05$  level; U = Mann-Whitney U test conducted with non log-transformed variables.

**Table 2.** Correlations between maternal and paternal ‘blues/low’s’ and ‘highs’.

	1. (N)	2. (N)	3. (N)	4. (N)
1. Paternal ‘highs’ Score	—	<b>.467**</b> (97)	<b>.229*</b> (96)	.119 (96)
2. Paternal ‘lows’ Score	<b>.467**</b> (97)	—	.194 (96)	<b>.234*</b> (96)
3. Maternal ‘highs’ Score	<b>.229*</b> (96)	.194 (96)	—	<b>.292**</b> (97)
4. Maternal ‘blues’ Score	.119 (96)	<b>.234*</b> (96)	<b>.292**</b> (97)	—

\*Correlation is significant at the  $p < 0.05$  level, \*\* Correlation is significant at the  $p < 0.01$  level.



**Figure 1.** Maternal and paternal symptomatology.

**Table 3.** Generalised estimating equations between parental symptomatology, covariates and bonding.

Variables	B	SE	CI 95%	Wald	p
Gender	.083	.011	.061 -.105	55.521	.000
No. previous children	.001	.003	-.005 -.006	.046	n.s.
Civil status	.005	.008	-.007 -.018	.670	n.s.
‡Professional occupation	.023	.007	.010 -.037	11.142	.001
Blues/Lows	.000	.000	-.002 -.001	.128	n.s.
Highs	.003	.001	.000 -.006	4.583	.032
Professional Occupation*Gender	.024	.010	.003 -.044	5.275	.022
Blues/Lows*Gender	.000	.002	.000 -.004	2.620	n.s.
Highs*Gender	-.000	.001	-.004 -.004	.000	n.s.

Reference category for all variables = female (mothers), ‡= Binary variable (senior positions vs. all other positions).

poorer bonding (Mann–Whitney U-test;  $p = .00$ ) than men with lower positions. Maternal ‘highs’ were moderately positively correlated with bonding ( $r_s = .38$ ,  $p \leq .01$ ).

### 3.2 Parental affective symptoms as predictors of quality of bonding

A generalised estimating equation was conducted to identify predictors of bonding. As can be seen in Table 3, the model indicated that fathers reported more positive bonding than mothers (unstandardised  $B = .08$ ,  $SE = .01$ ,  $p = .00$ ). The model also indicated that bonding was significantly independently associated with parental highs (unstandardised  $B = .00$ ,  $SE = .00$ ,  $p = .03$ ) and senior professional occupations (unstandardised  $B = .02$ ,  $SE = .00$ ,  $p = .00$ ); none of the other covariates were significant. The model also included the interaction between parental ‘highs’ and parental ‘blues/low’s neither of which was significant. The interaction between parental professional occupation and gender indicated that the association between occupation and quality of bonding was stronger in fathers than mothers.

## 4. Discussion

We aimed to investigate the association between maternal and paternal mood in the first days after childbirth and the degree to which parents' postpartum 'blues/lows' and 'highs' were associated with early bonding. We found similarity in partners' immediate affective responses to childbirth: maternal 'blues' symptomatology was significantly associated with paternal 'lows' and mothers' 'highs' were moderately associated with fathers' 'highs'. Quality of bonding was independently predicted in mothers and fathers from parental 'highs' with no evidence of gender moderation.

Maternity 'blues' and 'highs' are the most common affective symptoms occurring immediately after birth (Gerli et al., 2019) and could result in later depression (Beihaghi et al., 2019); therefore, raised symptoms in the early days following childbirth may deserve clinical attention (Castle, 2008; Zaslou, 1985).

Our finding that mothers' and fathers' 'highs' and 'blues/lows' were moderately correlated is notable and has several explanations. One explanation is assortative mating, or the tendency for mated pairs to be more similar to each other phenotypically than would be expected if they were mated at random, is a potential mechanism associated with similarity of response (Merikangas & Spiker, 1982). Evidence of assortative mating in couples is well established for psychiatric disorders (Dudley et al., 2001; Gregory, 1959; Kreitman, 1962; Mathews & Reus, 2001; Nielsen, 1964; Nordsletten et al., 2016). However, to our knowledge, no study has reported that this phenomenon also occurs in transitional, non-pathological responses such as 'highs' and 'blues/lows' following childbirth. Alternative explanations exist for similarity in partners' responses; for example, it might be that the shared stresses (or delights and excitements) about the event of childbirth and the surrounding conditions give rise to similarity in partners' response. There may also be synergistic processes leading parents who respond to childbirth with the 'blues/lows' to accentuate and reinforce each other's depressed affect. The degree of similarity should not be overstated, however: the modest overlap of 'highs' and 'blues/lows' between partners, which was less than the mood correlations within partners, implies some degree of unique experiences of the same childbirth event.

Additionally, fathers can experience hormonal alterations during their partner's pregnancy and postpartum phase, which might predispose early mood symptoms associated with later development of postpartum depression (Kim & Swain, 2007). Data on maternal and paternal mood prior to and during pregnancy would be needed in order to differentiate these alternative hypotheses. The implication of these findings for clinical settings is a reminder that interventions to prevent occurrence or ameliorate symptoms should focus on both parents, since fathers may also require attention, support and follow-up.

Notably, within mothers and fathers, 'highs' and 'blues/lows' were positively correlated. This agrees with the study from Lane et al. (Lane et al., 1997), which assessed correlates of mood disturbance at 3 days postpartum. They found a positive correlation between the 'highs' and depressive symptoms (as measured with the Edinburgh Postnatal Depression Scale) and concluded that hypomanic and depressive symptoms might have some degree of overlap and can be experienced simultaneously. Moreover, Miller and Rukstalis (Miller & Rukstalis, 1999) suggested that mood lability and hypomanic-like symptoms are essential parts of the postpartum 'blues' symptomatology. Conversely, others (Glover et al., 1994)



found weak or no associations between the ‘blues’ and the ‘highs’, suggesting that analyses may be needed on more diverse samples and over longer follow-up periods.

Our finding that parental higher professional occupation is associated with poorer early bonding may corroborate research on the role of fathers in the Swiss society (Valarino, 2017). For instance, in the work environment, men face the assumption that fatherhood is mostly about financial provision for the family (Burnett et al., 2013; Højgaard, 1997); employed fathers have been recognised as caregivers by the Swiss electorate only since 2020 – after the current study data were collected – when new legislation introducing paternity leave for fathers was approved. Evidence from other settings suggests that support from employers, such as paid paternity leave, may help fathers adapt to stressors commonly experienced in the postpartum period (Kim & Swain, 2007). It may be that changes in paternal leave practices may modify the results obtained in this study. This is an important area of social policy-psychological research that warrants further investigation.

Interestingly, although there is some indication that maternal postpartum ‘highs’ is a risk factor for later postpartum depression (Castle, 2008; Chessick & Dimidjian, 2010; Glover, 2014), we found that parental ‘highs’ predicted more positive bonding in the neonatal period. Feeling elated and excited in the immediate postpartum days was associated with a more loving, protective and close perceived relationship between parents and babies; early ‘blues/lows’ did not have an independent prediction. Of note, we did not find a gender moderation between parental symptomatology in relation to bonding. Further follow-up would be necessary to determine if this effect on perceived bonding persists into the period of risk for postpartum depression and extends to parenting behaviour and child–parent attachment.

Several limitations of the study should be noted. Although we used an established measure of bonding, clinical application would require that these parental reports are substantiated with observational methods and longer-term follow-up taking into account parental mood after the period here investigated. Also, the sample size was modest, which limited the number of covariates and suggests a need for replication. In addition, the study identified a generally middle-class Swiss sample; generalisation to families from diverse socio-demographic backgrounds requires replication and extension.

In conclusion, our results show similarities in parental affective symptoms in the first 5 days after childbirth, and how this can be related to their bonding towards their baby. Future research on biological data possibly correlating to fathers’ emotional reaction after childbirth is warranted. Coordinated parental mood symptomatology following childbirth may persist and develop to a more important disorder throughout the postpartum period and deserve clinical attention.

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No potential conflict of interest was reported by the authors.

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## Authors' contributions

MK designed the study, wrote the proposal and supervised the project. CPA acted as project manager. RAC analysed the data. TOC, MK and VG verified the analytical methods. VG, MK and TOC supervised the interpretation of the results. RAC took the lead in writing the manuscript. All authors provided critical feedback and contributed to the final version of the manuscript.

## Contributions of the paper

- Fathers had higher 'highs' and bonding scores than mothers. Mothers had higher 'blues' scores upon comparison with fathers.
- There was significant and moderate correlation between mothers and fathers in both the 'blues/ lows' and the 'highs' following childbirth.
- Associations between parental early affective symptoms and reported bonding were similar for partners: better bonding was associated with 'highs'.

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