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Research report

A new concept of maternity blues: Is there a subgroup of women with rapid cycling mood symptoms?

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ABSTRACT

Background: Rapid cycling mood symptoms during the first postpartum week are an important aspect of maternity blues. The aim of this study is to identify women with these rapid cycling mood symptoms in the general population and to investigate possible risk factors of these symptoms.

Methods: The Maternity Blues Scale (MBS) was validated in The Netherlands in 949 women at one week postpartum. Personal and family history of mood disorders and obstetric demographics were collected and the Edinburgh Postnatal Depression Scale (EPDS) was completed. A 16-item three-factor MBS solution was found: depression, negative and positive affect. The latter two were used to define a rapid cycling mood symptoms group.

Results: Using the 75th percentile cut-off, 20 (2%) women reported high negative/high positive affect (rapid cycling mood group) and 65 (7%) women were depressed (EPDS $\geq$ 11). A previous episode of depression, major life events and instrumental delivery were independently related to depression (OR 3.5, 2.5 and 2.3, respectively) while only a history of depression in first-degree relatives was independently related to rapid cycling mood (OR 3.4, 95% CI 1.2–9.8).

Limitations First, no syndromal diagnoses were obtained for depression and rapid cycling mood disorder. Second, history of depression was self-reported (not based on structural psychiatric interviews). Third, our study was not designed to study the longitudinal follow-up of women with rapid cycling mood symptoms.

Conclusion the 16-item MBS could be useful in screening programs in detecting postpartum women at risk for (severe) mood disorders. Postpartum women with 'rapid cycling mood symptoms' can be identified with a possible more familiar form of mood disorder.

1. Introduction

Within the first week following childbirth, a considerable proportion of women shows signs of intense short-lasting mood changes, commonly described as 'the blues'. Dysphoric mood, irritability, emotional lability, crying, anxiety, sleep disturbance and poor concentration are common symptoms of the blues which have longtime been described (Kendell et al., 1981, 1984; Kennerley and Gath, 1989; O'Hara et al., 1990, 1991; Andrews-Fike, 1999; Stewart et al., 2003). Prevalence rates reported in the literature vary from 40% to 80%, (O'Hara and McCabe, 2013). Postpartum or maternity blues are regarded as a physiological phenomenon, with a characteristic peak between three and five days postpartum, most likely to be explained by abrupt endocrine changes (Buttner et al., 2012; Fooladi, 2006; Gonidakis et al., 2007; O'Hara and McCabe, 2013). The pathophysiological background is complex, for which at risk women might have differential sensitivity to the alteration of hormones, instead of altered levels of the hormones themselves (Bloch et al., 2003). Recently, one study proposed a neurobiological model of estrogen decline, followed by elevated MAO-A binding, leading to the blues (Sacher et al., 2010). Another model proposed hypercortisolism, followed by a transient adrenal suppression leading to postpartum blues (Kalantaridou et al., 2007; O'Keane et al., 2011). Further, a few studies have suggested that

Abbreviations: EPDS, Edinburgh Postnatal Depression Scale; CFA, Confirmatory Factor Analysis; CFI, Comparative Fit Index; MBS, Maternity Blues Scale; NFI, Normed Fit Index; RMSEA, Root Mean Square Error of Approximation; TLI, Tucker-Lewis Index; EFA, explorative factor analysis

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the occurrence of postpartum blues could be related to increased tryptophan breakdown, a physiological phenomenon of pregnancy and the postpartum period (Maes et al., 2002; Kohl et al., 2005) or that serotonin and/or adrenergic activity is related to the occurrence of blues (Doornbos et al., 2008).

Interestingly, apart from negative affect symptoms, blues symptoms also include positive affect symptoms and rapid cycling mood changes: from crying spells and irritability to elated feelings and happiness. Thus far, most research has been focused on negative affect symptoms of the blues such as depression, anxiety and distress. Kennerley and Gath (1989) developed the Maternity Blues Scale (MBS) to assess maternal mood symptoms during the first postpartum week. They showed that mood symptoms in the early postpartum period differed from those at other times in a woman's life (e.g., after major gynecological surgery, Iles et al., 1989). A two factor structure has been described within the MBS: positive affect (PA) and negative affect (NA), PA is defined by mood items such as elated, alert, confident, mentally relaxed, whereas NA is characterized by descriptors such as irritability, helpless, oversensitive and afraid.

It is remarkable that most if not all of this research on the MBS does encompass dimensions of positive affect, but these positive items are recoded to enable that higher scores reflect higher 'negative affect' symptoms. Consequently, both positive affect and – hence – rapid mood changes in the early postpartum period are understudied. However, the positive symptoms and mood changes should not be overlooked, given the high risk for the first onset or exacerbation of bipolar-spectrum mood episodes in the postpartum period (Munk-Olsen et al., 2006; Sharma et al., 2009). Mania and affective psychosis are 22 times more prevalent in the early postpartum period compared to any other period in a women's life (Munk-Olsen et al., 2009). In addition, there is general consensus that bipolar depression is highly prevalent particularly in the postpartum period. Unfortunately, the actual prevalence of bipolar postpartum depression is unknown because bipolar depression postpartum is often misdiagnosed as unipolar depression (Sharma et al., 2009; Sharma and Xie, 2011). Accordingly, the present study was designed to identify women in the general postpartum population with high scores on both negative and positive affect ('rapid cycling mood symptoms'). Primary aim of the study was to validate the MBS for use in The Netherlands. Secondary aim was to evaluate determinants of high scores in women who reported high levels of positive and negative mood within the first postpartum week and compare them with determinants of depression during the first postpartum week. We hypothesized that women with 'rapid cycling mood symptoms' will have different characteristics compared to women with depression symptoms during the first postpartum week.

2. Method

2.1. Study design

The study used a prospective longitudinal design and included three steps. The first step evaluated the psychometric properties of the translated scale. The second step consisted of another statistical analysis to confirm the structure of the first draft of the Dutch scale. The third step included concurrent validity analysis and research into determinants of high scores on several instruments (MBS and EPDS) that were used.

2.2. Procedure and participants

A Dutch translation of the Maternity Blues Scale (MBS) of Kennerley and Gath (1989), a 28-item self-rating scale was distributed in seven community midwife offices to examine its psychometric properties. A total of 1347 third late trimester (32–34 weeks) pregnant women visiting their midwife were invited to participate in the study. Women who signed the informed consent and met all inclusion criteria were asked to fill in the 28 full-item version of the MBS, the 10-item version of the EPDS and some additional questions regarding obstetric outcome at the seventh postpartum day. Exclusion criteria were: not being Caucasian and not being able to read and understand Dutch sufficiently. In addition, women with preterm birth (<37 weeks of gestation), women who gave birth to a child with serious congenital abnormality or had a postnatal hospitalization of the newborn were excluded from the analysis. The total sample of respondents was randomly divided into two subsamples. Sample I was used to conduct an explorative factor analysis (EFA) while sample II was used to conduct a Confirmatory Factor Analysis (CFA). Thereafter, data from sample I and II were merged for further analysis.

The study was approved by the Medical Ethics Research Committee of the Máxima Medical Centre in Veldhoven, The Netherlands.

2.3. Measurements

The MBS (Kennerley and Gath, 1989) was used to assess blues symptoms. The original draft of this scale consisted of 47 different items adjectives describing women's emotional experiences during the first few days following childbirth. Construct analysis resulted in a 28-item scale including seven clusters: primary blues, decreased alertness, hypersensitivity, decreased self-confidence, depression, despondency, and reservation (Kennerley and Gath, 1989). In general the positive items are recoded to achieve a total score where higher scores reflect higher intensity of blues symptoms. Contrarily to the original scale, the Dutch version had a 5-point Likert scale referring to symptoms during the first postpartum week (much less than usual, less than usual, no different, more than usual, much more than usual) and the positive items were not recoded. The Edinburgh Postnatal Depression Scale (EPDS) was used to assess maternal depression (Cox et al., 1987) during the first postpartum week. The EPDS is a brief self-rating scale, total EPDS scores range from 0 to 30, higher scores indicate more depressive symptoms. The EPDS has extensively been validated in The Netherlands in the postpartum as well as during pregnancy (Pop et al., 1992; Bergink et al., 2011) and is commonly the most widely used scale to assess depressive symptoms in the postpartum period. Using a cut-off of 11, clinical depression is detected in up to 60% of the cases with adequate specificity and sensitivity. Demographic characteristics were obtained including age, marital status, educational level, obstetric features including parity and mode of delivery. Moreover, a concise set of questions was asked with regard to life time depression. First, the women were asked whether they had a diagnosis of depression earlier in life. Second, they were asked whether one or both parents or sister(s) and/or brother(s) (first-degree family members) were diagnosed with depression. Finally, they were asked whether a major life event (not in relation to childbearing or the baby's health) did occur during pregnancy and the first postpartum week.

2.4. Statistical methods

Statistical analyses were performed using SPSS (version 20.0, IBM, Chicago, Illinois, USA). An explorative factor analysis (EFA) with varimax rotation was performed on the full 28-item version of the MBS in sample I. Factor loadings above 0.40 were considered important. If an item loaded on more than one dimension and the differences were less than 0.20, the item was deleted. Subsequently, Confirmatory Factor analysis (CFA) was performed on the retaining items of the MBS to test the stability of the factor structures found with EFA. The Confirmatory Factor analysis (CFA) was done using AMOS (version 20, IBM, Chicago, Illinois, USA). Adequate model fit can be assumed with a comparative fit index (CFI) ≥ 0.80, combined with a Normed Fit Index (NFI) ≥ 0.80, a Tucker-Lewis Index (TLI) ≥ 0.80 and a Root Mean Square

Error of Approximation (RMSEA) ≤ 0.05 for good and ≤ 0.08 for adequate fit (Browne and Cudeck, 1993; Hu and Bentler, 1999). Thereafter, sample I and II were merged ($N=949$) to test the concurrent validity of the MBS by correlating the MBS (sub) scale(s) with the EPDS (Pearson's *r*-correlations, two-tailed). Moreover, different groups of women were defined according to scores on the MBS subscales. Differences between these groups with regard to the occurrence of earlier depression in the woman herself as well to depression in first-degree relatives were analyzed using χ^2 statistics. Finally, two logistic regression analyses were performed (OR, 95% CI). In the first analysis we used depression according to the EPDS scores (cut-off ≥ 11) as dependent variable and the lifetime and first-degree relatives depression as independent variables. In the second regression analysis blues scores as dependent variable and the same independent variables were used. Both regressions were adjusted for mode of delivery (spontaneous versus instrumental), educational level, the occurrence of a major life event during the first postpartum week, parity and age.

3. Results

3.1. Patient sample

A total of 1094 women met the inclusion criteria and consented to participate, of whom 979 (89%) fully completed the questionnaires at the seventh day postpartum. Thirty women with preterm birth and/or neonates with severe congenital conditions and/or hospitalization during the first postpartum week were excluded resulting in 949 women for the analysis. The two samples consisted of 463 (sample I) and 486 (sample II) women with similar characteristics (Table 1). In total, 42.7% of the women in this study were primiparous and 76.1% of the childbirths occurred spontaneously.

3.2. Validation of the MBS

In sample I, all items were normally distributed, except the item 'tiredness' (item 21 kurtosis >3), which was therefore eliminated (Kline, 2011). An 'open' EFA factor analysis revealed five dimensions with an Eigen value >1, but factor 4 and 5 showed an Eigen value of 1.16 and 1.13, respectively, including less than four items. Moreover, Catell's scree plot suggested a three-component solution. Therefore, a three-factor analysis with varimax rotation was performed, explaining 49% of the variance (Table 2). EFA showed eight items (items 3, 4, 7, 13, 22, 23, 26, 27) loading on more than one factor with less than 0.20 difference and were therefore omitted, resulting in a 19-item total blues scale (items 1, 2, 5, 6, 8–12, 14–20, 24, 25, 28). The negative affect subscale consisted of six items (1, 2, 9, 17, 20, 25), the depression subscale of six items (6, 10, 11, 14–16) and the subscale positive affect

Table 2
Explorative factor analysis with varimax rotation in 463 women (sample I), showing a three-factor solution of the Dutch Maternity Blues Scale (MBS).

	Factor I Negative affect	Factor II Depression	Factor III Positive affect
Eigenvalue	**9.3**	**2.4**	**1.5**
Percentage of variance explained	**34.6**	**8.8**	**5.6**
1. **Tearful**	**0.73**		
2. **Mentally tense**	**0.62**	0.28	0.25
3. Able to concentrate	0.48		0.33
4. Feeling down	0.39	0.59	0.24
5. **Elated**			**0.72**
6. **Helpless**	0.35	**0.62**	
7. Difficult to show feelings	0.29	0.47	
8. **Alert**			**0.68**
9. **Forgetful, muddled**	**0.53**	0.23	
10. **Anxious**	0.40	**0.63**	
11. **Wishing you were alone**	0.30	**0.56**	
12. **Mentally relaxed**	0.34		**0.66**
13. Brooding on things	0.52	0.33	
14. **Feeling sorry for yourself**	0.27	**0.68**	
15. **Emotionally numb**		**0.69**	
16. **Depressed**	0.28	**0.75**	
17. **Over-emotional**	**0.58**	0.38	
18. **Happy**		0.30	**0.52**
19. **Confident**	0.24		**0.67**
20. **Changeable in your spirits**	**0.63**	0.25	
22. Irritable	0.48	0.36	0.23
23. Crying without being able to stop	0.53	0.42	
24. **Lively**			**0.69**
25. **Over-sensitive**	**0.73**	0.25	
26. Up and down in your mood	0.54	0.47	0.27
27. Restless	0.40	0.51	
28. **Calm**	0.23		**0.56**

To retain items (**bold**, $n=19$) a cut-off score of item loading of 0.40 was used and a minimum difference of 0.20 if an item had two or more loadings. Total explained variance is 49%.

Table 1
Characteristics of the two samples of women who recently gave birth (total $N=949$).

Characteristics	Sample I ($N=463$)				Sample II ($N=486$)			
	n	**%**	**Mean (SD)**	**Range**	***n***	**%**	**Mean (SD)**	**Range**
Demographics								
Age (in years)			30.3 (3.3)	21–40			30.2 (3.5)	21–41
Marital status: with partner	461	99.4			483	99.5		
Educational level								
Low	93	20.1			113	23.3		
Medium	179	38.7			186	38.3		
High	191	41.3			187	38.5		
Obstetric features								
Parity								
Primiparous	191	41.3			214	44.0		
Multiparous	272	58.7			272	56.0		
Mode of delivery								
Spontaneous	351	75.9			372	76.5		
Induced	59	12.7			53	10.9		
Forceps/vacuum	37	8.0			48	9.9		
Cesarean section	16	3.4			13	2.7		

of seven items (5, 8, 12, 18, 19, 24, 28). Subsequently, in sample II, a CFA was performed on this first 19-item draft but did not show an adequate model fit (NFI=0.84, TLI=0.85, CFI=0.87, RMSEA=0.09.) After removing three items that showed poor standardized residual covariances (item 2, 10, 18), a three-factor structure with 16 items showed an adequate model fit (NFI=0.89, TLI=0.90, CFI=0.92 and RMSEA=0.07). These three subscales are shown in Table 2.

The positive items were not recoded meaning that higher scores on the positive affect scale reflected positive mood (six items, Cronbach's α=0.87), higher scores on the subscale 'negative affect' (five items, α=0.80) reflected negative mood and higher scores on the 'depression' subscale (five items, α=0.76) depression. When we recoded the positive items, Cronbach's α for the total 16-item scale was 0.88. When we repeated the analysis with a two factor structure in the EFA in sample I as suggested by Buttner et al. (2012), followed by CFA in sample II, we were unable to find an adequate model fit (data not shown). Due to comparable characteristics (Table 1), sample I and II (total N=949) were merged for further analyses. Another EFA with the 16-item solution on this total sample confirmed three dimensions with no overlap of items and a total explained variance of 58%. All three MBS subscales (negative affect, positive affect and depression) correlated highly and significantly with the EPDS: r=0.59, 0.57 and 0.61, respectively ($p<0.001$, two-tailed, large effect size according to Cohen (1992)).

The mean scores of the 16-item total (recoded) MBS scale were 41.2 (SD: 13.2, range: 16–86), the five-item subscale negative affect 15.1 (SD: 6.4, range: 5–30), the five-item subscale depression 11.9 (SD: 6.2, range: 6 to 31), the six-item subscale positive affect 16.9 (SD: 4.8, range: 6–36) and the EPDS 4.2 (SD: 3.7, range: 0–25). Subsequently, only the subscales negative affect and positive affect of the MBS were used for further analysis, together with the EPDS.

In the total sample, there were 176 (18%) women who reported a previous episode of depression earlier in life and 103 women (11%) reported depression to occur in first-degree relatives. There were 15 women (1.6%) reporting depression both in (one of) the parents as well as a sister or brother.

3.3. Identification of a subgroup of women with 'rapid cycling mood'

The negative and positive affect subscales of the MBS were used to define a rapid cycling mood symptoms group. Because descriptive statistics showed a normal distribution for both subscales, we defined scores $\geq$75th percentile cut-off as 'high' negative affect and as 'high' positive affect. Four different groups were discriminated (Table 3). The first group consisted of 418 women with low negative and low positive affect; the second group of 234 women with low negative and high positive affect; the third group, the 'rapid cycling mood symptoms group', consisted of 20 (2%) women with high negative affect and high positive affect and the fourth group of 269 women reporting high negative affect and low positive mood.

3.4. Women with depressive features compared to women with rapid cycling mood

During the first postpartum week, 65 (7%) women were depressed (EPDS score $\geq$11). In these 65 women, 27 (42%) reported a previous episode of depression earlier in life, compared to 149 women (17%) in the remaining 884 women without depression on the EPDS (χ^2=24, df=1, $p<0.001$). There was no difference between the depressed and non-depressed group with regard to a first-degree relatives history of depression: 14% versus 11%. Twenty women (2%) had a 'rapid cycling mood symptoms'. These women reported significantly more often a history of depression in first-degree family (parents or brother/sister) (30%) and in both parents and brother/sister (10%) compared to the other groups. A previous history of depression did occur significantly more often in the rapid cycling mood group and in the 'high negative affect and low positive affect' group (Table 3). Depression according to

Table 4
Adjusted Odd Ratios (OR) in 949 women assessed during the first postpartum week with rapid cycling mood symptoms as dependent variable in Table 4a, and depression (EPDS $\geq$ 11) as dependent variable in Table 4b.

Parameter	OR	95% CI
A. Dependent variable: rapid cycling mood symptoms		
First-degree relative's depression	3.4	1.2–9.8*
Previous episode of depression	1.6	0.5–4.1
Depressed according to EPDS $\geq$ 11	1.8	0.7–4.9
Age (per year)	1.03	0.97–1.1
Primiparity	0.7	0.3–1.8
Major life events	1.01	0.97–1.1
Instrumental delivery	1.9	0.6–7.1
High educational level	1.4	0.9–2.1
B Dependent variable: depression (EPDS $\geq$ 11)		
First-degree relative's depression	1.2	0.8–2.8
Previous episode of depression	3.5	1.9–6.2*
Rapid cycling mood symptoms	1.5	0.2–11
Age (per year)	0.9	1.01–1.1
Primiparity	0.6	0.4–1.3
Major life events	2.5	1.4–4.7
Instrumental delivery	2.3	1.3–3.9
High educational level	1.02	0.8–1.3

* $P<0.05$; EPDS=Edinburgh Postnatal Depression Scale.

Table 3
Prevalence of personal and family history of depression and number of women with depression (EPDS $\geq$ 11) in four subgroups of women according to scores on the subscales 'negative affect' and 'positive affect' using the 75th percentile cut-offs.

Subgroups	total N=949 N (%)	Depression earlier in life (N=176) N (%)	Depression in first-degree relatives (N=103) N (%)	Depression in parent(s) and brother/sister (N=15) N (%)	EPDS $\geq$ 11 during first postpartum week (N=65) N (%)
1) Low negative, low positive affect	418 (44)	68 (16)	36 (9)	9 (2.2)	8 (2)
2) Low negative, high positive affect	259 (27)	37 (14)	31 (12)	1 (0.4)	1 (0.4)
3) High negative, high positive affect(*rapid cycling mood*)	20 (2)	6 (30)	6 (30)	2 (10)	1 (5)
4) High negative, low positive affect	252 (27)	65 (26)	30 (12)	3 (1.2)	55 (22)
		χ^2=15.0 (df=3) P=0.002	χ^2=9.8 (df=3) P=0.02	χ^2=12.6 (df=3) P=0.006	χ^2=121.6 (df=3) $P<0.001$

EPDS: Edinburgh Postnatal Depression Scale.

an EPDS score >11 occurred significantly more often in the women with high negative and low positive affect.

Finally, Table 4 shows two multiple logistic regression analyses; 4a with rapid cycling mood (yes/no) as dependent variable, and 4b with depression (yes/no, EPDS ≥ 11) as dependent variable, adjusted for a previous episode of depression, a first-degree relative's history of depression, age, parity, the occurrence of a major life event, spontaneous versus instrumental delivery (ventouse, forceps, cesarean section) and educational level. As can be seen in Table 4a, the only variable which was independently related to rapid cycling mood symptoms during the first postpartum week was a history of depression in the first-degree relatives. A previous episode of depression, the mode of delivery, as well as the occurrence of a major life event were not related to rapid cycling mood symptoms. Also, depression according to the EPDS was not related to rapid cycling mood symptoms. In Table 4b, it is shown that a previous episode of depression, the occurrence of a major life event as well as an instrumental delivery were independently related to depression on the EPDS during the first postpartum week while rapid cycling mood symptoms did not contribute to depression.

4. Discussion

In the general population, a small subgroup of women (2%) reported high levels of negative as well as high levels of positive affect during the first week postpartum. These symptoms were measured on the 16-item validated Maternity Blues Scale and were defined as 'rapid cycling mood symptoms'. In an adjusted model, only a family history of first-degree relative's depression was significantly associated with these mood swings, while psychosocial predictors of depression did not show any association with rapid cycling mood. In contrast, women with depression (EPDS ≥ 11) showed a different pattern. A troublesome delivery, previous episode of depression and major life events were all associated to postpartum depression but there was no significant association with a first-degree family history of psychiatric illness. Together, these findings suggest that women with 'rapid cycling mood' symptoms represent a distinct subgroup of postpartum women.

The validation process (with EFA and CFA) in the current study of the Dutch version of the MBS of Kennerley and Gath (1989) revealed a 16-item scale with three subscales with adequate model fit: negative affect (five items, $\alpha=0.80$), positive affect (six items, $\alpha=0.87$) and depression (five items, $\alpha=0.76$). The three subscales corresponded with several of the seven clusters as described by Kennerley and Gath (1989). When we investigated a two-factor structure, as proposed by Buttner et al. (2012) the CFA did not result in an adequate model fit. Due to the availability of the extensively validated EPDS there seems no need for other (sub)scales to assess depression in the early postpartum period. Therefore, only the subscales negative and positive affect were used for further analysis defining a group of women who report both high levels of negative and positive affect.

Both in clinical practice and for research purposes, positive items on a MBS scale are usually recoded. This is remarkable while it has longtime been recognized that – apart from the typical crying spells, feeling tense and irritability – the blues concept includes also abrupt changes of low and high mood: from one moment of crying or irritability without any reason the woman feels elated, happy or 'mentally relaxed'. In the literature, it has repeatedly been reported that severe blues might be a risk factor for subsequent postpartum depression (Hapgood et al., 1988; Henshaw et al., 2004; O'Hara and McCabe, 2013; Reck et al., 2009). Thus far, prospective studies investigating the association between severe blues and bipolar depression related disorders such as postpartum psychosis are lacking due to the lower prevalence of the disorder.

The characteristics of the women with rapid cycling mood symptoms in the current study suggest a strong familiar component: the prevalence of a history of depression of first-degree relatives was the highest in those with rapid cycling mood symptoms. Furthermore, in the adjusted model, rapid cycling mood symptoms were only related to a history of depression in first-degree relatives and not to 'classical' determinants of unipolar depression. These findings are highly suggestive for a clear link with bipolar-spectrum disorders, as bipolar disorders have a heritability estimate of 80–90%, compared to 33–42% for unipolar depression (Craddock and Forty, 2006).

5. Limitations

This study has several limitations. First, no syndromal diagnosis was obtained for depression and rapid cycling mood disorder. Second, life and family history of depression was self-reported and not based on a structural psychiatric interview (with a distinction between unipolar and bipolar depression), which could have led to recall bias, for all groups. Third, our study was not designed to study the longitudinal follow-up of women with rapid cycling mood symptoms the first year postpartum.

The strength of the study is a new approach to the blues concept, the large sample size and the standardized way of assessment of symptoms at the seventh postpartum day. Clinician's and researchers could use the short 16-item version of the MBS with special attention to the two subscales negative and positive affect to define a subgroup with 'rapid cycling mood' symptoms (Table 3). Future research should include a psychiatric interview – with special attention to life time history of depressive and hypomanic episodes. Also, longitudinal postpartum follow-up data are essential to investigate whether these women are at particular high risk for subsequent episodes of unipolar or bipolar mood disorders during the postpartum period. In conclusion, the Dutch validation of the Maternity Blues Scale resulted in a 16-item MBS scale with three dimensions: positive and negative affect and depression. The combined use of the sub-scales 'positive affect (not recoded!) and negative affect' enables researchers and clinician to detect women with rapid cycling mood symptoms. A family history of depression was an important determinant of rapid mood cycling. After delivery, the 16-item MBS could be useful in screening programs, together with the EPDS to detect postpartum women at risk for both unipolar and bipolar mood episodes.

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Conflict of interest
The authors declare that they have no competing interests.

Contribution to authorship

VP, HW, MvS and VB were involved in conception and design of the study. VP, HW, VS and ST were involved in data collection and performed the statistical analyses. VP, ST, VS and VB drafted the manuscript. HW and MvS reviewed the manuscript. All authors read and approved the final manuscript.

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Appendix: The 16-item Maternity Blues Scale

Below is a list of words which newly delivered mothers have use to describe how they are feeling. Please indicate how you have been feeling during the first postpartum week, including today.

more usual	Much less than usual	Less than usual	No. different	More than usual	Much than
1. Tearful	□	□	□	□	□
2. Elated	□	□	□	□	□
3. Helpless	□	□	□	□	□
4. Alert	□	□	□	□	□
5. Forgetful, muddled	□	□	□	□	□
6. Wishing you were alone	□	□	□	□	□
7. Mentally relaxed	□	□	□	□	□
8. Feeling sorry for yourself	□	□	□	□	□
9. Emotionally numb	□	□	□	□	□
10. Depressed	□	□	□	□	□
11. Over-emotional	□	□	□	□	□
12. Confident	□	□	□	□	□
13. Changeable in your spirits	□	□	□	□	□
14. Lively	□	□	□	□	□
15. Over-sensitive	□	□	□	□	□
16. Calm	□	□	□	□	□

Sub-scale depression: item 3, 6, 8, 9, 10.
Sub-scale negative affect: item 1, 5, 11, 13, 15.
Sub-scale positive affect: 2, 4, 7, 12, 14, 16.

Adapted from the 28 item Maternity Blues Scale (Kennerley and Gath, 1989).

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