Research report

Anxiety in pregnant and postpartum women. An exploratory study of the role of maternal orientations

Johan C.H. van Bussel^{a,*}, Bernard Spitz^b, Koen Demyttenaere^{a,c}

^a Institute of Family and Sexuality Sciences, Department of Public Health, Faculty of Medicine, Katholieke Universiteit Leuven, Belgium

^b Department of Gynaecology and Obstetrics, University Hospital Gasthuisberg, Leuven, Belgium

^c Department of Neurosciences and Psychiatry, University Hospital Gasthuisberg, Leuven, Belgium

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Abstract

Background: Little is known about why some women are anxious during pregnancy but not in the postpartum period, or vice versa. We aimed to determine the influence of maternal antenatal orientations (Raphael-Leff, J. (2005) *Psychological Processes of Childbearing*, London, The Anna Freud Centre.) on the prevalence of general anxiety symptoms and specific anxiety in pregnant and postpartum women.

Methods: Four hundred and three pregnant women participated in a longitudinal study and completed general (HADS-A) and specific (PRAQ, MSAS) anxiety questionnaires and measures of maternal antenatal orientations, personality traits, cognitive and behavioural coping styles and attachment.

Results: Higher scores on the neuroticism and regulator orientation scale consistently predicted higher scores on the general and pregnancy related anxiety measures. Also, an interaction effect was found between the regulator scale and the neuroticism scale on the general anxiety symptoms and pregnancy related anxiety. Finally, the facilitator orientation scale and the neuroticism scale, predicted maternal separation anxiety in the postpartum period.

Conclusion: Women differ in the risk factors, the nature and timing of heightened anxiety during the transition to motherhood. The anxieties of women tending to the regulator orientation are pregnancy related, whereas women tending to the facilitator orientation fear the separation from their child in the postpartum period.

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1. Introduction

Pregnancy is a major life event that confronts women with specific physical, psychological and social

changes. Maternal mood changes and general feelings of anxiety are therefore common in this period, but their prevalence and severeness are not found to be significantly different from non-pregnant women (van Bussel et al., 2006). High levels of antenatal anxiety, however, have been identified as a strong predictor of depressive disorder in postpartum women (Robertson et al., 2004). Also, associations were found with obstetric outcome (premature delivery, longer duration of labor, more use of analgesia), neonatal outcome

* Corresponding author. Institute of Family and Sexuality Sciences, Faculty of Medicine, Katholieke Universiteit Leuven, Kapucijnenvoer 33, 3000 Leuven, Belgium. Tel.: +32 16 32 26 26; fax: +32 16 32 26 20.

E-mail address: johan.vanbussel@med.kuleuven.be (J.C.H. van Bussel).

(lower birth weight, lower apgar score, smaller head circumference) and mental health in childhood (ADHD symptoms, externalizing problems, depressed mood and anxiety) (Dunkel-Schetter, 1998; Copper et al., 1996; Standley et al., 1979; Morris and Haddah, 1989; Lou et al., 1994; van den Bergh and Marcoen, 2004; van den Bergh et al., 2008). But since many of these associations were not confirmed or based on small populations, more research on the determinants and effects of antenatal and postpartum anxiety is needed (Littleton et al., 2007; Johnson and Slade, 2003).

There is a need in anxiety research to consider anxiety in pregnant and postpartum women as a multidimensional phenomenon. Indeed, antenatal and postpartum anxiety have often been operationalized with general anxiety measures (Huizink et al., 2004). Several authors, however, identified specific antenatal and postpartum fears and worries — like fear for labor pain, the integrity of the fetus, or changes in personal and marital life (Standley et al., 1979; Areskog et al., 1981; Beck et al., 1980; Burstein et al., 1974; Elliott et al., 1983; Leifer, 1977; Rizzardo et al., 1985; Sjogren, 1997). As a result, a number of specific antenatal and postpartum anxiety measures have been developed (Levin, 1991; Areskog et al., 1982; van den Bergh, 1989; Melender, 2002; Statham et al., 1997; Yali and Lobel, 1999; Da Costa et al., 1998; Hock et al., 1989). But although pregnancy specific anxiety measures predict birth outcomes independently and at least as well as general anxiety measures (Rini et al., 1999; Wadhwa et al., 1993), the latter are far more commonly used in recent antenatal and postpartum research.

Sociodemographic (age, marital status, socio-economical status), intrapersonal (self-esteem, neuroticism, negative life experiences), social (marital dissatisfaction, lack of social support) and pregnancy related clinical (risk status of pregnancy, previous pregnancy experiences) variables have been associated with higher levels of anxiety in pregnant women (Areskog et al., 1983; Armstrong and Hutti, 1998; Cox et al., 1982; Da Costa et al., 1999; Higgins et al., 1994; Kalil et al., 1993; Kemp and Hatmaker, 1989; Levin, 1991; McVeigh and Smith, 2000; Melender, 2002; Norbeck and Anderson, 1989; Paarlberg et al., 1999; Pagel et al., 1990; Saisto and Halmesmaki, 2003; Saisto et al., 2001; Westbrook, 1978). In contrast, little is known about how maternal expectations, experiences beliefs and attitudes about the pregnancy, the child and motherhood, relate to antenatal and postpartum anxiety. Indeed, women's approach of pregnancy and motherhood varies considerably. Nevertheless, based on her clinical experi-

ence and small-scale qualitative research, Raphael-Leff differentiated four clusters (called 'maternal orientations') of cognitive and behavioural expressions of underlying intrapsychic processes related to the pregnancy and motherhood (Raphael-Leff, 2005; Sharp and Bramwell, 2004). Women tending to the facilitator orientation, see pregnancy and motherhood as the ultimate proof of their female identity. They follow the flow of the physical and emotional changes, and tend to identification and symbiosis with the fetus. Others fear that motherhood will change their identity and life style too dramatically, and therefore tend more to detachment (regulators). Most pregnant women, however, positively integrate their ambivalent emotions and uncertainties towards the pregnancy and motherhood (reciprocators), whereas a small group of women shifts between the extreme orientations (bipolar mothers). The risk factors, nature and timing of women's psychological disturbance during the pregnancy and the postpartum period, are suggested to differ according to these maternal orientations (Raphael-Leff, 2005; Sharp and Bramwell, 2004). In terms of anxiety, women tending to the regulator orientation are hypothesised to be more vulnerable to pregnancy related anxieties, whereas women tending to the facilitator orientation are suggested to be more prone to separation anxiety in the postpartum period.

In the present study, we further investigate the role of these maternal orientations on the prevalence of both general anxiety symptoms and specific antepartum and postpartum anxiety. In addition, the predictive value of the maternal orientations will be compared with the predictive value of other intrapersonal variables known for their association with anxiety.

2. Participants and methods

2.1. Participants

At a routine antenatal clinical at the Gasthuisberg University Hospital Leuven (Belgium) (from July 2005 until March 2006), pregnant women between 8 and 15 gestational weeks, were invited to participate in this study. The women were informed by a nurse or midwife about the aims and design of the study. Both primigravida and multigravida were included. Women pregnant after fertility treatment were also included. Women, younger than 18 years old, or with a poor understanding of Dutch, or with a major physical or psychological complication of the pregnancy, were not invited to participate in this study. Four hundred and three women agreed to participate and gave their written consent.

The participants were asked to complete a booklet of questionnaires in the first (between 8 and 15 weeks: T1), second (between 20 and 26 weeks: T2) and third (between 30 and 36 weeks: T3) trimester of the pregnancy, and between 8–12 weeks (T4) and 20–25 weeks (T5) postpartum. The first booklet was given at the hospital; the following booklets were posted to the participants' home address. Of the 403 women that agreed to participate in the first trimester, we received 330 booklets (81.89%) at T2, 298 booklets (73.95%) at T3, 263 booklets (65.25%) at T4 and 202 booklets (50.12%) at T5. Most frequent reasons for dropout were miscarriage, occurrence of a pregnancy complication and changed address.

Ethical approval for this study was received from the Commission Medical Ethics of the University Hospitals Leuven (5/7/2005).

2.2. Measurements

The sociodemographic information collected included maternal age, education, marital status and labour force status. The participants were also asked to report the number of previous pregnancies and miscarriages, whether their present pregnancy was conceived naturally or by reproductive technology, whether their present pregnancy was planned, and the desired number of own children.

2.2.1. Antenatal and postpartum anxiety

The anxiety subscale of the Hospital Anxiety and Depression Scale (HADS-A) (Zigmond and Snaith, 1983) was used to detect general anxiety symptoms. The HADS-A consists of seven items and responses are rated on a four-point (0–3) response category. The HADS-A is a widely used measure of anxiety and has demonstrated good reliability and validity (Herrmann, 1997). In this study, we found Chronbach's reliability coefficients varying from 0.71 to 0.81. Participants completed the HADS-A at every antenatal and postpartum point of measurement (T1–T5).

The Pregnancy Related Anxiety Questionnaire (PRAQ) (van den Bergh, 1989) was used to measure specific fears and worries related to the participant's pregnancy. The PRAQ consists of 55 items divided over five subscales: fear for delivery (9 items), fear for the integrity of the baby (6 items), concerns about the changing partner relationship (11 items), concerns about the own mood and its effect on the baby (11 items), egocentric feelings/fear for changes (8 items). Responses are rated on a seven-point Likert scale ranging from 'Does absolutely not apply' (1) to 'Applies very well' (7). While

no published psychometric data was found, we found high internal reliabilities for the total scale (0.95 on T1, T2 and T3) and its subscales. Participants completed the PRAQ at every antenatal point of measurement (T1–T3).

The Maternal Separation Anxiety Scale (MSAS) (Hock et al., 1989) was used to measure anxiety and feelings of guilt about leaving the child. The MSAS consists of 35 items divided over three subscales: separation anxiety (21 items), perception of separation effects on the child (7 items), and employment-related separation concerns (7 items). Responses are rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). In this study, we found a high Chronbach's reliability coefficient for the total scale (0.87). Participants completed the MSAS between 20 and 25 weeks postpartum.

2.2.2. Psychological predictor variables

The revised facilitator and regulator scales of the Placental Paradigm Questionnaire (PPQ) (Raphael-Leff, 2005) were used to determine participant's maternal orientation. Both the facilitator and regulator scale consist of five items, like 'In some ways I feel my baby tries to communicate with me' (facilitator) and 'I experience the baby inside me as being hard to satisfy' (regulator). Responses are rated on a four-point scale: a high score reflects the frequent use of that beliefs and attitudes. No psychometric data was previously published. In this study, we calculated moderate internal reliabilities (facilitator: 0.75; regulator: 0.59). Participants completed the scales in the third trimester of the pregnancy.

The NEO Five Factor Inventory (NEO-FFI) (Costa and McCrae, 1992) was used to assess general personality traits in the participants. The NEO-FFI (55 items) is a short form of the NEO-Personality Inventory-Revised (NEO-PI-R) (Costa and McCrae, 1992), a measure of the Five Factor Model of Personality composed of neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness scales. Responses are rated on a five-point scale, ranging from 'strongly disagree' (1) to 'strongly agree' (5). The NEO-FFI is a widely used measure and has demonstrated good reliability and validity (Murray et al., 2003). In this study, we found Chronbach's reliability coefficients varying from 0.64 to 0.75. Participants completed the NEO-FFI in the second antenatal trimester.

The Utrecht Coping List (UCL) (Schreurs and van de Willige, 1988) was used to determine participants coping style. The UCL, a Dutch adaptation of the Westbrook Coping Scale (Westbrook, 1979), consists of 47 items divided over seven subscales: active problem solving, palliative reaction, avoiding/waiting, seeking of

Table 1

Significant results of first and second step multiple robust regression analysis with maternal antenatal anxiety (HADS-A, PRAQ) as dependent variable

	HADS-A									PRAQ								
	T1 (<i>n</i> =403)			T2 (<i>n</i> =330)			T3 (<i>n</i> =298)			T1 (<i>n</i> = 403)			T2 (<i>n</i> =330)			T3 (<i>n</i> = 298)		
	<i>β</i>	SE	<i>t</i>	<i>β</i>	SE	<i>t</i>	<i>β</i>	SE	<i>t</i>	<i>β</i>	SE	<i>t</i>	<i>β</i>	SE	<i>t</i>	<i>β</i>	SE	<i>t</i>
Step 1																		
PPQ																		
Regulator	0.57	0.11	5.32***	0.70	0.11	6.51***	0.79	0.10	7.70***	8.40	1.42	5.90***	11.02	1.54	7.17***	11.89	1.46	8.17***
	(F=28.35***, R ² =0.09)			(F=42.33**, R ² =0.13)			(F=59.32**, R ² =0.17)			(F=34.79***, R ² =0.11)			(F=51.41***, R ² = 0.15)			(F=66.79***, R ² =0.19)		
NEO-FFI																		
Conscientious													−2.35	0.64	−3.67			
Neuroticism	0.28	0.03	9.11***	0.27	0.03	8.81***	0.27	0.03	8.93***	3.31	0.40	8.33***	3.92	0.41	9.55***	4.43	0.43	10.24***
	(F=83.05***, R ² =0.21)			(F=77.68***, R ² =0.20)			(F=79.74***, R ² =0.23)			(F=69.43***, R ² =0.18)			(F=53.15***, R ² = 0.25)			(F=104.89***, R ² =0.27)		
UCL																		
Depressive	0.43	0.06	7.35***	0.54	0.06	9.56***	0.59	0.06	9.86***	6.13	0.74	8.29***	6.12	0.78	7.80***	7.20	0.85	8.43***
Palliative													2.26	0.68	3.31*			
Social support							−0.15	0.05	−3.03*									
	(F=54.07***, R ² =0.14)			(F=91.43***, R ² =0.22)			(F=51.20***, R ² =0.27)			(F=68.79***, R ² =0.18)			(F=41.29***, R ² =0.20)			(F=71.02***, R ² =0.20)		
PBI																		
M Care													−1.28	0.37	−3.51**			
P Care							−0.07	0.03	−2.73*									
P Overprotect	0.11	0.03	3.89***	0.08	0.03	3.02*										1.17	0.42	2.80*
	(F=15.16**, R ² =0.04)			(F=9.12*, R ² =0.03)			(F=7.45*, R ² =0.03)			(F=12.29**, R ² =0.04)						(F=7.86*, R ² =0.03)		
RQ																		
Secure attachm.	−1.55	0.31	−5.04***	−2.21	0.36	−6.11***	−1.12	0.35	−3.17**	−23.63	4.22	−5.60***	−28.50	5.14	−5.55***	−22.51	5.37	−4.19***
	(F=25.39***, R ² =0.06)			(F=37.33***, R ² =0.10)			(F=10.07*, R ² =0.03)			(F=31.36***, R ² =0.07)			(F=30.76***, R ² =0.08)			(F=17.56***, R ² =0.05)		
Step 2																		
Regulator	0.34	0.11	3.18*	0.43	0.10	4.39***	0.50	0.10	5.17***	5.84	1.37	4.26***	7.63	1.37	5.57***	9.56	1.35	7.07***
Neuroticism	0.28	0.03	8.46***	0.12	0.04	3.20*	0.13	0.04	3.27*	2.50	0.40	6.28***	3.17	0.40	7.96***	3.86	0.41	9.41***
Depressive				0.30	0.07	4.01***	0.29	0.07	3.99***									
Palliative													2.51	0.73	3.44**			
Secure attachm.										−18.79	4.65	−4.04***	−18.91	4.97	−3.80**			
	(F=48.75***, R ² =0.28)			(F=39.89***, R ² =0.32)			(F=44.87***, R ² =0.35)			(F=33.66***, R ² =0.27)			(F=42.26***, R ² =0.39)			(F=87.19***, R ² =0.41)		

* $p > 0.01$, ** $p > 0.001$, *** $p > 0.0001$.

Table 2

Significant results of first and second step multiple robust regression analysis with maternal postpartum anxiety (HADS-A, MSAS) as dependent variable

	HADS-A						MSAS		
	T4 (<i>n</i> =263)			T5 (<i>n</i> =202)			T5 (<i>n</i> =202)		
	<i>β</i>	SE	<i>t</i>	<i>β</i>	SE	<i>t</i>	<i>β</i>	SE	<i>t</i>
Step 1									
PPQ									
Facilitator							1.20	0.31	3.83**
Regulator	0.90	0.09	10.08***	0.59	0.11	5.15***	1.66	0.55	3.04*
	(F=101.69***, R ² =0.29)			(F=26.52***, R ² =0.12)			(F=9.62**, R ² =0.08)		
NEO-FFI									
Neuroticism	0.27	0.03	9.52***	0.24	0.04	6.67***	0.90	0.18	5.00***
	(F=90.72***, R ² =0.27)			(F=44.49***, R ² =0.18)			(F=24.98***, R ² =0.11)		
UCL									
Active problem							−0.70	0.26	−2.72*
Depressive	0.45	0.05	8.58***	0.46	0.07	6.48***	0.96	0.36	2.67*
	(F=73.64***, R ² =0.22)			(F=41.97***, R ² =0.17)			(F=9.03***, R ² =0.08)		
PBI									
P Overprotect	0.10	0.03	4.12***						
	(F=17.00***, R ² =0.06)								
RQ									
Preoccupied	2.09	0.68	3.06*						
	(F=12.22*, R ² =0.04)								
Step 2									
Facilitator							1.08	0.308	3.66**
Regulator	0.64	0.09	7.41***	0.47	0.12	4.09***			
Neuroticism	0.14	0.03	4.10***	0.19	0.04	5.29***	0.71	0.14	5.11***
Depressive	0.19	0.07	2.96*						
	(F=55.85***, R ² =0.43)			(F=28.34***, R ² =0.23)			(F=16.95***, R ² =0.14)		

* $p > 0.01$, ** $p > 0.001$, *** $p > 0.0001$.

social support, depressive reaction pattern, expression of negative emotions, and reassuring thoughts. Possible answers range from ‘rarely’ (1) to ‘very often’ (4). Only subscales are summed. A high score on a subscale reflects the frequent use of that coping style. In this study, we found Chronbach’s reliability coefficients varying from 0.64 to 0.83. Participants completed the UCL in the second antenatal trimester.

The Parental Bonding Inventory (PBI) (Parker et al., 1979) was used to obtain retrospective data from the parent–child interaction in participants’ childhood. Both the mother and father version of the PBI consist of 25 items divided over two subscales: ‘caring’ (12 items) and ‘overprotection’ (13 items). Responses are rated on a four-point scale: high scores reflect, respectively, a more affectionate, warm and caring parent–child interaction, and a more dominant and overprotective parent. The PBI is a widely used measure and has a satisfactory construct and convergent validity (Parker, 1989). In this study, we found Chronbach’s reliability coefficients varying from 0.83 to 0.92. Participants completed the PBI in the first antenatal trimester.

The Relationship Questionnaire (RQ) (Bartholomew and Horowitz, 1991) was used to determine participant’s attachment pattern in close adult peer relationships. The RQ consists of four short paragraphs, each describing a prototypical attachment pattern (secure, fearful, preoccupied, and dismissing). Participants are asked to rate their degree of correspondence to each prototype on a seven-point scale. The RQ shows convergent validity with the interview ratings (Bartholomew and Horowitz, 1991; Griffin and Bartholomew, 1994). The RQ was completed by the participants in the first antenatal trimester.

2.3. Statistics

SAS 9.1 software package was used for statistical analysis (SAS Institute Inc., 2002). Descriptive statistics are described in means and standard deviations, absolute numbers and percentages. Attrition analyses comparing differences in means of HADS-A and PRAQ at T1 of those who participated at all time points of the study and those who dropped out during the study, were performed

Table 3

	HADS-A									PRAQ								
	T1 (<i>n</i> = 403)			T2 (<i>n</i> = 330)			T3 (<i>n</i> = 298)			T1 (<i>n</i> = 403)			T2 (<i>n</i> = 330)			T3 (<i>n</i> = 298)		
	β	SE	<i>t</i>	β	SE	<i>t</i>	β	SE	<i>t</i>	β	SE	<i>t</i>	β	SE	<i>t</i>	β	SE	<i>t</i>
Regulator																		
Neuroticism	0.28	0.03	8.46***	0.10	0.04	2.67*	0.10	0.04	2.71*	2.28	0.41	5.55***	7.68	1.37	5.60***	3.48	0.42	8.26***
Depressive coping				0.29	0.07	3.99***	0.29	0.07	3.96**									
Palliative coping													2.51	0.73	3.44**			
Secure attachment										-19.08	4.64	-4.11***	-18.93	4.97	-3.81**			
Neuroticism * Regulator	0.01	0.003	3.50**	0.01	0.003	4.58***	0.01	0.003	5.23***	0.17	0.04	4.38***				0.27	0.04	7.19***
	<i>(F</i> = 49.28***, <i>R</i> ² = 0.28)			<i>(F</i> = 40.43***, <i>R</i> ² = 0.32)			<i>(F</i> = 44.91***, <i>R</i> ² = 0.35)			<i>(F</i> = 34.26***, <i>R</i> ² = 0.27)			<i>(F</i> = 42.39***, <i>R</i> ² = 0.39)			<i>(F</i> = 88.76***, <i>R</i> ² = 0.42)		
* <i>p</i> > 0.01, ** <i>p</i> > 0.001, *** <i>p</i> > 0.0001.																		

3. Results

We tested whether HADS-A and PRAQ scores at T1 differed between the group of women who participated at all time points of the study ($n=181$, 44.91%) and those who dropped out. The HADS-A ($t=2.05$, $p=0.04$) and PRAQ ($t=2.79$, $p=0.006$) scores of the drop outs were significantly higher compared to the women who participated at all time points.

3.1. The course of anxiety during pregnancy and the postpartum period

The HADS-A mean scores of the participants at T1, T2, T3, T4 and T5 are respectively: 5.03 (SD 3.37), 5.00 (SD 3.51), 5.43 (SD 3.50), 4.44 (SD 3.13) and 4.11

Table 4

Results of the final multiple robust regression analysis (including interaction effect) with maternal postpartum anxiety (HADS-A) as dependent variable

	HADS-A					
	T4 (<i>n</i> =263)			T5 (<i>n</i> =202)		
	β	SE	<i>t</i>	β	SE	<i>t</i>
Neuroticism	0.12	0.04	3.36**			
Depressive coping	0.18	0.07	2.64*	0.34	0.08	4.38***
Neuroticism * Regulator	0.02	0.003	7.47***	0.01	0.003	3.44**
	$(F=54.24***, R^2=0.42)$			$(F=25.85***, R^2=0.21)$		

* $p < 0.01$, ** $p < 0.001$, *** $p < 0.0001$.

(SD 2.94). The PRAQ mean scores of the participants at T1, T2 and T3 are respectively: 135.48 (SD 45.07), 147.52 (SD 45.51) and 148.05 (SD 44.88). At T5, the MSAS mean is 103.62 (SD 14.85). A Linear Mixed model analysis ($F=9.47$, $p < 0.0001$) revealed a significant increase of the HADS-A total mean in the third pregnancy trimester compared with the first ($t=-3.87$, adj. $p=0.0001$) and second ($t=-4.29$, adj. $p=0.0002$) pregnancy trimester. Compared with the third pregnancy trimester, the HADS-A total mean at 8–12 weeks postpartum ($t=4.56$, adj. $p < 0.0001$) and 20–25 weeks postpartum ($t=5.56$, adj. $p < 0.0001$) significantly decreased. A Linear Mixed model analysis ($F=55.14$, $p < 0.0001$) revealed a significant increase of the PRAQ means in the second ($t=-7.52$, adj. $p < 0.0001$) and third ($t=-2.57$, adj. $p=0.02$) pregnancy trimester.

3.2. Predictors of anxiety in pregnant and postpartum women

Higher scores on the neuroticism subscale (NEO-FFI), the depressive coping scale (UCL) and the regulator scale (PPQ) predicted higher scores on both the HADS-A and the PRAQ at T1, T2 and T3 (Table 1). Higher scores on the secure romantic attachment scale (RQ) predicted lower scores on both the HADS-A and the PRAQ at T1, T2 and T3 (Table 1). Within the second-step-models, only higher neuroticism and regulator scores consistently predicted higher scores on both the HADS-A and the PRAQ at T1, T2 and T3 (Table 1).

In the postpartum period (T4 and T5), higher scores on the neuroticism subscale, the depressive coping scale and the regulator scale consistently predicted higher scores on both the HADS-A and the MSAS (Table 2). Within the second-step-models, only higher scores on the neuroticism scale consequently predicted higher scores on both the HADS-A and the MSAS. The regulator scale remained a consistent predictor of the

HADS-A scores, but not for the MSAS scores. The facilitator scale remained a positive predictor of the MSAS scores.

Multiple robust linear regression analyses were performed with the sociodemographic variables as independent variables. None of the sociodemographic variables consistently predicted the general and pregnancy related anxiety scores (data not reported).

In a final step, the analyses of the psychological and sociodemographic variables were combined into new regression models (Tables 3 and 4). In addition, the product of the responses on the neuroticism scale and the regulator scale was added as an interaction variable. As a result, the responses on the neuroticism scale still predicted, consistently, the responses on the HADS-A, and PRAQ. The main effect of the regulator scale disappeared in all but one model (PRAQ T2). Instead, the interaction variable contributed consistently to the prediction of the responses on the HADS-A and the PRAQ (except at T2). Overall, the final models with the interaction term did not predict larger proportions of variance compared with the second-step-models.

4. Discussion

In this study, both the degree of general anxiety symptoms (HADS-A) and pregnancy related anxiety (PRAQ) increased during pregnancy. In the postpartum period, the general anxiety symptoms decreased to a level that was lower than in early pregnancy. Higher scores on the neuroticism and regulator scale consistently predicted higher scores on the HADS-A and PRAQ. In addition, an interaction effect was found between the regulator scale and the neuroticism scale on the general anxiety symptoms and pregnancy related anxiety. Finally, the facilitator scale, together with the neuroticism scale, predicted maternal separation anxiety between 20 and 25 weeks postpartum.

Although pregnancy and motherhood are guided with unique maternal emotions, cognitions and behaviours, different trends across individual women were described by Raphael-Leff (2005). Each of these trends or orientations, are suggested to have specific psychosocial triggers to antepartum and postpartum mental disturbances. Regulator women, for example, are described by Raphael-Leff as women who generally feel less in control during pregnancy, compared to facilitator women (Raphael-Leff, 2005). Regulator women are therefore hypothesised to have higher levels of anxiety during pregnancy. Our findings support this hypothesis since higher scores on the regulator scale were found to predict higher scores on both general anxiety symptoms during pregnancy and pregnancy related anxiety. In the case of pregnancy related anxiety, it should be noted that the PRAQ mainly taps for fears (e.g. fear for labor and delivery; changes in personal life and life style; changes in the relationship) that are expected to be more prevalent and stronger in regulator women than in facilitator women. Indeed, according to Raphael-Leff, regulators approach childbirth more as a painful medical event that is accompanied with the loss of control (Raphael-Leff, 2005). They are therefore expected to fear labor and delivery more than facilitators do. In contrast with facilitators, who immediately embrace their maternal role, regulators tend to detachment because they fear the changes that motherhood will bring in their personal life and life style. Likewise, fear for the changes in the relationship with their partner will be more prevalent among regulator women than in facilitator women (Raphael-Leff, 2005).

Facilitator women, as described by Raphael-Leff, strongly belief in their role as the primary and exclusive caretaker (Raphael-Leff, 2005). If, for instance for socioeconomic reasons, they are forced to separate from their child (e.g. employment), they believe this will have irreversible psychological effects on the child (Raphael-Leff, 2005). In contrast, regulator women approach mothering more as a learned skill that is also exchangeable with their partner or another significant person. Regulators are therefore expected to trust day care more than facilitators do. In their study, however, Scher and Blumberg found no significant difference in the level of separation anxiety between facilitator and regulator mothers (Scher and Blumberg, 1999). Both groups of mothers reported higher scores than the reciprocal (intermediate) group of mothers. In our study, we found that higher scores on the regulator and facilitator scale both predicted higher levels of maternal separation anxiety (between 20 and 25 weeks postpartum) when no other predictor variable was included in the regression

model. When other significant psychological predictor variables were included, only the responses on the facilitator scale remained a significant predictor of maternal separation anxiety, together with the neuroticism scale. The finding that, to a lesser extent, more regulator women are also vulnerable to feelings of separation anxiety, could be due to their own insecure attachment representations (Scher and Blumberg, 1999).

The relation between neuroticism and state anxiety in both a non-clinical population (Hettema et al., 2006) and in a population of pregnant women (Canals et al., 2002), has been described in several studies. Also, higher scores on neuroticism were found to be associated with higher scores on pregnancy related anxiety (Wilson et al., 2007; Saisto et al., 2001) and maternal separation anxiety (Bradley et al., 1997). Our results thus add further evidence to these findings. The interaction effect we found between the regulating maternal orientation and neuroticism is not surprising. Indeed, since they belief that their identity and life style is threatened by the pregnancy, the baby and motherhood, regulators are suggested to be more preoccupied with the burdens of this transition (Raphael-Leff, 2005).

Although depressive coping is not inherently adaptive or maladaptive (Lazarus, 1993), frequent use of depressive coping behaviours or cognitions in pregnant women was found to be positively associated with state and trait anxiety (Demmytenaere et al., 1995; Bergner et al., 2007) and distress (Sanderman and Ormel, 1992). Our results support these findings partially. When only the coping styles were included into the regression model, the frequent use of depressive coping behaviours and cognitions were found to predict higher levels of both general anxiety symptoms and pregnancy related anxiety. When other significant psychological predictors were entered, the statistical significance of the effect of the depressive coping style on pregnancy related anxiety, disappeared. Depressive coping thus seems to be associated more clearly with general anxiety symptoms than with pregnancy or maternal separation related anxieties.

According to attachment theory, individuals unable to establish secure attachment bonds, are hypothesised to have heightened levels of anxiety in daily-life situations (Bowlby, 1973). In a non-clinical population, both positive memories of parental attachment during the own childhood and secure adult attachment have been found to be protective for higher levels of anxiety (Carter et al., 2001; Bennet and Stirling, 1998; Mickelson et al., 1997). In our study, memories of parental attachment in the own childhood, were not associated with maternal anxiety in a clear and

consistent way. Alternatively, it has been suggested that the installation of the maternal self-identity, is guided with current patterns of attachment, rather than representations based on the past (Priel and Besser, 1999; Ruble et al., 1990). Consequently, not the memories of parental attachment during the own childhood but the actual adult romantic attachment style would than be the primary attachment predictor of anxiety in pregnant and postpartum women. In our study, a more secure adult attachment relationship indeed predicted lower levels of both general anxiety symptoms and pregnancy related anxiety. However, the weight of secure attachment in a more complex regression model decreases in favour of neuroticism and the regulating orientation.

Several limitations of this study need to be considered. First, women reporting higher levels of anxiety during the first pregnancy trimester were more likely to drop out as the study progresses. Although common, this phenomenon could have biased the results of this study (Austin et al., 2007; Britton, 2008). Also, our data were obtained from a population of subjects who enrolled electively. A selective attrition is possible given the fact that participants were well educated and employed. Finally, much of the data is based upon questionnaires. Although most of them are well validated, an eventual reporting bias is difficult to estimate. However, given the fact that our results are consistent and correspond with both previous anxiety research and theory, we believe that our results contribute to a better understanding of anxiety in pregnant and postpartum women.

5. Conclusion

Women differ in the risk factors, the nature and timing of heightened anxiety during the transition to motherhood. The anxieties of women tending to the regulator orientation are pregnancy related, whereas women tending to the facilitator orientation fear the separation from their child in the postpartum period.

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Conflict of interest

The authors declare that they do not have a conflict of interest in submitting this manuscript. J.v.B. and B.S. have nothing to disclose. K.D. has been serving as a member of the advisory board/has been serving as a speaker for Boehringer Ingelheim, Cyberonics, Eli Lilly, Glaxo Smith Kline, Organon, Servier, Lundbeck, and Wyeth. None of these honoraria interfere with the design, the analysis or the preparation of the manuscript.

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