Cognitive factors and postpartum depression: What is the influence of general personality traits, rumination, maternal self-esteem and alexithymia?

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Key Practitioner Message :

- The application of cognitive models to the symptoms of the PPD is relevant and valid.
- PPD should perhaps not be considered as a single disorder that is stable over time.
- It is useful to consider both cognitive and emotional predictors of PPD symptoms (alexithymia accounted for a substantial proportion of the variance in the present work).
- Cognitive and emotional factors should be considered in PPD prevention and treatment programs.

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Abstract

Objectives: The objective was to assess the impact of cognitive factors on postpartum depression (PPD) symptoms. Since most of the literature data concern the immediate postpartum period or the first year postpartum, we notably sought to assess the longer-term impact of cognitive factors on the symptoms of PPD.

Methods: Two studies were performed. In a pilot study one month postpartum, 63 women filled out a sociodemographic information sheet and completed the abbreviated, revised Eysenck Personality Questionnaire, the Ruminative Responses Scale, the Maternal Self-Report Inventory and the Edinburgh Post-Natal Depression Scale. In the main study, 124 women additionally completed the Toronto Alexithymia Scale. The main study population was divided into two subgroups: women in the first year postpartum (n=74) and those in the second year postpartum (n=50).

Results: In the pilot study performed one month postpartum, brooding rumination and low self-esteem were significant predictors of the PPD symptom intensity. Neuroticism, brooding rumination and low maternal self-esteem were also significant predictors of the PPD symptoms reported in the first year postpartum. Lastly, ruminative thoughts and alexithymia were significant predictors of the PPD symptoms reported in the second year postpartum. *Conclusions:* Our results suggest that alexithymia may be an important predictor of the incidence of this condition. The observation of differences in the PPD models as a function of the postpartum period may open up opportunities for developing novel PPD prevention/treatment programs.

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Introduction

Postpartum psychopathological conditions

Although giving birth to a child is an important event in the mother's life, this potentially stressful event can render women vulnerable to psychopathological disorders (Guédeney & Allilaire, 2001) such as "baby blues", postpartum depression (PPD), brief episode psychotic disorder (APA, 2013) and even posttraumatic stress disorder (Denis & Callahan, 2009; Denis, Parant & Callahan, 2011; Olde, Van der Hart, Kleber & Van Son, 2006).

In the present study, we focused on predictors of PPD - a depressive episode experienced by a mother following childbirth (Guédeney, 2001). Symptoms of depression are as common during pregnancy as in the postnatal period (Bauer, Parsonage, Knapp, Lemmi & Adelaja, 2014). PPD differs from major depressive disorder with regard to specific symptoms, such as symptom onset in the evening, less frequent suicidal ideation, low maternal self-esteem, and high levels of anxiety towards the baby (Dayan, Andro & Dugnat, 2003). The incidence of PPD in population is approximately 10% (O'Hara, 2009; O'Hara & Swain, 1996). In France, a recent study found a prevalence rate of 17% (Gaillard, Le Strat, Mandelbrot, Keita & Dubertret, 2014). The symptoms of PPD have adverse effects not only on the mothers themselves but also on mother-infant relationships (Martins & Gaffan, 2000) (including impairment of the infant's functional and emotional development) (Beck, 1999; Righetti-Veltema, Conne-Perreard, Bousquet

& Manzano, 2002; Weinberg & Tronick, 1998) and specifically on construction of child attachment. Child attachment can be conceptualized as a working model for how relationships function; the child's strategy for organizing their relation behavior with their primary attachment figures (Raine, Cockshaw, Boyce & Thorpe, 2016). It has been shown that perinatal depression symptoms clearly impact development of child's attachment (Murray et al., 2010, Murray et al., 2014).

Even though the symptoms of PPD may weaken within the first few months postpartum for some women, others may experience clinical or subclinical depressive symptoms for many months or even years after childbirth (Goodman, 2004). In a context of PPD, the nature of the depressive symptoms has a decisive impact on the mother-infant relationship (Goodman, 2004). Accordingly, there is a need to identify and characterize risk factors for both acute PPD symptoms (in the immediate postpartum phase) and late PPD symptoms (up to several years after delivery) (Uguz, Akman, Sahingoz, Kaya & Kucur, 2009).

Cognitive perspectives on depression

Although several psychopathological studies have sought to identify risk factors for PPD (with a particular focus on predisposing demographic factors or obstetric characteristics, such as partnership status, a woman who is giving birth for the first time), the length of pregnancy and the type of delivery, the putative role of cognitive risk factors has been largely neglected (Barnum, Woody & Gibb, 2013; Raes *et al.*, 2014). As mentioned by Barnum *et al.* (2013), the literature data suggest two major cognitive models for depression: the hopelessness theory and the response styles theory.

In the hopelessness theory, depressed patients tend to have a negative view of themselves, their environment and the future (i.e. the "cognitive triad of depression"). The causes of the depressive event are considered to be stable (i.e. unlikely to change), and involve negative consequences and negative individual characteristics (Abramson, Metalsky & Alloy, 1989). This theoretical model – i.e. a depressive patient envisioning an endless, hopeless future – was prompted by studies of the influence of personality on depressive affects. Neuroticism is considered to be a strong predictor of major depressive disorder. This personality trait is defined as a predisposition to experience psychological distress. It manifests itself in different forms, such as anxiety, anger, depression and other negative affective states. High neuroticism scores are related to maladjustment (Costa & McCrae, 1992). Several perinatal studies have shown that neuroticism is a significant predictor of the symptoms of PPD (Boyce, Parker, Barnett, Cooney & Smith, 1991; Hipwell, 2004; Marks, Wieck, Chekley & Kumar, 1992). Plus, studies showed that high interpersonal sensitivity is a risk factor for postpartum depression symptoms (Boyce, Hickie & Parker (1991) and mother-infant interaction quality (Raine, Cockshaw, Boyce and Thorpe, 2016). Raine et al. (2016) showed that personality traits of interpersonal sensitivity, measured at early pregnancy, were more robust predictors of subsequent mother-infant-interaction quality than perinatal depressive symptoms.

In the response styles theory, depressed patients respond to a negative mood by ruminating (e.g., Di Schiena, Luminet, Chang & Philippot, 2013; Nolen-Hoeksema, 1991). Rumination can be defined as ''repetitive, prolonged, and recurrent thoughts about one's self, one's concerns and one's experiences'' (Watkins, 2008). Individuals with depression often ruminate ("*Why do I always feel like this?", "Will I ever feel better* *again?*", etc.), and the rumination process seems to contribute to the development and maintenance of depression (Nolen-Hoeksema, Wisco & Lyubomirsky, 2008). Treynor, Gonzalez & Nolen-Hoeksema (2003) suggested the existence of two types of rumination: brooding and reflective rumination. Brooding is defined as "a passive comparison of one's current situation with some unachieved standard", whereas reflective rumination is defined as "purposeful turning inward to engage in cognitive problem solving to alleviate one's depressive symptoms" (Treynor *et al.*, 2003). Brooding and reflective rumination are distinct constructs. Although both brooding and reflective rumination are associated with depression, brooding appears to be a better predictor of symptom intensity (Nolen-Hoeksema *et al.*, 2008). Treynor had previously reported that rumination had a major role in the development and persistence of depression (Treynor *et al.*, 2003). It should be however noted that the distinction between brooding and reflection in rumination is not always found (Griffith & Raes, 2015). Although a prevailing view is that brooding and reflection are different domains, another view is that the reflection items do not measure a content separate from brooding.

Studies showed the negative impact of additional variables on depressive symptoms. In the present study, we decided to examine two additional traits often associated with depression: self-esteem (i.e. maternal self-esteem) and alexithymia. Self-esteem is defined as an overall, subjective evaluation of personal worth (Marsh & O'Mara, 2008; Rosenberg, 1965), and is thought to be based on both general and specific elements of an individual's identity. Having a child is a major life experience for a woman; hence, specific components of a woman's self-esteem are influenced by the experience of motherhood (Denis, Séjourné & Callahan, 2013). Previous research has revealed a link between low maternal self-esteem and the severity of PPD symptoms (Denis, Ponsin & Callahan, 2012; Denis *et al.*, 2013). Leerkes and Crockenberg (2002) investigated maternal cognition in general and the feeling of incompetency (the mother's perception of her maternal role) in particular.

Alexithymia is a multifaceted personality dimension built on basic socio-emotional competencies. Individuals who score highly for this dimension (i) take little interest in their inner emotional and fantastical life, (ii) have a literal, utilitarian, externally oriented cognitive style, and (iii) experience difficulty in identifying emotions and describing how they feel to others (e.g., Taylor & Bagby, 2004; Taylor, Bagby & Parker, 1997). In contrast, lower scorers are at ease with their inner emotional life and fantasies, and can easily identify their feelings and share them with others. Alexithymia is considered to be a disorder of affect regulation that increases the likelihood of mental and physical illness (e.g., Taylor *et al.*, 1997; Tolmunen, Lehto, Heliste, Kurl & Kauhanen, 2010). Although a link between alexithymia and depression has often been documented (e.g., Luminet, Bagby & Taylor, 2001), few researchers have focused on the relationship between alexithymia and PPD symptoms. One study showed that during the perinatal period, alexithymia is a stable phenomenon and is positively correlated with depressive symptoms. Researchers have found significant correlations between alexithymia and depression symptoms in both the antepartum and postpartum periods (Nhu Le, Ramos & Munoz, 2007). Other studies have provided indirect evidence by showing that mothers suffering from PPD have trouble regulating their children's emotions (Kooiman *et al.*, 2004; Fukunishi, Kawamura, Ishikawa & Ago, 1997).

Overview of the two studies

Overall, the studies assessed (i) general personality dimensions (extraversion, neuroticism, and psychoticism), (ii) rumination (brooding and reflection), (iii) maternal self-esteem, and (iv) alexithymia as predictive factors for the symptoms of PPD.

We first performed a pilot study in which women filled out a sociodemographic information sheet shortly after childbirth and agreed to receive (by mail) and complete four questionnaires assessing general personality, rumination, maternal self-esteem and PPD symptoms one month postpartum.

The main study was a larger, retrospective assessment whose primary objective was to test whether cognitive and personality variables predicted postpartum depression. A secondary objective was to examine whether alexithymia was also predictive of PPD symptoms. Another secondary objective was to compare the symptoms of PPD in the first year postpartum (i.e. acute PPD symptoms) with those in the second year postpartum (i.e. late PPD symptoms). In the main study, the participants were recruited via a list of e-mail addresses provided by a French PPD support group and via Internet forums dedicated to PPD.

Both studies were performed in compliance with the ethical tenets of the Declaration of Helsinki. All the women provided their written, informed consent form. Study participants did not receive any remuneration.

Methods

Participants

The pilot study. A total of 63 women aged between 19 and 40 years (mean ± standard deviation (SD) age: 30 ± 4.24 years; 1) were recruited in a French maternity clinic 2 days after having given birth (M = 32.27 ± 0.53 days postpartum). The main inclusion criteria were as follows: age 18 or over, fluency in French, and having given birth to a live infant. The four study questionnaires were filled out at one month postpartum.

The main study. A total of 124 women aged between 18 and 41 years (mean ± SD age: 26.8 ± 5.43) having given birth within the previous two years were included in the study. At the time when the study questionnaires were administered, 74 women (60%) were in the first year postpartum and 50 (40%) were in the second year postpartum. The main inclusion criteria were age 18 or over, fluency in French, having given birth to a live infant, and the absence of known neonatal pathologies. The inclusion criteria were checked against the sociodemographic information sheet filled out by each participant. The participants' sociodemographic and obstetric data are summarized in Table 2)

Measurements

Global dimensions of personality were evaluated using a validated French-language version of the abbreviated, revised Eysenck Personality Questionnaire (EPQR-A) (Francis, Brown & Philipchalk, 1992; Bouvard, Aulard-Jaccod, Pessonneaux, Hautekeete & Rogé, 2010). The EPQR-A comprises 24 items. It provides scores on a 0 (low) to 6 (high) scale for three general personality dimensions (extraversion, neuroticism, psychoticism) and a validity scale (lying).

Rumination was evaluated using a French-language version (Douilliez, Baeyens, Guimpel & Philippot, submitted) of the Ruminative Responses Scale (RRS) (Treynor, Gonzales & Nolen-Hoeksema, 2003). The RRS measures ruminative activities in response to a sad or depressed mood with regard to individual traits *("[thinking] about all your shortcomings, failings, faults, mistakes*"), the symptoms ("[*thinking] how hard it is to concentrate*") and the possible causes and consequences of a depressive mood ("*[analyzing] recent events to try to understand why you are depressed*"). Treynor *et al.* (2003) suggested a two-factor solution in which one subscale comprises five items assessing "brooding rumination" and another comprises five items assessing "reflective rumination". The subscales each range from 5 (low level of rumination) to 20 (high level of rumination).

Maternal self-esteem was evaluated using a validated French-language version (Denis, Séjourné & Callahan, 2013) of the short-form Maternal Self-Report Inventory (MSI) (Shea & Tronick, 1988). This 26-item questionnaire provides scores on five subscales: preparedness for mothering role (e.g., "*I think that I will be a good mother*), feelings concerning pregnancy, labor, and delivery (e.g., "*I found the delivery experience to be frightening and very unpleasant*"), expected relationship with the baby (e.g., "*I worry about whether my baby will like me*"), caretaking ability (e.g., "*I often worry that I may be forgetful and cause something bad to happen to my baby*") and acceptance of the baby (e.g., "*I am confident that I will be able to work out any normal problems I might have with my baby*"). The score ranges from 26 (low maternal self-esteem) to 130 (high maternal self-esteem). In the present study, only the total score was analyzed.

Alexithymia was assessed with a validated French-language version (Loas, Otmani, Verrier, Fremaux & Marchand, 1996) of the 20-item Toronto Alexithymia Scale (TAS-20) (Bagby, Parker, & Taylor, 1994). The TAS-20 is a 20-item self-report scale that consists of three subscales measuring core characteristics of alexithymia: difficulty identifying feelings ("*I am often confused about what emotion I am feeling*"), difficulty describing feelings ("*It is difficult for me to find the right words for my feelings*"), and externally oriented thinking ("*I prefer to analyze problems rather than just describe them*"). The score ranges from 20 (low alexithymia) to 100.

The Edinburgh Post-Natal Depression Scale (EPDS) is a self-administered questionnaire that specifically rates PPD symptoms on 10 Likert-type scales (Cox, Holden & Sagovsky, 1987). For example, item 1 is "*In the past 7 days, I have been able to laugh and see the funny side of things*". For each item, respondents have to attribute a score of 0 ("*As much as I always could*"), 1 ("*Not quite so much now*", 2 ("*Definitely less than I used to*") or 3 ("*Hardly at all*"). The overall score ranges from 0 (no PPD) to 30 (severe PPD). The threshold commonly used for indicating a high probability of having an episode of clinical depression is greater than or equal to 12 (Gaillard, Le Strat, Mandelbrot, Keita, & Dubertret, 2014). Murray and Carothers (1990) estimated the sensitivity and specificity of the EPDS against diagnoses generated using the Standardised Psychiatric Interview (Goldberg et al., 1970). The specificity was 95.7% with a cut-off of 12.5 and the sensitivity to major depression was 81.1%. The EPDS has been validated by standardized psychiatric interviews with large samples and has well-documented reliability and validity (Affonso et al., 2000). A validated French-language version of the EPDS was administered in the present study (Guedeney & Fermanian, 1998). In the present research, Cronbach's alphas were, respectively, 0.75 and 0.70 in the pilot study and the main study.

Statistical analyses

In both studies, hierarchical regression analyses were used to predict the intensity of PPD symptoms. The putative predictive factors were included in different blocks (representing different classes of process). In the pilot study, the analyses were performed by entering global personality dimensions (extraversion, neuroticism and psychoticism), rumination dimensions (brooding and reflective rumination) and then maternal self-esteem. In the main study, two different hierarchical regression analyses were carried out: the first included the 74 women in the first year postpartum, and the second included the 50 women in the second year postpartum. Along with the putative predictive factors used in the pilot study, alexithymia was included in the regression analysis.

Results

The pilot study

Participants

The participants' mean ± standard deviation (SD) age was 30 ± 4.24 (range: 19–40). Of the 63 women, 44% were first-time mothers and 87% had given birth at 36 weeks or later. There were 48 vaginal deliveries (76%), 8 vaginal deliveries with instruments (12.7%) and 7 cesarean deliveries (7.7%). The study population's demographic and obstetric data are summarized in Table 1. Given the small sample size, separate regression analyses were performed in order to test the potential influence of the following demographic or obstetric variables on the dependent variable (the EPDS score): marital status, primiparity, prematurity, the type of delivery, and epidural anesthesia. None of these variables was found to be significantly associated with the EPDS score (respectively $\beta = -0.18$, $p = 0.16$; $\beta = -0.06$, $p = 0.56$; $\beta = -0.08$, $p = 0.54$; $\beta = 0.19$, $p = 0.14$; and $\beta = -0.02$, $p = 0.89$). Hence, these characteristics were not taken into account by subsequent analyses.

Frequency of PPD symptoms, and predictive factors

At one month postpartum, six women (9.5%) had an EPDS score of 12 or more, indicating probable PPD. The mean ± SD EPDS score was 7.32 ± 3.33. The three steps in the hierarchical regression analyses are presented in Table 3. Two variables were found to predict the overall EPDS score: brooding rumination ($\beta = 0.34$; $p = 0.02$) and low maternal self-esteem ($\beta = -0.26$; $p = 0.04$). The final model accounted for 48% of the variance (see Table 3).

The main study

Participants

A total of 124 women (mean ± SD age: 26.8 ± 5.43; age range: 18–41) were included in the main study; 109 women (88%) were living with a partner, 79 (64%) were primiparous, and 82 (81%) had undergone vaginal deliveries. Seventy-four (60%) had given birth within the previous 12 months, and 50 (40%) had given birth between 12 and 24 months previously (see table 2). As in the pilot study, separate regression analyses were performed in order to test the potential influence of descriptive variables on the intensity of the dependent variable (the EPDS score). Again, none of the variables was found to be significantly associated with the EPDS score (status marital: $\beta = 0.04$, $p =$

0.69; primiparity: β = 0.16, p = 0.07; prematurity: β = - 0.01, p = 0.89; type of delivery: β = 0.05, p = 0.59; epidural anesthesia: β = 0.00, p = 0.98). Hence, these characteristics were not taken into account in the subsequent analyses.

Prevalence of PPD symptoms, and predictive factors

Seventy-two women (58%) had an EPDS score of 12 or more (41 (55%) in the first year postpartum subgroup and 31 (62%) in the second year postpartum subgroup), indicating probable PPD. The mean ± SD EPDS score was 12.78 ± 4.97.

The four steps of the hierarchical regression analyses for two subgroups are presented in Table 4. For women in the first year postpartum, three variables were predictive of the overall EPDS score: neuroticism (β= 0.22; p= 0.04), brooding rumination (β= 0.3; p= 0.009) and maternal self-esteem (β= - 0.37; p= 0.001). The model accounted for 55% of the variance. It is noteworthy that brooding rumination and self-esteem were also found to be significant predictors in the pilot study.

For women in the second year postpartum, brooding rumination was again found to be predictive of the overall EPDS score (β= 0.42; p= 0.003), along with two new factors: reflective rumination (β= 0.3; p= 0.02) and alexithymia (β= 0.38; p= 0.004). The model accounted for 52% of the variance. The three alexithymia subscale scores accounted for 11% of the variance, and were significantly correlated with each other and with the majority other predictive factors (see Tables 5 and 6).

Discussion

Our main objective was to identify cognitive risk factors for the development and long-term persistence of symptoms of PPD. In a pilot study, we first tested the influence of general personality variables, rumination and maternal self-esteem on PPD symptoms self-reported at one month postpartum. The goal of the subsequent main study was to confirm the initial results and focus on the symptoms of late PPD in women between 12 and 24 months postpartum.

One important point issue is the prevalence of women having high probability of having an episode of clinical depression (EPDS scores ≥ 12). The value recorded in our pilot study (i.e. around 10%) is in agreement with other data (O'Hara, 2009; O'Hara, 1996). In contrast, the frequencies of women having high probability of having an episode of clinical depression observed in the main study (55% for the first year postpartum and 62% for the second year postpartum) are much higher than the literature values and the frequency observed in the pilot study. This difference can be explained (at least in part) by the way in which the participants were recruited into the main study - i.e. through PPD support groups and discussion forums dedicated to "baby blues" and PPD. These women were usually experiencing psychological distress and looking for information on subjectively perceived symptoms; a high frequency of PPD symptoms is thus not unexpected. Hence, the frequency of PPD symptoms in the main study must be considered with caution. However, it should be noted that the predictors of PPD symptoms were almost all the same in all three subgroups - suggesting that our results can be generalized.

Secondly, most studies of the development and persistence of PPD symptoms have focused on demographic and/or obstetric variables. It is noteworthy that in the present work, neither marital status, primiparity, prematurity nor the type of delivery had a specific influence on the intensity of PPD symptoms. This result was surprising but suggests that even though these variables may influence a woman's emotional state in the immediate postpartum period, other (cognitive) factors should be considered with regard to emotional difficulties at later periods postpartum.

With regard to the involvement of cognitive factors, the results observed for women at one month postpartum (in the pilot study) highlighted the influence of brooding rumination and low maternal self-esteem on the intensity of depressive symptoms. These two findings are in line with the literature data. Indeed, it has been reported that rumination is involved in the development and persistence of depressive affects (Nolen-Hoeksema, 1991). Our present results shed new light on the role of ruminative thoughts in PPD. In fact, the literature data are contradictory; although one study found that rumination during pregnancy influenced the development of PPD symptoms at three months postpartum (O'Mahen, Flynn & Nolen Hoeksema, 2010), two other studies did not observe a significant effect of rumination in the postpartum period (Muller, Teismann, Havemann, Michalak, & Seehagen, 2013; Raes *et al.*, 2014). Furthermore, our results characterized the influence of rumination (and notably reflective rumination) on symptoms measured one and two years postpartum and one month postpartum. The study by Raes *et al.* (2014) did not differentiate between brooding and reflective rumination. Hence, our work does not contradict the above-mentioned literature data but suggests that only one specific type of rumination has a significant impact on PPD symptoms. Brooding rumination was a significant predictor in all three populations studied in the present work. Hence, brooding rumination seems to be a strong predictor of

PPD symptoms, regardless of the time since delivery or the concomitant presence of other predictors. It is difficult to compare our results with those reported by Muller *et al.* (2003) because the latter researchers did not use the RRS to measure rumination. An another interpretation should be discussed. We noticed that the betas for brooding and reflection were very similar in the pilot and the main study. This supports the view, already mentioned in the introduction section (See Griffith and Raes, 2015), that reflection and brooding are more similar dimensions that what was thought when developing the two subscales.

With regard to maternal self-esteem, our results are consistent with previous reports of a link between low maternal self-esteem and the symptoms of postpartum blues (Denis *et al.*, 2012) and PPD symptoms (Denis, Callahan & Bouvard, 2013).

The influence of brooding rumination and maternal self-esteem was confirmed in our main study. While bearing in mind the atypical characteristics of the study population (i.e. a very high prevalence of PPD), one can cautiously consider that brooding rumination and maternal self-esteem should receive particular attention in a PPD prevention/management program. However, the results of our main study added to this model, and suggested that the PPD profile depends on the time postpartum. Whereas only rumination and maternal self-esteem were significant predictors of depressive symptoms at one month postpartum, a personality trait (neuroticism) was an additional predictor at one year postpartum. Women who were vulnerable to depressive affects (as measured by the level of neuroticism) presented more intense symptoms of PPD. Our results are consistent with literature reports on the link between personality factors (notably neuroticism) and the risk of developing depressive affects (Boyce, Hickie & Parker, 1991; Goodwin & Gotlib, 2004). The study by Iliadis *et al.* (2015) further showed that women with an elevated level of neuroticism were more likely to develop PPD – even when they had not displayed symptoms of depression during pregnancy. In summary, the results of our main study showed that neuroticism, brooding and low maternal self-esteem constitute a vulnerability pattern for the development of PPD symptoms in the first year postpartum.

Lastly, our results showed that neuroticism was a significant predictor of PPD symptoms at one year postpartum but not at two years postpartum. In the latter subgroup of women, brooding rumination and low maternal self-esteem were again significant predictors. Furthermore, a new factor (alexithymia) was found to account for a fair proportion of the variance. Previous studies have found that alexithymia is associated with the symptoms of depression during and immediately after pregnancy (Nhu Le *et al.*, 2007). However, our study sheds new light on this matter by showing that alexithymia was not a significant predictor of PPD symptoms one year postpartum but was a significant predictor two years postpartum. This finding not only suggests the validity of different models of PPD at one and two years postpartum. It also indicates that alexithymia could play a more decisive role in the symptoms of PPD symptoms observed in the second year postpartum. The fact that alexithymia was significantly correlated with neuroticism at two years postpartum but that only alexithymia was a significant predictor of PPD symptoms in this subgroup prompts a further hypothesis: beyond the dimension of negative affect, regulation of the emotions involved in alexithymia may have a role in late PPD symptoms. Our results showed that in addition to the cognitive dimensions represented by the two rumination subscales, emotional dimensions included in the alexithymia scale are also predictive of PPD symptoms.

Conclusion

Although the present work had several limitations (the relatively small sample size, self-reporting of PPD symptoms, measure of PPD symptoms at one point only in the preliminary study), our results raise several important questions and suggest that (i) the application of cognitive models to the symptoms of the PPD is relevant and valid, (ii) PPD should perhaps not be considered as a single disorder that is stable over time, and (iii) it is useful to consider both cognitive and emotional predictors of PPD symptoms (since alexithymia accounted for a substantial proportion of the variance in the present work). These factors need to be studied in more depth. If our results are confirmed, they might enable the revision and improvement of PPD symptoms prevention and treatment programs. For example, the more widespread postpartum administration of the TAS-20 might lead to the provision of more support for women with a high level of alexithymia.

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Table 1

Pilot study: sociodemographic and obstetric characteristics of the participants (n=63).

Variables	*Pilot study (n=63)*
	n (%)
In work:	55 (87.3)
Partnership status:	
Single	1 (1.6)
In a couple, with the baby's father	62 (98.4)
Primiparity:	28 (44.44)
Length of pregnancy:	
Less than 36 weeks	8 (12.7)
More than 36 weeks	55 (87.3)
Type of delivery:	
Vaginal	48 (76.19)
Vaginal with instruments	8 (12.7)

Cesarean	7 (11.11)
Delivery under epidural anesthesia:	53 (84.13)

Table 2

Main study: Sociodemographic and obstetric characteristics of the participants (n=124, including 74 women in the first year postpartum and 50 women in the second year postpartum).

Variables	*Main study (n=124)*
	n (%)
In work:	55 (44.36)
Partnership status:	
Single	15 (12.1)
In a couple, with the baby's father	109 (87.9)
Primiparity:	79 (63.7)
Length of pregnancy:	
Less than 36 weeks	23 (18.55)
More than 36 weeks	101 (81.45)
Type of delivery:	
Vaginal	82 (66.13)

Vaginal with instruments	18 (14.52)
Cesarean	24 (19.35)
Delivery under epidural anesthesia:	103 (83.06)

Table 3

Pilot study: hierarchical regression analyses predicting postpartum depression symptoms (the EPDS score) in a sample of 63 women at one month postpartum.

Variables	Unstandardized beta	Final beta	t	*p*	R^2	ΔR^2	F(48)
Step 1					0.12	0.12	2.11
EPQR-A – neuroticism	0.07	0.03	0.25	0.8			
EPQR-A – extraversion	-1.52	- 0.08	- 0.63	0.53			
EPQR-A – psychoticism	-0.06	- 0.017	- 0.15	0.88			
Step 2					0.43	0.31	6.45
RRS – brooding	0.37	0.34	2.38	0.02*			
RRS – reflective rumination	0.35	0.27	1.9	0.06			
Step 3					0.48	0.05	6.44
MSI	-0.07	-0.26	-2.02	0.04*			

* Significant at $p < .05$

EPDS: Edinburgh Postpartum Depression Scale

EPQR-A: Abbreviated Revised Eysenck Personality Questionnaire

RRS: Ruminative Response Scale

MSI: Maternal Self-esteem Inventory

Table 4

Main study: hierarchical regression analyses predicting postpartum depression symptoms in a sample of 124 women (including 74 women in the first year postpartum and 50 women in the second year postpartum: subgroups 1 and 2 respectively).

	Subgroup 1 (n= 74)							Subgroup 2 (n=50)						
Variables	Unstandardized beta	Final beta	t	*p*	R^2	ΔR^2	F(65)	Unstandardized beta	Final beta	t	*p*	R^2	ΔR^2	F(49)
dStep 1					0.24	0.24	6.38					0.16	0.16	2.91
EPQR-A - neuroticism	1.05	0.22	2.06	0.04*				-0.46	- 0.07	- 0.59	0.56			
EPQR-A – extraversion	-0.41	- 0.1	- 1	0.32				-0.73	- 0.16	- 1.4	0.17			
EPQR-A – psychoticism	0.32	0.06	0.67	0.5				-0.25	- 0.06	- 0.57	0.57			
Step 2					0.41	0.17	8.3					0.40	0.24	5.95
RRS – brooding	0.42	0.3	2.7	0.009*				0.56	0.42	3.1	0.003*			
RRS – reflective rumination	0.22	0.13	1.28	0.2				0.4	0.3	2.4	0.02*			

Step 3					0.54	0.13	11.7					0.41	0.01	5.01
MSI	-0.12	- 0.37	- 3.92	0.001*				0.05	0.17	1.3	0.2			
Step 4					0.55	0.01	10					0.52	0.11	6.41
TAS-20	0.03	0.08	0.69	0.5				0.14	0.38	3.03	0.004*			

* Significant at p< .05

EPDS: Edinburgh Postpartum Depression Scale

EPQR-A: Abbreviated Revised Eysenck Personality Questionnaire

RRS: Ruminative Response Scale

MSI: Maternal Self-esteem Inventory

TAS-20: Toronto Alexithymia Scale

Table 5

Main study: correlations between TAS-20 and all variables in a sample of 124 women (including 74 women in the first year postpartum and 50 women in the second year postpartum: subgroups 1 and 2 respectively).

Variables	Subgroup 1 (n=74)	Subgroup 2 (n=50)
EPQR-A - neuroticism	0.42*	0.37*
EPQR-A – extraversion	-0.08	-0.33*
EPQR-A – psychoticism	-0.13	-0.04
RRS – Brooding	0.44*	0.21
RRS – Reflective rumination	0.48*	0.06
MSI	-0.28*	-0.20

* Significant at p< .05

EPQR-A: Abbreviated Revised Eysenck Personality Questionnaire

RRS: Ruminative Response Scale

MSI: Maternal Self-esteem Inventory

TAS-20: Toronto Alexithymia Scale

Table 5

Main study: correlations between all variables in the subgroup 1 of main study (n= 74)

Variables	1	2	3	4	5	6	7	8
1- EPDS	-							
2- EPQR-A - neuroticism	0.5*	-						
3- EPQR-A – extraversion	- 0.19	-0.22	-					
4- EPQR-A – psychoticism	0.09	0.03	-0.14	-				
5- RRS – Brooding	0.52*	0.29*	-0.15	-0.04	-			
6- RRS – Reflective rumination	0.39*	0.28*	-0.09	-0.13	0.4*	-		
7- MSI	- 0.51*	-0.24*	-0.07	-0.05	-0.17	-0.2	-	
8- TAS-20	0.44*	0.42*	-0.08	-0.13	0.48*	0.2	-0.28*	-

* Significant at p< .05

EPDS: Edinburgh Post-Natal Depression Scale

EPQR-A: Abbreviated Revised Eysenck Personality Questionnaire

RRS: Ruminative Response Scale

MSI: Maternal Self-esteem Inventory

TAS-20: Toronto Alexithymia Scale

Table 6

Main study: correlations between all variables in the subgroup 2 of main study (n= 50)

Variables	1	2	3	4	5	6	7	8
1- EPDS	-							
2- EPQR-A - neuroticism	0.27	-						
3- EPQR-A – extraversion	-0.32*	-0.15	-					
4- EPQR-A – psychoticism	-0.03	-0.01	-0.08	-				
5- RRS – Brooding	0.52*	0.35*	-0.08	0.08	-			
6- RRS – Reflective rumination	0.43*	0.16	-0.13	-0.06	0.4*	-		
7- MSI	-0.26	-0.08	0.1	0.08	-0.48*	-0.45*	-	
8- TAS-20	0.48*	0.37*	-0.33*	-0.04	0.21	0.06	-0.2	-

* Significant at p< .05

EPDS: Edinburgh Post-Natal Depression Scale

EPQR-A: Abbreviated Revised Eysenck Personality Questionnaire

RRS: Ruminative Response Scale

MSI: Maternal Self-esteem Inventory

TAS-20: Toronto Alexithymia Scale