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Research paper

A key for perinatal depression early diagnosis: The body dissatisfaction

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ABSTRACT

Objective: To test if the evaluation of body dissatisfaction by images could be an interesting tool to detect perinatal depression early in pregnancy, questioning patients about their body image instead of their depressive symptoms.

Methods: A sample of 457 women was recruited in a longitudinal study. Three evaluations were performed at the 4th and 8th months of pregnancy and during post-partum. During these evaluations, sociodemographic data were collected and psychiatric scales were completed, including Edinburgh Postnatal Depression Scale (EPDS), Eating Disorder Examination-Questionnaire (EDE-Q), Pictorial Body Image Scale (PBIS) and Body Shape Questionnaire (BSQ).

Results: 33% of the women who were unsatisfied with their body image suffered from perinatal depression vs. 11.3% of the women who were not ($p < 0.0001$). The risk of perinatal depression was 4 times higher in women dissatisfied with their body image ($p < 0.001$) if unintended pregnancy and age are taken into account and is 3 times significantly higher in women with higher levels of eating disorders symptoms ($p < 0.001$) if unintended pregnancy and age are taken into account. Our sample was a privileged population, as often in the literature.

Conclusion: The administration of a simple scale (PBIS) during an early visit during pregnancy allows detecting perinatal depression. This should prevent the stigmatization of women during pregnancy and reduce the risk of not diagnosing depression during pregnancy and post-partum.

1. Background

The prevalence of perinatal depression ranges from 7–20% (Bennett et al., 2004; Gavin et al., 2005; Thombs et al., 2015). Based on epidemiological study, screening for DPP is recommended (Committee on Obstetric Practice, 2015), but in clinical practice depression is rarely diagnosed". This diagnosis is difficult because only 11% of depressed women express their depressive complaints (Bhat et al., 2017; Cerimele et al., 2013). and if questioned about depression they feel it as an intrusion and stigmatization (Brealey et al., 2010). There is a social pressure surrounding the joy of being pregnant and women could deny or minimise their depressive disorders out of fear of being judged on their capacity of being a mother (Andrighetti et al., 2017; Duhoux et al., 2013; Howard et al., 2014). Gynecologist-obstetricians have a key role to detect depression early, but they need to have simple and pertinent screening tools (Bhat et al., 2017).

Another perinatal depression risk factor is a past/current eating disorder (Easter et al., 2015; Micali et al., 2011). It has been shown that during pregnancy, depression increases the risk of body dissatisfaction (Fuller-Tyszkiewicz et al., 2013; Gavin et al., 2005) and vice-versa (Gjerdingen et al., 2009; Silveira et al., 2015). However, the body dissatisfaction assessment by scales is not easy in clinical practice. The gold standard used is the Body Shape Questionnaire (BSQ includes 34 questions. This is a long questionnaire which needs a scoring at the end. In fact, the follow-up consultations are often limited in time, and so the professionals don't have the time to pass these questionnaires in clinical practice. In addition the subject answer may be "biased" due again to a social desirability wish of pregnant women. The body dissatisfaction can be evaluated by multiple ways (Silveira et al., 2015), like questionnaires, but also with images, like with the Pictorial Body Image Scale (PBIS) (Stunkard et al., 1983). This method is quicker and more spontaneous than a long questionnaire, which would allow passing it during follow-up consultations.

We hypotheses that the evaluation of the perceived body

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dissatisfaction at the beginning of pregnancy (at 4 months) could be evaluated by images (via the Pictorial Body Image Scale (PBIS) (Stunkard et al., 1983) instead of a questionnaire: the Body Shape Questionnaire (BSQ); and that a perceived body dissatisfaction at the beginning of the pregnancy would predict higher risk of developing pregnancy or post-partum depression (perinatal), taking into account other perinatal depression risk factors (past eating disorders, unintended pregnancy, primiparity and age (Easter et al., 2015; Guintivano et al., 2018; Howard et al., 2014; Micali et al., 2011).

2. Methods

2.1. Study design

We conducted a prospective longitudinal study including three evaluations which took place on the 4th and 8th month of pregnancy and during post-partum (between 6 and 8 weeks after birth). The protocol was approved by the French ethical comitee Consulting Committee for the Protection of Subjects in Biomedical Research of Hôtel-Dieu Hospital, Paris. After full information was provided, all subjects gave written consent for their participation in the study. All data obtained were anonymous.

2.2. Sample

A sample of 457 women was recruited between February and December 2009. They were included in the study during the first consultation at the maternity which coincides with the systematic prenatal visit which takes place at the 4th month of pregnancy with the midwife or the doctor who will follow her during the pregnancy at the maternity of the Institut Mutualiste Montsouris, Paris, France. The inclusion criteria were: being older than 18 years of age, consulting during the 4th month of pregnancy (registered with the maternity of the Institut Mutualiste Montsouris), being able to read and speak France, accepting to participate in the study, signing the consent and not participating in another research project. The exclusion criteria were: incapacity to give consent, refusal to participate.

The research protocol was presented and those who accepted to participate, were given the consents to be signed, the questionnaire as well as pre-addressed envelopes for mailing them. All the patients who complied with the criteria and accepted to participate in the study were included. Shortly before the 8th month of pregnancy consultation (2nd assessment), and between 6 to 8 weeks after birth (3rd post-partum evaluation), the self-administering questionnaire was sent by the post with a stamped envelope for the response. A telephone reminder was also carried out. The patients who did not send back the questionnaires were contacted once by phone.

At the 4th month, 253 women were included in the study, i.e. an inclusion rate of 55.4% (253/457), and 4 women were excluded from the analyses because the records were almost blank. The response rate at 8 months was of 81.4% (206/253), then 63.2% (160/253) in post-partum. These elements are summarised in Fig. 2. The reasons for the attrition were related to a lack of return of questionnaires. The participants completed an anamnestic form: socio-demographic, medical (current body mass index (BMI): and before pregnancy, minimum and maximum BMI, history of eating disorders and current eating disorders) and gyneco-obstetric (gestations, characteristics of birth and infant, prematurity: before 37 weeks of amenorrhea, unintended pregnancy) data and four questionnaires: the French version of the Edinburgh Postnatal Depression Scale (EPDS) (Guedeney et al., 2000), the Eating Disorder Examination-Questionnaire (EDE-Q) (Fairburn and Beglin, 1994; Mond et al., 2006), the Pictorial Body Image Scale (PBIS): (Stunkard et al., 1983) and the Body Shape Questionnaire (BSQ) (Cooper et al., 1987).

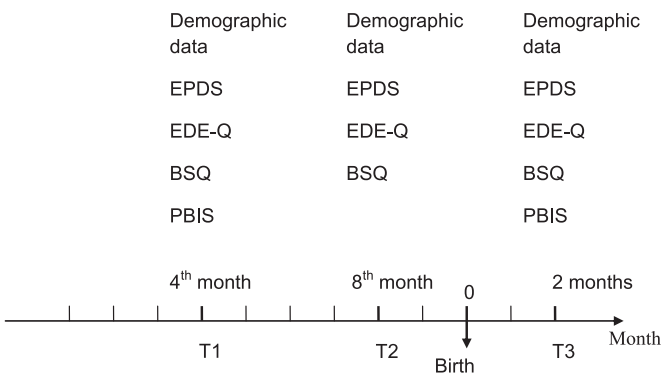

Fig. 1. Study time schedule. Abbreviations: EPDS: Edinburgh Postnatal Depression Scale, EDE-Q: Eating Disorder Examination-Questionnaire, BSQ: Body Shape Questionnaire.

2.2.1. Evaluation of depression

The time of the evaluations and their content are summarised in Fig. 1.

The evaluation was performed using the Edinburgh Postnatal Depression Scale (EPDS) which is the gold standard for the detection of the prevalence of depression during pregnancy and post-partum (Cox et al., 1987; Guedeney et al., 2000; Howard et al., 2014). It is a self-administering questionnaire of 10 items intended for screening depression during pregnancy and post-partum, by evaluating the intensity of depressive symptoms over the last 7 days. Each item is scored 0 to 3. The minimum score is 0 and the maximum score 30. The higher the score is, the more significant the depressive syndromes are. This scale does not depend much on somatic or physical symptoms and is validated for use over the perinatal period (Nast et al., 2013). A cut off score of 12 is recommended to screen for depressive episodes and a sensitivity of 86% and a specificity of 78% (Cox et al., 1987; Guedeney et al., 2000; Howard et al., 2014). We considered the existence of depression on at least one moment of the pregnancy and of the post-partum if EPDS score was greater than or equal to 12 and called it perinatal depression. If one data was missing at one time of the study, it was considered as non-depressed.

2.2.2. Evaluation of the image and representations of the body: body dissatisfaction

Body image is a multidimensional construct consisting of perception (evaluation of body size), affection (satisfaction or dissatisfaction with body image) and behaviours (through exercising or dieting to control or change body appearance) Body dissatisfaction is the degree to which individuals experience the difference between their cognitive and ideal weight and body shape (Sun et al., 2018).

- Pictorial Body Image Scale (PBIS)

This instrument is used to evaluate the perception by women of their own body image at the time of the evaluation as well as their ideal body image (Stunkard et al., 1983). The scale is composed of nine pictures of women ranging from very thin silhouettes to silhouettes depicting obesity. Each image corresponds to a number from 1 to 9 (1 = extremely thin, 9 = obesity). The women were questioned about their current silhouette: “Over the last four weeks, which picture resembles the most your current silhouette” and their ideal silhouette: “Over the last four weeks, which silhouette would you like to resemble the most?” Body dissatisfaction according to the silhouette test corresponds to: (number of evaluation of the current silhouette)-(number of evaluation of ideal silhouette). The patients were divided into two classes: dissatisfied with their body (difference greater than or equal to 2) or satisfied (difference smaller than 2).

- Body Shape Questionnaire (BSQ)

This is the gold standard one-dimension self-administering questionnaire used to evaluate *the body shape concerns* including in pregnant

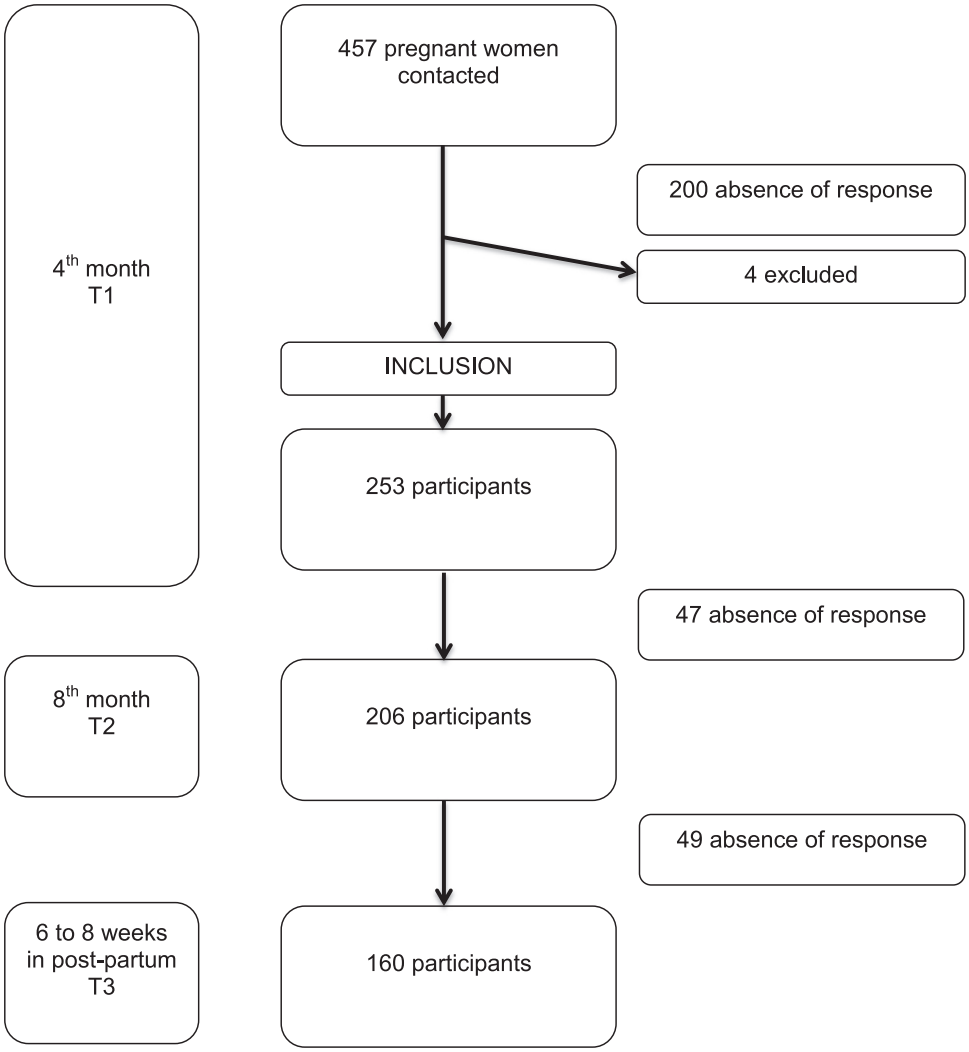

Fig. 2. Study flow chart.

women populations (Gjerdingen et al., 2009; Silveira et al., 2015). This questionnaire was designed by Cooper (Cooper et al., 1987). It is composed of 34 items scored on Likert scale in 6 points (ranging from never to always). The total scores range from 34 to 204. Scores below 80 indicate the absence of body shape concerns. According to the literature, the standard measurements to detect body image dissatisfaction are Body Areas Satisfaction Scale (BASS), Body Shape Questionnaire (BSQ), Body Cathexis Scale (BCS) and Eating Disorder Inventory (EDI) (Silveira et al., 2015). These scales capture the satisfaction with specific body areas. Only one was validated in pregnant population, the Pregnancy and Weight Gain Attitude Scale (PWGAS) (Hartley et al., 2018; Silveira et al., 2015). Although there are several scales for measuring a discrepancy between an individual's own body weight and their ideal body weight, figure rating scales are most commonly used (Mutale et al., 2016).

2.2.3. *Dimensional assessment of eating disorders*

The Eating Disorder Examination-Questionnaire (EDE-Q) is a self-administering questionnaire derived from the Eating Disorder Examination interview, that allows both a category and dimensional scoring of eating symptoms (Fairburn and Beglin, 1994; Mond et al., 2006). The EDE-Q evaluates the principal characteristics of eating disorders over the last 28 days. A score higher than 4.0 defines the presence of eating disorder. The EDE-Q is a useful measure of eating disorder psychopathology, attitudes and behaviors associated with these pathologies previously validated in French (Carrard et al., 2015).

- Statistical analysis

Firstly, descriptive statistics were produced for all continuous and categorical data. Means and SD were used for normally distributed data and median and interquartile range or range for data not meeting this assumption. Secondly, we verified the prerequisite of our study i.e. that the evaluation of body dissatisfaction during pregnancy could be performed by PBIS in reference to BSQ. Thirdly, the relationships between perinatal depression and the perceived body dissatisfaction at the beginning of the pregnancy in one hand and clinical perinatal depression risk factors (history of eating disorders, unintended pregnancy, primiparity and women older than 35) in the other hand, were tested by bivariate analysis using independent-samples *t* tests to test, χ^2 or Fisher exact test as appropriate. Logistic regressions were used to calculate odds ratio and 95% Confidence Interval for the odds of depression according to body dissatisfaction (PBIS score) and eating disorders symptoms (EDE-Q score). Statistical analyses were performed using SPSS 19 Statistics package. Logistic regression was then used in order to test the relationship between perinatal depression and predictive risk factors identified in the literature and selected by univariate analysis ($p < 0.1$).

Table 1
Characteristics of the cohort at T1, T2 and T3.

Characteristics	
Cohort at T1 (*n* = 253)	
Sociodemographic characteristics	
- Maternal age, mean ± SD [min–max]	31.2 ± 3.8 [19–40]
- Paternal age, mean ± SD [min–max]	33.8 ± 4.9 [22–55]
Marital status	
- Married, cohabitation, number (%)	238 (94.4)
- Single, number (%)	12 (4.8)
- Divorced, separated, number (%)	2 (0.8)
French citizen, number (%)	220 (87.3)
Other, number (%)	32 (13.9)
Women with professional activity, number (%)	230 (92.0)
Last maternal diploma, number (%)	
- graduate diploma > 3 years post-secondary education diploma	187 (74.5)
- BTS, DUT or DEUG	30 (12.0)
- secondary education diploma	16 (6.4)
- CAP/BEP	13 (5.2)
- BEPC/lower certificate	3 (1.2)
- None	2 (0.8)
Last paternal diploma, number (%)	
- graduate diploma > 3 years post-secondary education diploma	155 (61.5)
- BTS, DUT or DEUG	35 (13.9)
- secondary education diploma	29 (11.5)
- BEPC/lower certificate	4 (1.6)
- None	3 (1.2)
Mean number of children per women, mean ± SD [min;max]	0.54 ± 0.7 [0–3]
Primiparity	144 (56.9)
Eating disorders	
- History of eating disorders, number (%)	75 (29.6)
- History of bulimia, number (%)	25 (9.8)
- History of anorexia nervosa, number (%)	19 (7.5)
- Current eating disorder, number (%)	16 (6.3)
Characteristics of pregnancy	
- BMI before pregnancy, kg/m^2, mean ± SD [min–max]	22.0 ± 3.5 [16.9–37.6]
- Weight gain, kg, mean ± SD [min–max]	12.9 ± 5.9 [–15–29]
Cohort at T2 (*n* = 206)	
Women with professional activity, number (%)	23 (11.4)
Cohort at T3 (*n* = 160)	
Characteristics of birth	
- Type	
Vaginal route, number (%)	140 (87.5)
Cesarean, number (%)	20 (12.5)
Characteristics of newborn	
- Weight, g, mean ± SD [min–max]	3300 ± 461 [1800–4650]
- Length, cm, mean ± SD [min–max]	49.4 ± 2.1 [41–58]
- Prematurity, number (%)	7 (4.5)
- Feeding mode (%)	
Breast	122 (76.7)
Bottle	29 (18.2)
Mixed	8 (5.1)

%: percentage, SD: Standard Deviation, n: number, mean: mean, min: minimum, max: maximum, kg/m^2: kilogram/meter^2, g: grams

3. Results

3.1. Description

Table 1 describes the sample at T1, T2 and T3. The level of education was high with 74.5% of subjects having a higher education diploma (3 years after the secondary education diploma). On a socio-economic level, 53.0% of the subjects belonged to the managerial and higher intellectual occupations category in accordance with population of the local area.

The mean age of these young women was 31.2 years. They had on average 0.5 children per woman. The unwanted pregnancy represented 20 women in the cohort (8.0%). Premature births before 37 weeks of amenorrhea concerned 4.5% of pregnancies. In post-partum 76.7% of the women breast-fed.

Table 2
Main characteristics of mothers followed or not at T3.

Data at T1	Followed at T3		*p*
	Yes	No	
Number (%)	160 (63.2)	93 (36.8)	
Age ≥ 35 years old, number, (%)	34 (21.2)	17 (18.3)	0.6
Primiparity, number, (%)	96 (58.1)	48 (51.6)	0.2
Unintended pregnancy, number, (%)	11 (6.9)	9 (9.7)	0.4
History of eating disorders, number, (%)	42 (26.2)	33 (35.5)	0.1
Current eating disorder, number, (%)	7 (4.4)	9 (9.7)	0.2
Depression, number, (%)	19 (11.9)	12 (12.9)	0.8
Body dissatisfaction (PBIS), number, (%)	63 (39.4)	39 (41.9)	0.6
EDE-Q global score, mean ± SD	0.7 ± 0.8	0.8 ± 0.8	0.3
BSQ total score, mean ± SD	55.3 ± 22.4	60.0 ± 23.8	0.6
Last maternal diploma obtained			
Higher education diploma, number (%)	145 (90.6)	72 (77.4)	
Diploma less than or equal to secondary education diploma, number (%)	13 (8.1)	21 (22.6)	0.001*

Abbreviations: PBIS: Pictorial Body Image Scale, EPDS: Edinburgh Postnatal Depression Scale, EDE-Q: Eating Disorder Examination-Questionnaire, BSQ: Body Shape Questionnaire, mean

* Significant ($p < 0.05$)

Table 2 describes the comparison of the women followed ($n = 160$) with those not followed ($n = 93$)

The followed group had a higher level of studies ($p = 0.001$) but did not differ on any of the clinical characteristics studied.

3.1.1. Depression

In total, 51/253 women (20.2%) were depressed in the perinatal period (at least at one moment during their pregnancy or during post-partum). These elements are summarised in Fig. 3.

3.1.2. Body dissatisfaction and body shape concerns

According to the PBIS, at T1, 40.5% of women were dissatisfied with their body image.

The mean BSQ scores was in average 57.0 ± 23.0 [34;165] at T1. Only 12.7% of women ($n = 32$) had body shape concerns (a BSQ score greater than or equal to 80).

3.1.3. Eating disorders symptoms

Level of eating disorders symptoms was low, the mean EDE-Q score at T1 was low in average (0.7 ± 0.8 [0;3.9]).

3.2. Bivariate analysis

3.2.1. Prerequisite of our study: relationship between the body concern score (BSQ) and body dissatisfaction (PBIS)

We confirmed the link between the PBIS and BSQ scores at 4 months of pregnancy. The women who were dissatisfied with their body in the silhouette test (PBIS) had significantly higher body concern score in the BSQ, (respectively 71.2 ± 27.4 vs 47.7 ± 12.7; $p < 0.0001$).

3.2.2. Relationships between body dissatisfaction (PBIS) and perinatal depression

A significant relationship was found between body dissatisfaction and perinatal depression. Thus, 33% of women dissatisfied with their body image were depressed at some moment during the pregnancy or post-partum vs. 11.3% of the women who were not ($\chi^2 = 18.2$; $p < 0.0001$).

This risk of suffering of perinatal depression was 3 times greater in women dissatisfied with their body image compared who were not (OR = 3.7, 95% CI 1.9–7.2).

3.2.3. Relationships between potential risk factors and perinatal depression

- Relationship between eating disorders symptoms (EDE-Q) and perinatal depression

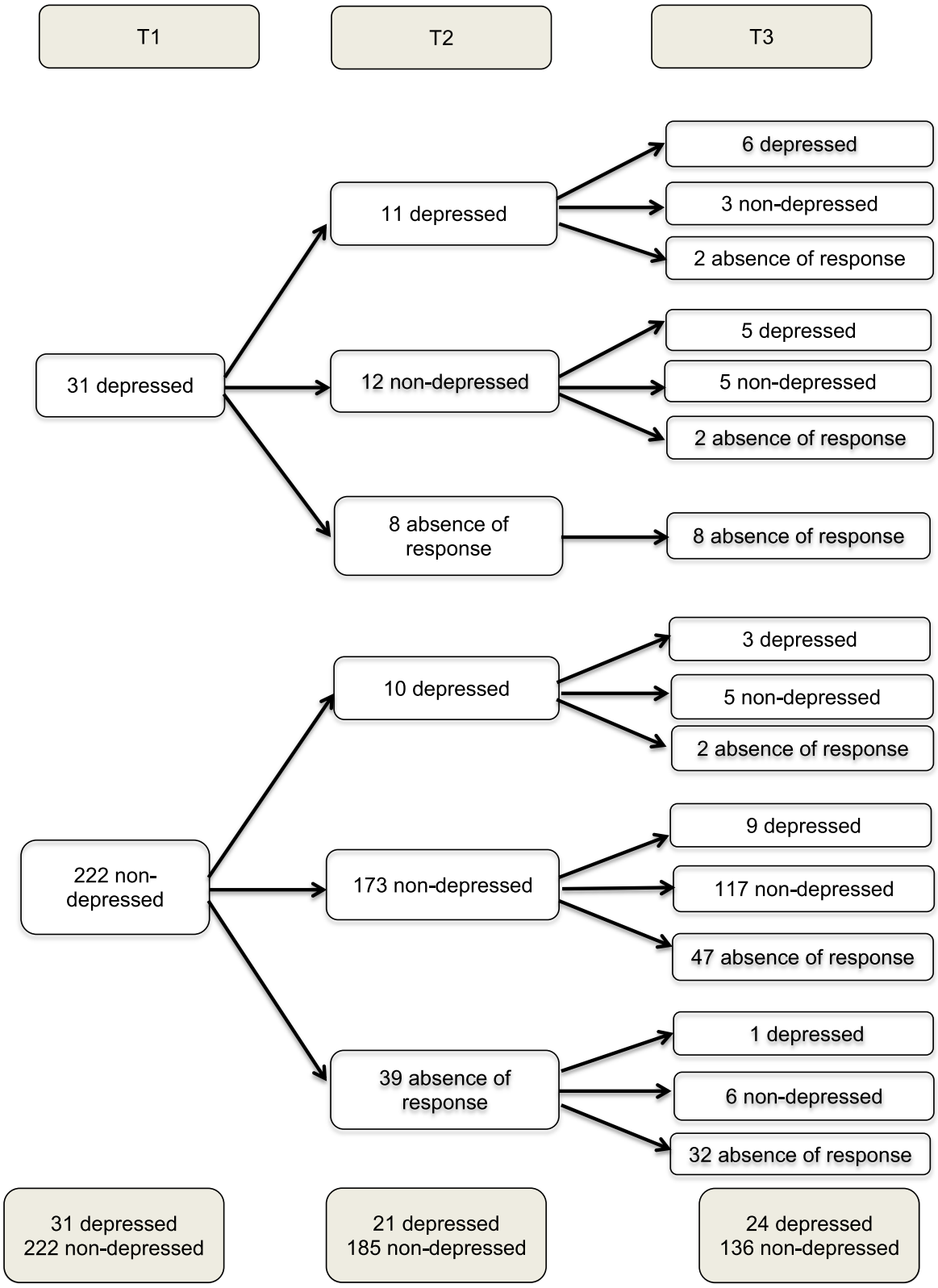

Fig. 3. Distribution of depression in the sample according to time of evaluation.

The eating disorders symptomatology scores (EDE-Q) was significantly higher in depressed women (at any moment during the pregnancy) compared to non-depressed women (respectively $m = 1.3$ SD = 1.05 vs $m = 0.6$ SD = 0.6; $p < 0.0001$)

- Relationship between unintended pregnancy and perinatal depression

A relationship was found between depression and unintended pregnancy. Thus, 55.0% of women with an unintended pregnancy were depressed at the perinatal period vs. 17.4% of women who intended their pregnancy ($p < 0.0001$).

This risk of having perinatal depression was 5 times greater in women with unintended pregnancy compared women with wanted pregnancy (OR = 5.1, 95% CI 1.9–13.6).

- Relationship between primiparity and perinatal depression

A total of 13.9% of primiparae women were depressed at some moment during the pregnancy or post-partum vs. 28.4% of multiparous women ($p < 0.004$).

- Relationship between age and perinatal depression

A total of 31.4% of women older than 35 were depressed at some moment during the pregnancy or post-partum vs. 17.3% of women younger than 35 ($p < 0.03$).

3.2.4. Relationships between body dissatisfaction (PBIS score) and eating disorders symptoms (EDE-Q)

As eating disorders are highly link to body dissatisfaction we tested the link between EDE-Q scores and PBIS score before the multivariate analysis. The eating symptomatology scores (EDE-Q) were significantly higher in women dissatisfied with their body image compared to those who were not (respectively $m = 1.2$ SD = 0.9 and $m = 0.4$ SD = 0.5; $p < 0.0001$).

3.3. Multivariate analysis

As EDE-Q scores and PBIS score where linked, we tested in two models different the relationships between perinatal depression in one hand body dissatisfaction or eating disorders symptoms in the other hand taking into account the existence of other risk factor (unintended pregnancy and women older than 35 years old).

The risk of perinatal depression was 4 times higher in women dissatisfied with their body image ($p < 0.001$) if unintended pregnancy and age are taken into account.

The risk of perinatal depression is 3 times significantly higher in women with higher levels of eating disorders symptoms ($p < 0.001$) if unintended pregnancy and age are taken into account. Detailed results are shown in Table 3.

In both cases unintended pregnancy and age are also significant predictive factors of perinatal depression (see Table 3 for details).

4. Discussion

The main objective of our work was to identify whether the body dissatisfaction expressed by women early during pregnancy (ie: during the first visit to the maternity at 4 months of pregnancy) was associated with a perinatal depression.

Table 3
(A) Multivariate regression models predictors of perinatal depression. (B) Final model.

	Explicative variables	*p*-value	Related effect size OR [95% CI]
Perinatal depression	- EDEQ	**0.0001**	**3.0** [1.9; 4.8]
	- Age > 35	0.02	2.7 [1.2; 6.0]
	-Unintended pregnancy	0.004	4.9 [1.7;14.3]
	- Primiparity	0.02	2.7 [0.3; 1.1]
Perinatal depression	- PBIS	**0.0001**	**3.6** [1.9; 7.5]
	- Age > 35	0.05	2.2 [1.0; 4.8]
	-Unintended pregnancy	0.003	4.7 [1.7; 13.0]
	- Primiparity	0.06	0.5 [0.3; 1.0]
Perinatal depression	- EDEQ	**0.0001**	**3.2** [2.0; 5.0]
	- Age > 35	0.007	3.0 [1.3; 6.7]
	-Unintended pregnancy	0.003	5.0 [1.8;14.4]
Perinatal depression	- PBIS	**0.0001**	**4.0** [2.0; 7.9]
	- Age > 35	0.002	2.5 [1.2; 5.5]
	-Unintended pregnancy	0.002	4.8 [1.7; 13.0]

Abbreviations: EDE-Q: Eating Disorder Examination-Questionnaire, PBIS: Pictorial Body Image Scale, OR: Odds Ratio, CI: Confidence Interval

In total, 20.2% of women were depressed in the perinatal period which is comparable to the literature (Bennett et al., 2004; Gavin et al., 2005; Thombs et al., 2015). According to the PBIS, at T1, 40.5% of women were dissatisfied with their body image. We confirmed the link between the PBIS and BSQ scores at 4 months of pregnancy ($p < 0.0001$). We confirmed a significant relationship between body dissatisfaction based on the PBIS score and perinatal depression (Silveira et al., 2015).

We found that the risk of perinatal depression was 4 times higher in women dissatisfied with their body image ($p < 0.001$) if unintended pregnancy and age are taken into account. In addition we also found that perinatal depression is 3 times higher in women with higher levels of eating disorders symptoms ($p < 0.001$) if unintended pregnancy and age are taken into account

As we develop in the introduction, the literature has already highlighted that the body shape concerns measured by the BSQ was related to depression during pregnancy (Haedt and Keel, 2007). The body dissatisfaction assessment by images, like with the Pictorial Body Image Scale (PBIS) (Stunkard et al., 1983) is quicker and more spontaneous than a long questionnaire, so we approached this question in an original manner via the perception of the body image and using the body dissatisfaction concept, which had never been done before.

The PBIS evaluates in a simple manner the representation a woman has of her silhouette and the difference between this representation and what she would want. The score of body dissatisfaction by the PBIS is related to that measured by the BSQ widely used during pregnancy in other studies (Gjerdingen et al., 2009; Haedt and Keel, 2007). The use of BPIS instead of BSQ has multiple advantages. The two questions of the PBIS are easy and quick to ask by a healthcare professional who monitors the pregnancy and asks the patient how she perceives herself physically. These quick simple questions can be easily include in the clinical examination, they focus the women preoccupations in order to screen for depression. These questions avoid the limitation of the screening focused on depression symptoms in women who do not dare mention them during the perinatal period (Andrighetti et al., 2017). These simple questions can help to reduce the risk of absence of screening, common in the perinatal period (Bhat et al., 2017; Cerimele et al., 2013; Howard et al., 2014).

In addition to the question of the body dissatisfaction, we also have also confirmed that the intensity of eating symptoms scored on the EDE-Q was related to the onset of a perinatal depression in our study and these results are consistent with the literature (Micali, 2010). This relationship exists independently of a confirmed eating disorder diagnosis.

Thus, both body dissatisfaction and eating symptoms at the beginning of pregnancy are predictive factors of perinatal depression, these two elements are two clinical fields to be investigated early during pregnancy in order to detect a depression.

4.1. Limitations

The women of our sample were slightly older than the general population of pregnant women in France in 2010 with a mean age of 31.2 years versus 29.7 years in the general population ("Indicateur conjoncturel de fécondité," n.d.) and the level of education was also higher than that of the general population of the same age at the same period (74.5% versus 26.9% of women with a graduate degree or 3 years of study post-secondary education) ("INSEE, Niveau de diplômes selon l' âge, série longue depuis, 2003" n.d.), as often in the literature (Silveira et al., 2015). This should constitute protective factors for post-partum depression (Howard et al., 2014) yet in our cohort, and using the EPDS cut off at 12, 24 out of 155 women (15.0%) were depressed during the post-partum, which is comparable to the

prevalence observed in the general population (Bennett et al., 2004; Gavin et al., 2005). We found that primiparae women were less depressed than multiparous women. This unusual relationship in our cohort is explained by the age of the women. A total of 28.4% of multiparous women were older than 35 years old vs. 13.9% of primiparae women ($p < 0.004$)" .

The response rate of 55.4% appears to be low. We have no information in favour of a biais or the opposite. We also had a relatively high lost to follow-up rate. The response rates were 81.4% at T2 and 63.2% at T3, respectively; however, the comparison of the patients initially included and having been followed did not show any differences with that of the patients who were lost to follow-up on the variable studies, except for one element: The women followed had a higher level of studies.

Finally, the prevalence of depression may have been underestimated in our study since the patients who did not respond to one of the three questionnaires at T1, T2 or T3, or were considered as non-depressed and therefore not taken into account in the data analysis of the 51 depressed patients. Therefore, the positive result is even more meaningful: some women actually depressed at T1, T2 or T3 were not detected as such in the analyses.

Conversely, this study also presents certain strengths, this study followed the recommendations of the meta-analysis by Silveira et al (Silveira et al., 2015): it was longitudinal, following prospectively a large cohort of women from the beginning of the pregnancy until post-partum in order to detect the relationships and the dynamic relation between body dissatisfaction and depression. The detailed and appropriate scales concerning body dissatisfaction, depression and eating disorders were repeated at three time points during pregnancy and post-partum to better understand the relationship between these different factors. To our knowledge, only six prospective studies have observed the prenatal impact of body dissatisfaction on perinatal depression (Silveira et al., 2015) but did not use the same type of instrument using silhouette and dissatisfaction but questionnaires.

5. Conclusion

Depression during pregnancy and in post-partum is frequency under diagnosed (Duhoux et al., 2013; Howard et al., 2014). The detection of depression during the perinatal depression is complex, as women do not mention their depressive problems readily (Andrighetti et al., 2017). The administration of depression scales may take considerable time and considered unacceptable by many women who cannot accept recognizing their distress (Brealey et al., 2010).

The evaluation of body dissatisfaction and eating symptoms during pregnancy could be good and indirect mean to detect risk of depression during pregnancy and in post-partum. Although the literature suggests a bidirectional association between depression and body image dissatisfaction, the interest is to detect these patients as soon as possible during pregnancy. The use of the Pictorial Body Image Scale (PBIS) (Stunkard et al., 1983) at the beginning of the pregnancy in order to detect a higher risk of perinatal depression, by questioning patients, not about their depressive symptoms but about their body image, could be done in clinical setting, and require future studies to confirm our first results. In line with this, a research should be develop to evaluate the usefulness of including a Screening question as the SCOFF (Sick, Control, One Stone, Fat, Food) in the early clinical examination during pregnancy (Morgan et al., 1999). The SCOFF could help to detect both patients with a risk of eating disorders, that is a risk for problems during pregnancy, and is associated with higher risk of perinatal depression. Early detection of perinatal depression allow to propose appropriate treatments to the depressed women in order to limit the consequences of depression, including the impact on the development of the child (Bhat et al., 2017; Howard et al., 2014).

Declarations of interest

none

Conflict of interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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