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Preconception paternal mental health history as predictor of antenatal depression in pregnant women

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Abstract

Background Depression occurring during the perinatal period (PND) could affect both future mother and father. PND may lead to several adverse physical and mental health outcomes for the whole family. Several psychopathological determinants have been identified, even though few studies investigated the role of paternal mental health in the onset of maternal perinatal depression (MPND). Hence, a retrospective cohort study was carried out in order to investigate the relationship between paternal mental health and the occurrence of antenatal maternal depression as well as identifying potential sociodemographic, clinical and obstetrical predictors in the development of MPND.

Methods All pregnant women afferent to the Perinatal Mental Health Outpatient Service of the Unit of Clinical Psychiatry at the University Hospital of Marche, Polytechnic University of Marche, Ancona, Italy, between April 2021 to February 2022, were consecutively recruited and longitudinally screened for antenatal depression. The sample was divided in two groups, based on the screening by using the Edinburgh Postpartum Depression Scale (EPDS) for PND. A stepwise binary logistic regression analysis was performed in order to evaluate the predictors associated with the presence of antenatal depression (vs. the absence of antenatal depression).

Results A total of 106 participants among all 460 screened from April 2021 to February 2022, were retrospectively included. In our sample, a prevalence of 13.2% in antenatal depression was found. The binary logistic regression model showed that the higher maternal age (OR = 1.320; $p = 0.005$), gestational comorbidity (OR = 10.931; $p = 0.010$), pregnant women's (OR = 19.001; $p = 0{,}001$) and their partner's positive history (OR = 16.536; $p = 0.004$) for mental disorder significantly predicted the presence of antenatal depression in our sample.

Conclusions Our study suggests the need to investigate the pre-existing psychopathology of the pregnant woman's partner as a potential risk factor for MPND, particularly for antenatal depression. Overall, a better understanding and investigation of all potential risk and/or protective factors for the onset and/or maintenance and/or worsening of MPND could help clinicians in early identifying treatment strategies to improve maternal mental health as well as future father's mental health.

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Keywords Antenatal depression, Paternal mental health, Peripartum depression, Postpartum depression, Pregnancy

Introduction

Perinatal depression (PND) comprises any mood disorder occurring during pregnancy (antenatal depression) and/or after childbirth (postnatal depression) [1], both among mothers- and fathers-to-be [2]. Indeed, despite women seeming to be approximately 2-fold more affected compared to male counterparts, PND could determine significant impactful adverse physical and mental health outcomes for the whole family [1, 3]. In Western countries, it has been estimated a lifetime prevalence of maternal PND (MPND) ranging from 13.2 to 25.3%, depending on the timing of MPND detection (e.g., type of trimester of pregnancy, postpartum versus antepartum, etc.), type of screening and diagnostic assessment used, and the country of the study [4]. Paternal perinatal depression (PPND) is a father-to-be specific nosological entity characterised by the onset of a major depressive disorder occurring throughout the pregnancy and/or during the first year after childbirth [5]. According to two meta-analyses [6, 7], PPND prevalence was estimated to be around 9-10%, with a significant increasing trend particularly following 3 and 6 months postpartum [6, 7].

PPND has been observed in around 24-40% of male partners of pregnant MPND women, by suggesting a potential association between PPND and MPND [6, 8, 9]. However, there is still very little research specifically assessing and investigating PPND as determinant in the onset and/or a maintenance of MPND, including antenatal depression. According to the biopsychosocial model of MPND, they have been supposed integrated and interchangeable associations of a set of variables, including a genetic liability, a specific psychological and/or psychiatric vulnerability, neurobiological, psychosocial and environmental factors, as well as determinants specifically derived by social and family networks, including the potential influencing/predisposing/perpetuating role of the presence of a PPND in favouring the onset and/or maintenance of a MPND [5, 10, 11]. Indeed, it has been demonstrated that the presence of a PPND in fathers-to-be could interfere with the attachment style and parental bonding in new-borns, affect child development and his/her mental health, predisposing to poor or lacking social/family support needed to pregnant [12–14].

However, despite the need to implement early strategies to identify and provide support to fathers-to-be affected with PPND, it seemed that men are usually less prone to be engaged by mental health services, less likely seek help for their mental health issues, much more likely express negative attitudes towards mental health treatment, as well as they much more likely discontinue mental health treatment compared to the female counterpart [15]. Hence, little attention was paid to the role of PPND in the expression of antenatal depression, mainly due to the lower rate of men with PPND who ask for a mental health professional help, particularly through all perinatal periods.

Therefore, we retrospectively collected a sample of pregnant women afferent to our Italian Perinatal Mental Health Outpatient Service within a regional screening program, among those hospitalised at the Unit of Clinical Gynaecology and Obstetrics of our same university hospital. The main objectives were: (a) investigating the prevalence of antenatal depression and associated preconception PPND in our sample of pregnant women; (b) evaluating the existing relationship (if any) between a concomitant PPND and the onset of an antenatal depression; (c) identifying whether other sociodemographic, clinical and obstetrical variables could act as predictors for the development of antenatal depression in our Italian sample.

Materials and methods

Study design and selection of participants

The present study is a sub-analysis of a larger multicentre nationwide population-based naturalistic observational screening project aimed at early identifying pregnant and/or puerperal women at-risk for developing perinatal mental disorders. All pregnant women admitted at the Perinatal Mental Health Outpatient Service, Unit of Clinical Psychiatry, University Hospital of Marche, Polytechnic University of Marche, Ancona, Italy, between April 2021 to February 2022, were consecutively recruited and longitudinally screened for antenatal depression. Written informed consent for research purposes was obtained from all participating women. All women were given the possibility to withdraw their participation from the study, without any kind of clinical and therapeutic consequences. Recruitment and enrolment of the final sample were based on the following inclusion criteria: a) ≥ 18 years old; b) pregnant women; c) absence of linguistic difficulties (i.e., not fluent Italian speaker and/or without a sufficient ability to understand Italian language); d) signed informed consent for collecting and analysing clinical data for research purposes. Participants were excluded if they met one or more of the following exclusion criteria: (a) incomplete or inadequate filled out questionnaires; (b) refusal to complete the informed consent; (c) not available data on the father's preconception mental health. All the study procedures were in accordance with the ethical standard of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable

ethical standards. The institutional Ethics Committee approved the study (Prot. 378/2022). This research study was conducted retrospectively from data obtained for clinical purposes.

Measures

All participants were asked to complete an ad hoc sociodemographic and clinical data form (e.g., age, ethnic, civil status, employment status, education level, family psychiatric history, medical history, pregnancy-related and other health conditions, previous psychiatric disorders and treatment histories). According to the 2014 National Institute for Health and Care Excellence [16] guidelines on antenatal and postnatal mental health, all women were administered the Edinburgh Postnatal Depression Scale [17, 18], as a screening tool for detecting depressive symptomatology in pregnancy. For those women positive at the EPDS screening, the clinical diagnosis of antenatal depression was carried out by senior psychiatrists through a semi-structured clinical interview for DSM-5 (SCID-5-CV) [18] administered to both pregnant women (to confirm a diagnosis of antenatal depression) and their partners (to confirm preconception history of major depressive disorder and/or a current diagnosis of PPND). The clinical assessment and collection of data on past psychiatric history of their partners were collected during the confirmatory stage.

The EPDS is a 10-item self-report scale, widely used in research in perinatal mental health [19, 20] and it has been validated for use in all perinatal periods [21–23]. EPDS assesses the severity of depression symptomatology experienced by the woman over the previous seven days and it has been proven to be an efficient and effective tool for early identification of women at-risk for MPND [24]. Each item is scored on a four-point Likert scale (0–3), with a total score ranging from 0 to 30. An Italian study of the EPDS [25] showed a high internal consistency with a Cronbach's alpha of 0.80 during pregnancy and 0.87 following delivery [26]. In our study, a cut-off of ≥ 9 at the EPDS was used to identify patients with PND, according to the previous published literature and international guidelines [16, 24, 27, 28]. In fact, as indicated in the validation study of the Italian version [17], the choice of the cut-off value to use depends on the objectives of the evaluation: a cut-off of 9 seems to be the most suitable in screening programmes or population surveys, while a cut-off of 12 is usually recommended in clinical assessment and research, particularly in effectiveness studies in practise (effectiveness), in which it is intended to treat only people with a higher probability of developing depression in the perinatal period [28].

Statistical analysis

Categorical variables (i.e., sociodemographic features, clinical and pregnancy-related variables) were presented by frequencies (n) and percentages (%). Continuous variables, whereas normally distributed, were expressed as mean and standard deviations (SD); whereas not normally distributed, as median and quartiles. After analyzing the continuous variables for skewness, kurtosis, normality distribution through the Shapiro-Wilk test, and the equality of variances by Levene test, parametric or non-parametric statistical tests were used when appropriate. The sample was also divided in two groups: those women with antenatal depression after a positive screening at EPDS and confirmation through SCID-5-CV and those women without antenatal depression. A stepwise binary logistic regression analysis was performed in order to evaluate the factors/predictors associated with the presence of antenatal depression (vs. the absence of antenatal depression). The estimated odds ratios (OR) along with the 95% of confidence intervals (95% CI), and standardized coefficient β values were generated for each variable. For all analyses, the level of statistical significance was set at $p < 0.05$, two-tailed. Statistical analysis was performed using SPSS version 25 for Windows [29].

Results

Socio-demographic features of the participants

All socio-demographic characteristics of the study participants are summarized in Table 1. A total of 460 participants were screened from April 2021 to February 2022. Based on the inclusion criteria, only 106 women were retrospectively included in the present study, of which 71.7% of them were assessed during their third trimester of pregnancy. The mean age of the participants was 33.3 (SD = 4.6). Most participants were Italians (97.2%) and cohabiting/married (97.2%). Almost half of the participants were university graduates (50.9%) and most of them declared to be regularly employed (84%). More than half of the sample was primiparous (58.5%), while 34% declared to have already had a child. A positive history for miscarriage was reported in one-fifth of the sample (20.8%). While 4.7% of the participants reported a previous in-vitro fertilisation treatment before the pregnancy.

Clinical and psychopathological features of the sample

Regarding the voluptuary habits, only 4.7% of the sample declared a preconception smoking habit, while more than half of the participants declared a daily coffee or tea consumption (54.7%). None of the participants reported a previous and/or current substance and/or alcohol use. Around 26.4% of the participants had preconception medical comorbidities, of which 18.9% regularly took a pharmacologic treatment for medical comorbidities. In the total sample, approximately 9.4% of the participants

Table 1 Sociodemographic and clinical data of the study participants

Variable	Frequency (%) Mean ± Standard deviation Median (Q1-Q3)	
Participants		106 (100%)
Age		33.3 ± 4.6
Nationality	Italian	103 (97.2%)
	Other	3 (2.8%)
Relationship status	Married/ cohabiting	103 (97.2%)
	Single	3 (2.8%)
Education	Secondary school	6 (5.7%)
	High school	46 (43.4%)
	Graduate	54 (50.9%)
Employment	Employed	89 (84%)
	Unemployed	17 (16%)
BMI (before pregnancy)		23.54 ± 5.26
Previous psychiatric disorder		19 (17.9%)
Family history of psychiatric disorder		34 (32.1%)
Partner's previous psychiatric disorder		10 (9.4%)
Trimester	First	16 (15.1%)
	Second	14(13.2%)
	Third	76 (71.7%)
Previous abortus		22 (20.8%)
Previous IVG		5 (4.7%)
Spontaneous pregnancy		103 (97.2%)
Number of children	0	62 (58.5%)
	1	36 (34%)
	2 or 3	8 (7.5%)
Smoking		5 (4.7%)
Alcohol or substance use		0 (0%)
Coffee or tea consumption		58 (54.7%)
Gestational comorbidity		30 (28.3%)
Medical comorbidity (other than gestational)		28 (26.4%)
Nausea during pregnancy		87 (82.1%)
Vomiting during pregnancy		48 (45.3%)

were obese before the pregnancy. While 28.3% of the sample had a concomitant gestational comorbidity, including gestational diabetes (7.5%), bleeding (4.7%), threatened abortion (3.8%), gestational hypertension (2.8%). Among the participants, 5.7% of them declared a positive history for mood disorders, 12.3% of them for anxiety disorder, and 3.8% for an eating disorder. Among these participants with mental health issues, only 2.8% received a psychopharmacological treatment, while 5.7% declared to follow a psychotherapy. Regarding a positive family psychiatry history, 17% of the participants declared a diagnosis of depression or mood disorder among their family members, 15% of them an anxiety disorder, 4.7% an eating disorder (Table 1). Most participants reported adequate social support (97.2%). The participants were asked for the presence of a mental health history in their intimate partners. Among their partners, around 2.8% had depression or mood disorders, 7.5% had anxiety disorders, 0.9% had eating disorders, 0.9% had psychotic disorders. None of the participants' partners reported a previous and/or a current alcohol and/or substance use disorder.

Table 2 Predictors of depressive symptomatology requiring clinical attention in pregnant women

Variable	B	Odds ratio	95% CI		*p* value
			Lower	Upper	
Age	0.277	1.320	1.087	1.602	0.005
Gestational comorbidity	2.392	10.931	1.754	68.108	0.010
Women's previous psychiatric disorder	2.944	19.001	3.305	109.232	0.001
Partners' previous psychiatric disorder	2.806	16.536	2.402	113.815	0.004

Dependent variable: Depressive symptomatology requiring clinical attention in pregnant women (Edinburgh Postnatal Depression Scale score ≥ 9). Nagelkerke R^2= 0.516 Omnibus χ^2=34.793 ($p < 0.001$), Hosmer & Lemeshow χ^2=1.329 ($p = 0.988$)

Clinical and psychopathological predictors of MPND

The average EPDS median score of the total sample was 4.0 (95%CI = 2.0–7.0), with a prevalence rate of 13.2% of antenatal depression, by using both EPDS (as screening tool) and SCID-5-CV (as confirmatory clinical interview). The binary logistic regression model was statistically significant (Omnibus χ^2=34.793 ($p < 0.001$). The model explained 51.6% (Nagelkerke R^2) of the variance in antenatal depression and correctly classified 80.8% of cases. The model showed that the higher maternal age (Exp (B) = 1.320; B = 0.277; $p = 0.005$), gestational comorbidity (Exp (B) = 10.931; $B = 2.392$; $p = 0.010$), pregnant women's (Exp (B) = 19.001; $B = 2.944$; $p = 0,001$) and their partner's positive history (Exp (B) = 16.536; $B = 2.806$; $p = 0.004$) for mental disorder predicted the presence of antenatal depression in our sample (Table 2).

Discussion

To the best of our knowledge, this is the first Italian study specifically investigating the pre-existing psychopathology among partners of a sample of pregnant women, as a potential risk factor for the onset and/or development of an antenatal depression. Indeed, most research has been conducted regarding the possible impact of a pre-existing and/or concurrent partner psychopathology on maternal depressive symptoms, more specifically in the first postpartum year [30, 31]. Few studies have been carried out during the antenatal period, mostly specifically assessing only the third trimester of pregnancy or the association between a PPND occurring during the pregnancy and the subsequent onset of an antenatal depression [32, 33]. Overall, a better understanding and investigation of all potential risk and/or protective factors for the onset and/or maintenance and/or worsening of MPND could help clinicians in early identifying treatment strategies to

improve maternal mental health as well as future father's mental health [1, 24, 34, 35].

Overall, our preliminary findings confirmed a set of variables as potential predictors of the onset of antenatal depression, such as a higher maternal age, a concomitant gestational medical comorbidity, and a positive family history for a psychiatric disorder, as already documented in previous literature [30, 36, 37]. In particular, a previous history of mental illness, especially anxiety and depression or a history of a psychiatric treatment during a previous pregnancy or at any time during the lifetime has been found to represent a consolidated risk factor in the development of antenatal depression [4, 30, 38].

Furthermore, our findings reported that a positive preconceptional psychiatric history of the women's partner could significantly predict the onset of an antenatal depression. According to previous published studies, a perceived lack/poor social and/or partner's support may act as a significant risk factor for antenatal depression [30, 39, 40]. Conversely, perceiving a positive and supportive marital satisfaction appears to be a protective factor for the development of maternal antenatal depression [41, 42]. The presence of a supportive partner significantly acts as a buffer against the difficulties experienced by the pregnant woman in the transition to parenthood, by protecting maternal mental health [30, 43]. In fact, social and partner support can help women to cope with negative emotions and stressors associated with pregnancy and to positively prepare themselves for the birth and the postpartum period [44]. Indeed, a meta-analysis by Paulson and Bazemore [45] already documented a positive and moderate effect size between maternal and paternal depression in the perinatal period, including pregnancy. Maternal and paternal mental health appear to be strongly bidirectionally associated [31, 46]. According to a previous study by Paulson et al. [6], there is also evidence that paternal depression leads to increased depressive symptomatology in mothers during pregnancy and in the first 6 postpartum months. Overall, the transition to fatherhood may represent a significant determinant for a father's mental health, who could describe overwhelmed feelings of confusion, exhaustion, asthenia, loneliness, feeling trapped and helplessness [47]. Indeed, these factors could determine an increased vulnerability to depressive symptomatology, which could also manifest as a clinically relevant major depressive disorder [48]. In fact, approximately 10% of new fathers may experience significant depression during the perinatal period, associated with anhedonia and apathy, thoughts of self-harm and/or suicidal ideation, sleep disorders, appetite and weight changes, and feelings of worthlessness, also frequently in comorbidity with anxiety symptomatology or alcohol and/or substance use disorders [8, 49, 50]. Indeed, PPND is often misinterpreted or underdiagnosed due to the predominant attention towards the physical and mental health status of pregnant women, the presence of paternal depressive symptomatology under the clinical threshold level and/or the men's reluctance to seek help for his mental distress [8, 51]. Moreover, fathers experiencing PPND are more likely to be isolated, to have few effective interpersonal supports, to be less satisfied with their couple relationships, to have poorer quality of life and social networks, as well as to adopt less effective and functional coping strategies which could be harmful to themselves and their families, including new-born and their partners [7, 52–54]. Furthermore, as already documented by literature so far published, there are no studies which investigated the impact of the presence of a preconception paternal depression on the onset of an antenatal and/or postnatal maternal depression as well as how a positive preconception paternal history of mental health could impact in terms of coping strategies and/or resilience abilities of the future father which indirectly could affect women's mental health.

Overall, despite these preliminary interesting findings, our study has several limitations that should be adequately discussed. Firstly, the retrospective and cross-sectional study design does not allow to draw definitive conclusions regarding the causal relationship between the onset of MPND and a positive history of preconception paternal mental disorder. Secondly, the retrospective nature of the study did not allow us to reach a large sample size, which could limit the generalizability of our findings to the general population of pregnant women. Moreover, most of our participants were recruited, in the screening phase, during the third trimester of pregnancy, not making the sample fully representative of the full peripartum period. Thirdly, we collected only the variable presence/absence of a pre-existing preconception paternal mental disorder (even though through a semi-structured clinical interview) without using a self-report assessment tool and only during the confirmatory phase (not during the screening phase that was addressed only to pregnant women and not to their partners). Further studies should also measure which is the differential impact of a different timing of onset and/or recurrence of depressive symptomatology experienced by fathers-to-be, by investigating if the psychopathological load could be different in case of a previous MDD in current clinical remission versus a de novo MDD onset during pregnancy on the onset and/or maintenance and/or worsening of antenatal depression in women. Moreover, further studies should also integrate screening and assessment tools specifically addressed to paternal mental health during pregnancy. Fourthly, our study being only descriptive and cross-sectional, did not evaluate the impact of potential psychoeducational and supportive interventions addressed to the couple in improving both

maternal and paternal mental health during the pregnancy. Fifthly, our findings clearly describe the impact of pre-existing paternal mental health on the onset of only antenatal depression, by not investigating which is the possible relationship with the possible future postnatal depression. Therefore, further larger, and longitudinal studies (also with a specific interventional focus) should be carried out to systematically investigate and confirm our preliminary findings by recruiting more Italian centres, as well as by investigating paternal mental health through validated and universally recognized assessment tools and not only by using a clinical interview.

Overall, our findings clearly underline the importance of providing a comprehensive screening for mental health issues, including mood disorders, already during the pre-conception phase to both mother and father-to-be, as well as in each phase of pregnancy trimester and puerperium. The role of paternal mental health is obviously fundamental in protecting and/or maintenance of a maternal wellbeing throughout the pregnancy and postpartum period. An informative and psychoeducational approach at the early stages of pregnancy (ideally in the pre-conception phase) should be implemented and provided to all couples who intend to start a pregnancy and the process to become parents. All perinatal services should also provide a psychological and/or psychiatric consultation specifically addressed to all fathers-to-be with a non judgemental approach, and a psychological support addressed to the couple and other family members. Both parents should then also provide psychological and/or psychiatric support during the postpartum period to help them in building a good attachment and relationship with their babies and providing them all needed support in favouring an adequate parental functioning.

Conclusions

Despite the abovementioned limitations and the preliminary findings here discussed, our study could significantly open new research questions about the possible impact of paternal mental health both during the pregnancy and postpartum period, by stimulating further studies specifically addressing paternal mental health which could indirectly impact on maternal mental health.

Our study suggested that paternal mental health should not be overlooked, even though there is the need to implement further studies specifically evaluating the PPND as primary outcome. In fact, on one hand, there is the need to deeply investigate the main determinants/causes of peripartum depression experienced by fathers-to-be. Moreover, there is also the need to clarify which is the potential relationship (i.e., predisposing, causal, concausal, etc.) between a positive paternal psychiatric history and the onset and/or maintenance and/or worsening of an antenatal and/or postnatal depression in pregnant and/or puerperal women. Consequently, there is the need to build new engaging and tailored preventive support programs for paternal mental health, by involving partners in family and couple focussed programs aimed at initially enhancing intimate relationships and, hence, set a supportive context for early identification and management of paternal mental health issues. Therefore, early, and fully integrated preventive and treatment programs addressing perinatal mental health of both parents-to-be, should be implemented to incentivize primary and secondary interventions for PND.

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Author contributions
L.O. and I.G.Y.-K. conceived and conceptualized the study. M.B., S.B. and G.F. contributed to the data collection. I.G.Y.-K. performed formal data analysis. Preliminary draft and the final draft was written by L.O. U.V. revised and edited all drafts and the final draft. U.V. supervised the work and provided the final feedback to the manuscript. All authors have read and agreed to the published version of the manuscript.

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Data availability
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
The study was approved by the institutional Ethics Committee (Protocol code 378/2022) and it complies with the Declaration of Helsinki. All participants provided their written informed consent to participate in the study.

Consent for publication
All participants provided their consent for publication of the present findings.

Competing interests
The authors declare no competing interests.

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