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Effect of Borderline Personality Disorder on Obstetrical and Neonatal Outcomes

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A B S T R A C T

Background: Borderline personality disorder (BPD) is a serious mental disorder commonly associated with functional impairments and adverse health outcomes. Very little is known about BPD in pregnant women; hence, our study objective was to evaluate the effect of BPD on obstetrical and neonatal outcomes.
Methods: We carried out a retrospective cohort study using the Healthcare Cost and Utilization Project, Nationwide Inpatient Sample from 2003 to 2012. We identified births using the *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) diagnostic and procedure codes and classified women by BPD status. Multivariate logistic regression was used to evaluate the effect of BPD on obstetrical and neonatal outcomes, adjusted for subject baseline characteristics.
Findings: During the study period, there were 989 births to women with BPD with an overall incidence of 11.65 in 100,000 births. Women with BPD were more likely younger, of lower socioeconomic status, smoked or used drugs, and had an underlying mental disorder. Unadjusted models revealed that BPD was associated with an increased risk of almost all adverse maternal and fetal outcomes we examined, the exception being post partum hemorrhage and instrumental delivery, which both had a null association with BPD, and induction of labor, which was negatively associated with BPD. Upon full adjustment, BPD was found to be associated with the following obstetrical and neonatal outcomes: gestational diabetes (odds ratio [OR], 1.45; 95% CI, 1.13–1.85), premature rupture of the membranes (OR, 1.40; 95% CI, 1.07–1.83), chorioamnionitis (OR, 1.65; 95% CI, 1.14–2.39), venous thromboembolism (OR, 2.11; 95% CI, 1.12–3.96), caesarian delivery (OR, 1.44; 95% CI, 1.26–1.64), and preterm birth (OR, 1.54; 95% CI, 1.29–1.83).
Conclusion: BPD is associated with several adverse obstetrical and neonatal outcomes. Hence, pregnant women who suffer from BPD should be monitored closely by a multidisciplinary health care team both before and during their pregnancies. This oversight would allow for the receipt of treatment for BPD and also interventions to help them to cease tobacco and drug use, which may ultimately decrease the incidence of poor obstetrical and neonatal outcomes.

Pregnancy is a natural yet often stressful event in a woman's life. Numerous studies have been conducted to understand the impact of mental disorders on obstetrical and fetal outcomes (Judd et al., 2014). It is well-established that women with bipolar disorder or schizophrenia are at higher risk for adverse maternal and fetal events during pregnancy, like preeclampsia, gestational diabetes, placental abruption, fetal distress, and preterm birth, which are owing in part to specific lifestyle exposures such as smoking (Frayne, Lewis, Allen, Hauck, & Nguyen, 2014; Jablensky, Morgan, Zubrick, Bower, & Yellachich, 2005; Judd et al., 2014). However, few studies have evaluated the effect of personality disorders on obstetrical and neonatal outcomes (De Genna, Feske, Larkby, Angiolieri, & Gold, 2012). In fact, only one study by De Genna et al. (2012) looked specifically at women with borderline personality disorder (BPD) and its effect on pregnancy outcomes. This study, which was based on structured clinical interviews, looked specifically at the effect of BPD on pregnancies, abortions, and births. Their results showed that severe BPD symptoms were associated with a greater likelihood of teenage

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pregnancies, unplanned pregnancies and more live births, but BPD was not associated with elective abortions (De Genna et al., 2012). Although these findings were revealing, this study did not include a detailed examination of maternal or neonatal outcomes. For example, intrapartum complications, such as preeclampsia, gestational diabetes, and premature rupture of membranes (PROM), and neonatal outcomes, such as preterm births, were not examined in the De Genna et al. (2012) study.

It is estimated that BPD affects about 1.7% of the population and is three times more common in women in clinical settings (De Genna et al., 2012; Gunderson, Weinberg, & Choi-Kain, 2013), although this gender difference appears less pronounced in community populations (Sansone & Sansone, 2011). BPD is characterized in axis II of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR) by personal, emotional, and interpersonal instabilities; impulsivity; risk-taking behaviors (self-harming behaviors, substance abuse, sexual risk taking); hostility; and significant functional difficulties (American Psychiatric Association, 2000; Gunderson et al., 2013; Leichsenring, Leibing, Kruse, New, & Leweke, 2011; Paré-Miron, 2010). High-risk sexual behaviors associated with BPD, including lack of condom use, multiple partners and prostitution, could result in increased risk of sexually transmitted infections and teenage pregnancies (Chen, Brown, Lo, & Linehan, 2007; De Genna et al., 2012). Moreover, BPD is also associated with multiple comorbidities, including mood disorders (depression and bipolar), self-harming behaviors (suicide attempts), eating disorders, and substance abuse, such as alcohol use, drug use, and smoking (Antoniadis, Samakouri, & Livaditis, 2012; Blankley, Power, & Chanen, 2014; Conroy, Marks, Schacht, Davies, & Moran, 2010; American Psychiatric Association, 2000; Gunderson et al., 2013; Kienast, Stoffers, Bermpohl, & Lieb, 2014; Leichsenring et al., 2011).

Although several previous studies have found various mental disorders, specifically bipolar disorder and schizophrenia, to be associated with adverse maternal and fetal outcomes, little is known about the impact of BPD on women's health and fetal events during pregnancy. Hence, the purpose of our study was to evaluate the effect of BPD on obstetrical and neonatal outcomes using a large, population-based database. The secondary objective was to determine whether the associations between maternal BPD and obstetrical and neonatal outcomes remain robust following control for important confounders including comorbid mental disorders. Baseline variables include demographic characteristics (age, race, overweight/obesity, and income); characteristics related to health care (insurance type and type of hospital where care was received); use of tobacco, alcohol, and illicit drugs; and other psychiatric comorbidities (Tomko, Trull, Wood, & Sher, 2014). These baseline variables were chosen because they have been found to be associated with BPD in the past.

Materials and Methods

We conducted a retrospective, population-based cohort study on all births from 2003 to 2012 inclusively using the Healthcare Cost and Utilization Project, Nationwide Inpatient Sample (HCUP-NIS; Home, 2014). The HCUP-NIS contains data from about 8 million hospital stays from about 1,000 hospitals in the United States and approximates a 20% sample of U.S. hospital admissions corresponding with rural and urban admissions in teaching and nonteaching hospitals (Home, 2014). Data are drawn from states participating in HCUP and in 2012 these states comprised more than 97% of the U.S. population. Inclusion in HCUP is not based on patient demographics (www.hcup-us.ahr.gov). The database is classified according to the *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) and includes age, demographics, duration of admission, comorbidities, discharge diagnoses (up to 15), procedures, and death during admission.

Our cohort was obtained by identifying all births in the HCUP-NIS database that occurred during our study period (2003–2012) by using diagnostic and procedure-related ICD-9 codes (code 650–677 with the 5th digit being 0, 1, 2, or 72–74). Our exposure was the presence or absence of a BPD diagnosis. Mothers were classified as having BPD if there were BPD-related codes in the ICD diagnoses (code 301.83) from HCUP-NIS. It should be noted that the ICD-9-CM code and DSM-IV code for BPD are identical. All men and all nonpregnant women were excluded. There were no restrictions in terms of maternal age or viability of the neonate.

Baseline characteristics were identified from the database coding system or by ICD-9-CM codes, which included age, race, income, type of insurance, and type of hospital. A list of the ICD-9-CM codes can be found in Table 1. The following characteristics were identified using ICD-9 codes: overweight (defined as body mass index > 25 kg/m^2), tobacco and alcohol use, and illicit drug use including cocaine, cannabis, amphetamines, and opioids. The main comorbidities found in the literature and based on diagnostic ICD-9-CM codes included bipolar disorder, major depressive disorder, anxiety, posttraumatic stress disorder, psychosis, or other psychotic disorders (Grant et al., 2008; Oldham et al., 1995).

Table 1
ICD-9-CM Codes Used to Identify Subject Characteristics, Comorbidities, Obstetrical Outcomes, and Neonatal Outcomes

Variable	ICD-9-CM Codes
Overweight	649.1, 278.0-278.01, V77.8, V85.2-V85.25, V85.3–V85.4, 783.1
Tobacco use	305.1, 649.0, V15.82
Alcohol use	303, 305.0
Substance use	304, 305, V65.42
Cocaine use	304.2, 305.6, 760.75
Cannabis use	304.3, 305.2
Amphetamine use	304.4, 305.7
Opioid use	304.0, 305.5
Bipolar disorder	296.0, 296.4-296.8
Major depressive disorder	296.2, 296.3, 296.82, 300.4, 301.12, 309.1, 311
Psychosis	291.3, 295, 298.0, 298.1, 298.4, 298.8, 298.9, 299.8, 301.2, 313.2, V11.0
Preeclampsia	642.4, 642.5, 642.7
Gestational diabetes	648.8
Premature rupture of membranes	644.0, 644.2, 658.1;
Chorioamnionitis	658.4, 762.7
Placental abruption	641.2
Caesarian section	74.0-74.2, 74.4, 74.9, 669.7, 763.4
Induction	73
Instrumental delivery (includes forceps and vacuum)	72.0-72.4, 72.71, 72.79
Postpartum hemorrhage	666.0-666.2
Venous thromboembolism	415.1, 453.4, 671.3, 671.4, 673, V12.51
Preterm birth	644.2, 765.0, 765.1, 765.21-765.28
Small-for-gestational age	764.x, 656.5
Intrauterine fetal death	656.4, 768.0, 768.1, v27.1, v27.3, v27.4, v27.6, v27.7

Abbreviation: ICD-9-CM, International Classification of Diseases, Ninth Revision, Clinical Modification.