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Theoretical Approaches to Maternal–Infant Interaction: Which Approach Best Discriminates Between Mothers With and Without Postpartum Depression?

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Abstract

Objective: The purpose of this study was to determine which of the four common approaches to coding maternal–infant interaction best discriminates between mothers with and without postpartum depression.

Methods: After extensive training, four research assistants coded 83 three minute videotapes of maternal infant interaction at 12 month postpartum visits. Four theoretical approaches to coding (Maternal Behavior Q-Sort, the Dyadic Mini Code, Ainsworth Maternal Sensitivity Scale, and the Child–Caregiver Mutual Regulation Scale) were used. Twelve month data were chosen to allow the maximum possible exposure of the infant to maternal depression during the first postpartum year. The videotapes were created in a laboratory with standard procedures. Inter-rater reliabilities for each coding method ranged from .7 to .9. The coders were blind to depression status of the mother.

Results: Twenty-seven of the women had major depressive disorder during the 12 month postpartum period. Receiver operating characteristics analysis indicated that none of the four methods of analyzing maternal infant interaction discriminated between mothers with and without major depressive disorder.

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Conclusion: Limitations of the study include the cross-sectional design and the low number of women with major depressive disorder. Further analysis should include data from videotapes at earlier postpartum time periods, and alternative coding approaches should be considered. Nurses should continue to examine culturally appropriate ways in which new mothers can be supported in how to best nurture their babies.

Early social interactions with consistent caregivers are important for children's emotional development (Ainsworth & Bell, 1970; Ainsworth, Blehar, Waters, & Wall, 1978; Blehar, Lieberman, & Ainsworth, 1977; Bowlby, 1969, 1970). Ainsworth et al. and Bowlby introduced the modern concept of attachment and the importance of early mother–infant interactions to the development of attachment behaviors and socio-emotional functioning of infants. An extensive literature documented the long reaching effects of early physical and social environments on socio-emotional development, cognitive functioning, school readiness, academic success, behavior, and health (Bornstein, Hendricks, Haynes, & Painter, 2007; Clark, Woodward, Horwood, & Moor, 2008; Cooper, Masi, & Vick, 2009; Davis, Harris, & Burns, 2009; Landry, Garner, Swank, & Baldwin, 1996; Landry, Miller-Loncar, Smith, & Swank, 2002; Robinson, Burns, & Davis, 2009; Salonen, Lepola, & Vauras, 2007; Zajicek-Farber, 2011).

Theoretical approaches to maternal infant interaction vary slightly in the specific aspect of the interaction that is emphasized. However, Ainsworth's Attachment Theory serves as the foundational theory in the field and postulates that the quality of the first attachment relationship is fundamental to social and emotional development of the infant and has a critical influence on the infant throughout life (Ainsworth et al., 1978). Data are commonly collected by observational approaches and analysis of videotapes of maternal infant interaction (Horowitz, Logsdon, & Anderson, 2005).

At the forefront of theoretical approaches to examining the maternal infant relationship is maternal sensitivity (Davis & Logsdon, 2011). Ainsworth et al. (1978) described five types of behaviors that exemplified maternal sensitivity with infants: responsiveness to infant cries or distress; reactions to infant's presence upon reunion after separation; affectionate bodily contact; synchrony in behaviors during face to face interactions; and synchrony during feeding. Sensitive mothers respond promptly and appropriately to infant signals (Tamis-LeMonda & Baumwell, 2011).

In contrast, Tronick and colleagues at Harvard Medical School base their work upon the Mutual Regulation Model or "the capacity of each of the interactants, child and adult, to express their motivated intentions, to appreciate the intentions of the partner, and to scaffold their partner's actions so that their partner can achieve their goal" (Tronick & Weinberg, 1997, p. 56). Thus, the role of the infant as partner in maternal infant interactions differentiates synchronous approaches from maternal sensitivity.

MATERNAL DEPRESSION AND MATERNAL INFANT RELATIONSHIP

In a nationally representative sample of the civilian population of the United States ($N=8916$), part of the National Epidemiologic Survey of Alcohol and Related Conditions, maternal depression was found to be a major public health problem in the United States

impacting 10% of new mothers and their families (Ertel, Rich-Edwards, & Koenen, 2011). International studies have demonstrated that salient features of maternal depression can impair the maternal infant relationship (Edhborg, Nasreen, & Kabir, 2011; Moehler, Brunner, Wiebel, Reck, & Resch, 2006) and adversely impact a child's cognitive development, social skills, and behavior (Grace, Evindar, & Stewart, 2003; Tronick & Reck, 2009; Wu, Selig, Roberts, & Steele, 2011). In a classic meta-analysis of 19 studies, Beck (1995) demonstrated a moderate to large effect of postpartum depression on maternal infant interaction during the first postpartum year.

IMPACT OF DEPRESSION TREATMENT

Fortunately, postpartum depression symptoms and overall functioning improve with treatment (Gjerdingen, 2003) as does the satisfaction with the maternal role (Logsdon, Wisner, Sit, Luther, & Wisniewski, 2011). However, the literature describing the impact of depression treatment on the maternal infant relationship and on the child is mixed. A systematic review of 8 clinical trials demonstrated the effectiveness of interventions directed towards improving the maternal infant relationship in depressed mothers (Poobalan et al., 2007). However, improvement in maternal depression may not prevent child psychopathology (Gunlicks & Weissman, 2008). Interventions that do not specifically focus on maternal infant interaction have variable effects on the maternal infant relationship. For example, in a clinical trial, Forman et al. (2007) investigated the impact of psychotherapy on parenting and child outcomes in women with postpartum depression. Participants included depressed women randomly assigned to psychotherapy ($n = 60$), a waitlist ($n = 60$), and a nondepressed comparison group ($n = 56$). At 6 months the depressed mothers were less responsive to their infants, experienced more parenting stress, and viewed their infants more negatively than did nondepressed mothers. Although treatment improved parenting stress, depressed mothers still rated their children lower in attachment security, higher in behavior problems, and more negatively in temperament than did nondepressed mothers.

Researchers investigating the impact of depression treatment on maternal infant interaction have used a variety of theoretical approaches in analysis of observational data of maternal infant interaction. Some coding methods focus only on maternal sensitivity, and other coding methods include the child's behavior in the scoring. As no "gold standard" exists, our research team investigated which approach might be a better measure of the impact of depression on the maternal infant relationship.

PURPOSE

The purpose of this study was to simultaneously determine which of four commonly used theoretical perspectives to coding maternal infant interactions best discriminates between mothers with and without postpartum depression. Since Mercer (1985) has established that mothers should function competently and comfortably in the maternal role by 12 months postpartum, videotapes of maternal infant interaction at 12 months postpartum were used for data analysis.

MATERIAL AND METHODS

Study Design and Setting

This observational study focused on examination of maternal infant interaction at 12 months postpartum in women with and without depression. The study was a supplemental study to an National Institute of Mental Health funded observational study which included women with major depressive disorder (treated or untreated with medication) and nondepressed controls, followed during pregnancy and postpartum (Wisner et al., 2009).

Procedures

Four research assistants separately coded three minute videotapes of maternal infant interaction which were recorded at 12 month postpartum. Each research assistant had expertise and extensive training in one of four common theoretical approaches to coding (Ainsworth Maternal Sensitivity Scale, the Dyadic Mini Code, Maternal Behavior Q-Sort, and the Child-Caregiver Mutual Regulation Scale), and our research team had previously conducted pilot studies of the procedures (e.g., Logsdon, 2008). Inter-rater reliabilities for each coding method ranged from .7 to .9; researchers who were experienced in each coding method provided training to individual research assistants and served as the partner for reliability ratings. The research assistants were masked to depression and treatment status of mothers. Noldus Behavioral Coding software was used for data entry and analysis.

The videotapes were created in an observation room with standard procedures developed by Tronick, Als, Adamson, et al. (1978). That is, mothers and infants were seated facing each other with the infant placed in a table top infant seat so that eye to eye contact was facilitated. Two video cameras recorded the faces of both the mother and the baby and the baby's entire body. The room had no windows or decorative items. The mother was told to play with her baby as she would normally, but no toys or food were allowed.

Instruments

Two of the coding approaches are focused upon determining maternal sensitivity. Ainsworth Maternal Sensitivity Scales are based on maternal behaviors as indicators of the mother's ability to perceive and interpret her baby's signals, and to respond to these signals in a prompt and appropriate manner. The scales are founded upon four fundamental components of maternal sensitivity, including the mother's awareness of baby's signals, an accurate perception of the signals, a prompt response to them, and an appropriate response to them. The scale consists of descriptive levels of maternal sensitivity including highly sensitive (9), sensitive (7), inconsistently sensitive (5), insensitive (3), and highly insensitive (1). After observing a maternal-infant interaction, an observer codes a numerical rating for overall maternal sensitivity, based on the 9 point scale. The rating should be anywhere from 1 (highly insensitive) to 9 (highly sensitive). At the conclusion of the assessment, a composite score of maternal sensitivity is created (Ainsworth, 1969).

A second measure of maternal sensitivity is the Maternal Behavior Q-Sort (MBQS). It was developed by David Pederson, Greg Moran and Sandi Ben to measure maternal sensitivity. It has been used to measure maternal sensitivity in a variety of studies including home based

and video-recorded observations. The measures are defined using q-factor analyses. The standard version of the Q-Sort consists of 90 items that measure maternal sensitivity with regards to accessibility, responsiveness and promptness to the child's needs. In order to measure sensitivity, observers sort the items into nine piles of ten based on correspondence between the observed behavior and the item. The maternal sensitivity score is calculated by comparing the descriptive sort and the criterion sort (prototypical sensitive mother) (Moran, Pederson, & Tarabulsky, 2011).

Two other approaches to analysis of maternal infant interaction focused on measurement of synchrony in maternal child interactions. The Dyadic Mini Code (DMC) is based upon synchrony between mother and child. Six items include measures of mutual attention, positive affect, mutual turn taking, maternal pauses, infant clarity of cues, and maternal responsiveness. Each item is given a score with the total score indicating high or low synchrony. Inter-rater reliability, concurrent validity, and evidence of construct validity have been reported (Censullo, Bowler, Lester, & Brazelton, 1987).

The Child Caregiver Mutual Regulation Scoring (CCMR) is based upon the Mutual Regulation Model (Tronick & Weinberg, 1997). The CCMR codes four dimensions of maternal and infant behavior: child affect, child behavior, maternal affect, and maternal behavior. The CCMR provides codes for specific behavioral dimensions: facial expression, direction of gaze, vocalizations, and affective configuration. For example, when an infant makes a bid for interaction toward the mother, the infant's behavior and the mother's response or behavior are coded as well as their affects. Coding is continuous and occurs for every instance of a behavior.

Depression was diagnosed by research study psychiatrists using the Structured interview guide for the Hamilton rating scale for depression with atypical depression supplement (Hamilton, 1960). Use of antidepressants by mothers was collected by interview.

Sample

Participants were 15–44 years of age and at 12 months postpartum consisted of women with no exposure to depression or antidepressants ($n = 94$); women using antidepressants ($n = 43$); women with depression and not using antidepressants ($n = 23$). Note: From birth to 1 year postpartum, twenty-seven mothers experienced major depressive disorder at some point (33%). Depressed mothers were more likely to be white, unemployed, married or cohabiting, and to have consumed alcohol during pregnancy. However, none of these differences reached statistical significance. See Table 1.

Data Analysis

Data was analyzed descriptively. Then, multiple regression was used to predict the impact of depression and use of antidepressants on maternal infant interaction. Finally, receiver operating characteristic (ROC) curves were fit to the maternal infant interaction data to evaluate the sensitivity and specificity of the assessments with respect to classifying postpartum depression.

RESULTS

Of the maternal/infant interaction assessments, women who were depressed at some point during the postpartum period performed somewhat better than non-depressed women on the CCMR positive affect and DMC high synchrony scales but performed somewhat worse on the Q-Sort. However, none of these differences reached statistical significance.

Each rating scale was regressed on depression and adjusted for antidepressant use. Of the 12 parameters estimated, only one reached statistical significance: Antidepressant use was significantly associated with better performance on the Ainsworth. With the exception of the CCMR positive affect scale, postpartum depression was found to be associated with worse maternal/infant interaction. Interestingly, postpartum depression is associated with *better* performance on the CCMR positive affect scale and antidepressant use is associated with *worse* CCMR positive affect performance. None of these parameter estimates are statistically significant with the exception of antidepressant use on the Ainsworth.

Receiver operating characteristic (ROC) curves were fit to the ratings to evaluate the sensitivity and specificity of the assessments with respect to classifying postpartum depression. None of the rating scales performed better than chance with area under the curve hovering around 50%. In short, maternal/infant interaction ratings were poor discriminators of postpartum depression.

DISCUSSION

Twenty seven of the women had major depressive disorder at some point during the postpartum period. Receiver Operating Characteristics analysis indicated that none of the four methods of analyzing maternal infant interaction discriminated between mothers with and without major depressive disorder. Hopefully, the report of these negative findings will stimulate thinking about predictors of postpartum depression, measuring instruments, statistics and the clinical implications for how best to support women.

Although 33% of the mothers had episodes that fulfilled criteria for major depressive disorder, they were subjects who consented to participation in a research protocol with substantial time commitment for assessments. These women also continued to participate throughout pregnancy and the postpartum period and provided mother- infant video recordings voluntarily. Therefore, these women were likely to be functioning more favorably than other mothers with major depression and their behavior toward their infants may have been modeled by the mother's sense of research staff expectations for the brief observational period. Thus, characteristics of the sample may limit study findings.

The c statistic, or area under the ROC curve, has been used extensively in clinical research to discriminate or correctly classify diseased and non-diseased patients (Metz, 1978). The c statistic is based on ranks. In this study, maternal-infant interaction at 12 months postpartum reflects a pattern of behavior and maternal infant interaction that has developed over time. These data can be contrasted with a commonly used lab value with an exact meaning attached to a specific score at a specific moment in time that may be used to predict cardiovascular risk. The c statistic may lack sensitivity as a predictive model of maternal

infant interaction and the use of more sensitive measures (e.g., likelihood ratio) should be considered in future studies. A subset of higher risk individuals should be analyzed separately to determine the accuracy of classification (Cook, 2007).

Conversely, it is possible that maternal infant interaction data are not directly associated with postpartum depression. Both recent and historical studies have failed to determine relationships between maternal sensitivity and depression (e.g., Sidor, Kunz, Schweyer, Eickhorst, & Cierpka, 2011). Since research has consistently demonstrated adverse impacts of maternal depression on the child, this lack of relationship suggests that maternal depression impacts child development through other mechanisms. Chronic or recurrent maternal depression rather than postnatal depression is likely related to long term impact on the child (Grace et al., 2003). A multifactorial longitudinal approach is needed to investigate these issues in high risk subgroups (Wan & Green, 2009).

Clinical Implications

The impact of postpartum depression on maternal infant interaction continues to be a concern to nurses and other health care providers. The long reaching effects of early environments on the child's socio-emotional development, cognitive functioning, school readiness, academic success, behavior, and health have been documented by interdisciplinary researchers, as well as early leaders of maternal child nursing (e.g., Mercer, Walker). Clinical nurses should continue to advise researchers on important clinical variables that need further research and the best ways to capture outcomes of depression treatment. In addition, nurses in a variety of roles should continue to examine culturally appropriate ways in which new mothers can be supported (whether they are depressed or not) as they continue to learn the role of mother and how to best nurture their babies (Koniak-Griffin, Logsdon, Hines-Martin, & Turner, 2006; Logsdon, Wisner, & Pinto Foltz, 2006; Mercer & Walker, 2006).

References

- Ainsworth M (1969). Maternal Sensitivity Scale: The Baltimore Longitudinal Project. Baltimore, MD: Johns Hopkins University.
- Ainsworth M, & Bell S (1970). Attachment, exploration, and separation: Illustrated by the behavior of one-year-olds in a strange situation. *Child Development*, 41(1), 49–67. [PubMed: 5490680]
- Ainsworth MD, Blehar MC, Waters E, & Wall S (1978). Patterns of attachment: A psychological study of the Strange Situation (Vol. 391). Hillsdale, NJ: Erlbaum.
- Beck C (1995). The effects of postpartum depression on maternal–infant interaction: A meta-analysis. *Nursing Research*, 44, 298–695. [PubMed: 7567486]
- Blehar MC, Lieberman AF, & Ainsworth MD (1977). Early face-to-face interaction and its relation to later infant-mother attachment. *Child Development*, 48, 182–194.
- Bornstein MH, Hendricks C, Haynes OM, & Painter KM (2007). Maternal sensitivity and child responsiveness: Associations with social context, maternal characteristics, and child characteristics in a multivariate analysis. *Infancy*, 12, 189–223, 10.1080/15250000701407525.
- Bowlby J (1969). Attachment and loss (Vol. 1) Attachment. New York: Penquin Books.
- Bowlby J (1970). Disruption of affectional bonds and its effects on behavior. *Journal of Contemporary Psychotherapy*, 2, 75–86.
- Censullo M, Bowler R, Lester B, & Brazelton TB (1987). An instrument for the measurement of infant–adult synchrony. *Nursing Research*, 36, 244–248. [PubMed: 3648699]

- Clark CAC, Woodward LJ, Horwood LJ, & Moor S (2008). Development of emotional and behavioral regulation in children born extremely preterm and very preterm: Biological and social influences. *Child Development*, 79, 1444–1462. [PubMed: 18826535]
- Cook NR (2007). Use and misuse of the receiver operation characteristic curve in risk prediction. *Circulation*, 115, 928–935. [PubMed: 17309939]
- Cooper JL, Masi R, & Vick J (2009). Socio-emotional development in early childhood: What every policymaker should know. New York, NY: National Center for Children in Poverty, Mailman School of Public Health, Columbia University.
- Davis DW, Harris RC, & Burns BM (2009). Attention regulation in preschoolers born prematurely: The influence of child temperament and parental sensitivity. *Journal of Early Child Development and Care*, 179, 1–22.
- Davis DW, & Logsdon MC (2011). *Maternal sensitivity: A scientific foundation for practice*. New York: Nova.
- Edhborg M, Nasreen H, & Kabir Z (2011). Impact of postpartum depressive and anxiety symptoms on mothers' emotional tie to their infants 2–3 months postpartum: A population based study from rural Bangladesh. *Archives of Women's Mental Health*, 14, 307–316, 10.1007/s00737-001-0221-7.
- Ertel K, Rich-Edwards J, & Koenen K (2011). Maternal depression in the United States: Nationally representative rates and risks. *Journal of Women's Health*, 20, 1609–1617.
- Forman DR, O'Hara MW, Stuart S, Gorman L, Larsen K, & Coy K (2007). Effective treatment for postpartum depression is not sufficient to improve the developing mother–child relationship. *Development and Psychopathology*, 19, 585–602. [PubMed: 17459185]
- Gjerdingen D (2003). The effectiveness of various postpartum depression treatments and the impact of antidepressant drugs on nursing infants. *JABFP*, 16, 372–382. [PubMed: 14645327]
- Grace S, Evindar A, & Stewart D (2003). The effect of postpartum depression on child cognitive development and behavior: A review and critical analysis of the literature. *Archives of Women's Mental Health*, 16, 263–274.
- Gunlicks ML, & Weissman M (2008). Change in child psychopathology with improvement in parental depression: A systematic review. *Journal of the American Academy of Child and Adolescent Psychiatry*, 47, 379–389. [PubMed: 18388766]
- Hamilton Max (1960). A rating scale for depression. *Journal of Neurology and Neurosurgical Psychiatry*, 23, 56–61.
- Horowitz JA, Logsdon MC, & Anderson J (2005). Measurement of maternal infant interaction. *Journal of the American Psychiatric Nurses Association*, 11, 164–172.
- Koniak-Griffin D, Logsdon MC, Hines-Martin V, & Turner C (2006). Contemporary mothering in a diverse society. *JOGNN*, 35, 671–678. [PubMed: 16958726]
- Landry SH, Garner PW, Swank PR, & Baldwin CD (1996). Effects of maternal scaffolding during joint toy play with preterm and full-term infants. *Merrill-Palmer Quarterly*, 42, 177–199.
- Landry SH, Miller-Loncar CL, Smith KE, & Swank PR (2002). The role of early parenting in children's development of executive process. *Developmental Neuropsychology*, 21, 15–41. [PubMed: 12058834]
- Logsdon MC (2008). Maternal role functioning in adolescents at 12 months postpartum. *Women's Health Care: A Practical Guide for Nurse Practitioners*, 7, 27–32.
- Logsdon MC, Wisner KL, & Pinto Foltz MD (2006). The impact of postpartum depression upon mothering. *JOGNN*, 35, 652–658. [PubMed: 16958723]
- Logsdon MC, Wisner KL, Sit D, Luther JF, & Wisniewski SR (2011). Depression treatment and maternal functioning. *Depression and Anxiety*, 28, 1020–1026, 10.1002/da.20892. [PubMed: 21898714]
- Mercer RT (1985). The process of maternal role attainment over the first year. *Nursing Research*, 34, 198–204. [PubMed: 3847870]
- Mercer RT, & Walker LO (2006). A review of nursing interventions to foster becoming a mother. *JOGNN*, 35, 568–582. [PubMed: 16958712]
- Metz C (1978). Basic principles of ROC analysis. *Seminar in Nuclear Medicine*, 8, 283–298.

- Moehler E, Brunner R, Wiebel A, Reck C, & Resch F (2006). Maternal depressive symptoms in the postnatal period are associated with long-term impairment of mother–child bonding. *Archives of Women’s Mental Health*, 9, 273–278.
- Moran G, Pederson D, & Tarabulsky G (2011). Become sensitive to sensitivity: Lessons learned from the development of the Maternal Behavior Q-Sort. In Davis D, & Logsdon MC (Eds.), *Maternal sensitivity: A scientific foundation for practice* (pp. 259–284).
- Poobalan A, Aucott L, Ross L, Smith W, Helms P, & Williams J (2007). Effects of treating postnatal depression on mother–infant interaction and child development. *British Journal of Psychiatry*, 191, 378–386. [PubMed: 17978316]
- Robinson JB, Burns BM, & Davis DW (2009). Maternal scaffolding and attention regulation in children living in poverty. *Journal of Applied Developmental Psychology*, 30, 82–91.
- Salonen P, Lepola J, & Vauras M (2007). Scaffolding interaction in parent–child dyads: Multimodal analysis of parental scaffolding with task and non-task oriented children. *European Journal of Psychology of Education*, 22, 77–96.
- Sidor A, Kunz E, Schweyer D. I, Eickhorst A, & Cierpka M (2011). Links between maternal postpartum depressive symptoms, maternal distress, infant gender, and sensitivity in a high risk population. *Child and Adolescent Psychiatry and Mental Health*, 5, 1–7. [PubMed: 21214953]
- Tamis-LeMonda C, & Baumwell L (2011). Parental sensitivity in early development: Definition, methods, measurement, and generalizability. In Davis D, & Logsdon MC (Eds.), *Maternal sensitivity: A scientific foundation for practice* (pp. 1–16).
- Tronick EZ, Als H, Adamson L, et al. (1978). The infant’s response to entrapment between contradictory messages in face to face interaction. *Journal of the American Academy of Psychiatry*, 17, 1–13.
- Tronick EZ, & Reck C (2009). Infants of depressed mothers. *Harvard Review of Psychiatry*, 17, 147–156. [PubMed: 19373622]
- Tronick EZ, & Weinberg MK (1997). Depressed mothers and infants: Failure to form dyadic states of consciousness In Murray L, & Cooper PJ (Eds.), *Postpartum depression and child development* (pp. 54–61). New York: Guilford.
- Wan M, & Green J (2009). The impact of maternal psychopathology on child–mother attachment. *Archives of Women’s Mental Health*, 12, 123–134.
- Wisner KL, Sit D KY, Hanusa BH, Moses-Kolko EL, Bogen DL, Hunker DF, Perel JM, Jones-Ivy S, Bodnar LM, & Singer LT (2009). Major depression and antidepressant treatment: Impact on pregnancy and neonatal outcomes. *American Journal of Psychiatry*, 166(5), 557–566. [PubMed: 19289451]
- Wu YP, Selig JP, Roberts M, & Steele R (2011). Trajectories of postpartum maternal depressive symptoms and children’s social skills. *Journal of Children and Family Studies*, 20, 414–423.
- Zajicek-Farber ML (2011). Connections of maternal sensitivity to children’s development, health, and well-being In Davis DW, & Logsdon MC (Eds.), *Maternal sensitivity: A foundation for clinical practice*. New York, NY: Nova Science Publishers, Inc.

Table 1
Maternal Demographics by Exposure to Depression and Antidepressants During Pregnancy.

Measure	Exposure during pregnancy					P values		
	All (N=160)	None (n=94)	SSRI (n=43)	MDD (n=23)	Overall	None v SSRI	None v MDD	SSRI v MDD
Age	30.9 ± 5.3	30.9 ± 5.2	31.7 ± 4.6	29.5 ± 6.6	0.27			
Race					0.0082	0.124	0.054	0.001 *
White	132 (82.5)	78 (83.0)	40 (93.0)	14 (60.9)				
Black	25 (15.6)	15 (16.0)	2 (4.7)	8 (34.8)				
Other	3 (1.9)	1 (1.1)	1 (2.3)	1 (4.3)				
Education					0.0052	0.569	<.001 *	0.022
<High school	5 (3.1)	1 (1.1)	1 (2.3)	3 (13.0)				
High school	9 (5.6)	5 (5.3)	1 (2.3)	3 (13.0)				
Some college	29 (18.1)	12 (12.8)	9 (20.9)	8 (34.8)				
College	72 (45.0)	47 (50.0)	18 (41.9)	7 (30.4)				
Graduate school	45 (28.1)	29 (30.9)	14 (32.6)	2 (8.7)				
Employed	95 (59.4)	66 (70.2)	20 (46.5)	9 (39.1)	0.0033	0.008 *	0.005 *	0.565
Marital status					0.2152			
Single	30 (18.8)	16 (17.0)	6 (14.0)	8 (34.8)				
Married/cohabiting	126 (78.8)	76 (80.9)	35 (81.4)	15 (65.2)				
Divorced/separated	4 (2.5)	2 (2.1)	2 (4.7)	0 (0.0)				
Pre-pregnancy BMI	26.4 ± 7.2	25.2 ± 6.0	27.2 ± 6.1	29.5 ± 11.4	0.0623			
Parity					0.0234	0.024	0.028	0.864
1	65 (40.6)	47 (50.0)	12 (27.9)	6 (26.1)				
2	57 (35.6)	32 (34.0)	17 (39.5)	8 (34.8)				
3+	38 (23.8)	15 (16.0)	14 (32.6)	9 (39.1)				
SIGH-ADS29	11.4 ± 7.0	8.3 ± 4.8	14.9 ± 7.5	17.4 ± 7.0	<.0001	<.001 *	<.001 *	0.176
Anxiety (lifetime)	50 (31.3)	20 (21.3)	20 (46.5)	10 (43.5)	0.0050	0.003 *	0.029	0.814
Smoked during pregnancy	15 (9.4)	8 (8.5)	4 (9.3)	3 (13.0)	0.7996			
Drank alcohol during pregnancy					0.2861			
No	114 (71.3)	67 (71.3)	30 (69.8)	17 (73.9)				
Once a week or less	37 (23.1)	24 (25.5)	10 (23.3)	3 (13.0)				

Measure	Exposure during pregnancy					P values		
	All (N=160)	None (n=94)	SSRI (n=43)	MDD (n=23)	Overall	None v SSRI	None v MDD	SSRI v MDD
More than once a week	9 (5.6)	3 (3.2)	3 (7.0)	3 (13.0)				
Weeks gestation	39.0 ± 1.8	39.2 ± 1.5	38.6 ± 2.0	38.8 ± 2.1	0.4300			
Weeks gestation <37	17 (10.6)	6 (6.4)	9 (20.9)	2 (8.7)	0.0354	0.017	0.655	0.304
Sex					0.0008	<.001*	0.947	0.011*
Male	91 (56.9)	62 (66.0)	14 (32.6)	15 (65.2)				
Female	69 (43.1)	32 (34.0)	29 (67.4)	8 (34.8)				
Ever breastfed	124 (77.5)	80 (85.1)	30 (69.8)	14 (60.9)	0.0162	0.036	0.017*	0.465

Note. Abbreviations: MDD = major depressive disorder, SSRI = serotonin selective reuptake inhibitors (antidepressant class); BMI body mass index; SIGH-ADS Structured interview guide for the Hamilton rating scale for depression with atypical depression supplement.

* Significant after Bonferroni correction.