Antenatal caregiving representations and perinatal behavior in mothers with severe lifetime psychopathology

Abstract

Psychopathology poses a risk for optimal parenting. The current study aimed to explore antenatal caregiving representations as markers for later risk of non-optimal maternal behavior among mothers with severe mental illness.

Sixty-five mothers diagnosed with psychosis, bipolar disorder, depression (psychopathology group), and non-clinical controls participated in a longitudinal study from pregnancy to 16 weeks after birth. Mental health diagnoses and caregiving representations were assessed during pregnancy. Maternal behavior was assessed during the five-minute recovery phase of the Still Face paradigm at 16 weeks.

Mothers with psychopathology showed significantly higher levels of 'heightened' caregiving representations (i.e., separation anxiety from the child) than controls. The only significant diagnostic group difference in perinatal maternal behavior was that mothers diagnosed with depression exhibiting more overriding behavior compared to non-clinical. In regression modelling, antenatal caregiving representations of 'role reversal' predicted lower levels of sensitivity and higher levels of overriding behavior independent of the effect of psychopathology.

The findings can be interpreted in the context of representational transformation to motherhood during pregnancy. Our results provide preliminary evidence for the potential of a new questionnaire measure of caregiving representations as a screening instrument for antenatal representational risk.

Keywords: antenatal caregiving representation; perinatal maternal behavior; psychopathology; psychosis, depression

Severe maternal psychopathology affects parenting behavior and places children at greater risk of suboptimal developmental outcomes (Oyserman, Mowbray, Meares, & Firminger, 2000). There is substantial evidence that depression diagnosis are associated with more negative-intrusive and hostile, less engaged, and less positive-sensitive maternal behavior (Lovejoy, Graczyk, O'Hare, & Neuman, 2000). Although negative-intrusive behavior may be more state-dependent than other dimensions of maternal behavior, evidence suggests women with depression diagnoses are also more intrusive compared to controls even in the absence of significant psychiatric symptomatology. A recent systematic review concluded that mothers diagnosed with schizophrenia showed disturbed parental behavior during the first 12 months compared to affective and non-clinical controls. More specific, mothers with psychosis showed reduced social contact, greater tension, and more behavioral intrusiveness compared to controls (Davidsen et al., 2015). Research on maternal behavior among mothers with bipolar disorder is sparse; the few studies conducted report that bipolar depressed mothers are *more* likely to vocalize and engage in positive interactions with their children compared to unipolar depressed mothers (Goodman & Liu, 2014). However, children of mothers with bipolar disorder are more likely to exhibit insecure attachment to their mother than children of mothers with unipolar depression (Radke-Yarrow, Cummings, Kuczynski, & Chapman, 1985), suggesting that bipolar disorder constitutes a risk factor for maternal behavior and child development.

Severe mental illness (SMI) is by nature episodic (Oyserman et al., 2000). Therefore, children of mothers with a lifetime history of SMI are likely to be parented both during active and remission phases of psychopathology. Epidemiological research has demonstrated that more than half of women with severe psychopathology (e.g., schizophrenia, bipolar disorder and other psychotic disorders) become mothers and no

clinical differences have been found between those that becomes mothers compared to those that do not (Howard, Kumar, & Thornicroft, 2001). Most parenting studies of mothers with SMI are cross-sectional and based on samples recruited from inpatient facilities (mother-baby units) (Davidsen et al., 2015). Therefore, most research on the impact of SMI on maternal behavior is based on observations during periods of active symptoms. Less is known about how a lifetime history of SMI affects parental behavior during remission phases.persistent emotional and relational difficulties among mothers with SMI are likely to be important in understanding impairments in motherhood (Oyserman et al. (2000). Antenatal caregiving representational development could be one parental domain affected by psychopathology. Better understanding of the link between caregiving representations and psychopathology could enable early detection of mothers at risk of non-optimal caregiving behavior.

Caregiving Representations

Substantial research has demonstrated that transformations during pregnancy prepares women for motherhood (Slade, Cohen, Sander, & Miller, 2011). This process involves maternal representations of becoming a parent that develop from emotional engagement with the fetus (maternal-fetal relationship) and expectations to the future relationship with the child. Both concepts have been suggested to form parts of the caregiving system (Walsh, 2010). Following attachment theory, George and Solomon (2008) theorized that all parents transform their internal representation from *seeking protection* (the goal of their attachment system) to *providing comfort and care* for their child (the goal of their caregiving system) in order to become the "stronger and wiser" member of the attachment-caregiving relationship. Further, these authors demonstrated that mothers of children with disorganized attachment have caregiving representations characterized by

helplessness or role reversal, conceived as high-risk representations of maternal abdication of care and failed protection.

Antenatal assessment of maternal representations predicts observed and mother-reported maternal behavior as well as infant attachment at 12 months (Crawford & Benoit, 2009; Dayton, Levendosky, Davidson, & Bogat, 2010; Siddiqui & Hägglöf, 2000; van den Bergh & Simons, 2009). Meta-analytic evidence suggest that depression is a significant predictor of maternal-fetal relationship (Yarcheski, Mahon, Yarcheski, Hanks, & Cannella, 2009). The only study involving clinically depressed mothers found lower intensities of the maternal-fetal relationship among depressed women compared to non-depressed women (McFarland et al., 2011). Therefore, knowledge of the impact of psychosis and bipolar disorder on caregiving representations is sparse and perinatal research involving clinical groups is needed. Furthermore, assessment of antenatal caregiving representations to date has relied on the use of time-consuming maternal interviews that limit the practical usefulness of these instruments in larger samples and clinical practice.

Aim and Hypothesis

The present study aimed to explore associations between psychopathology, antenatal caregiving representations, and maternal perinatal behavior in interactions with the infant at 16 weeks, in a sample of women with severe mental disorders and non-clinical controls. We hypothesized that women with psychopathology report more non-optimal antenatal caregiving representations and show less positive-sensitive and more negative-overriding maternal behavior in interactions with their infant compared to non-clinical women. As prior research on caregiving representations and perinatal behavior among women with psychosis and bipolar disorder is sparse, we did not pose a specific hypothesis

regarding differences between diagnostic groups. These analyses are thus exploratory. In addition to the effect of psychopathology on maternal behavior, we hypothesizes that antenatal caregiving representations would be predictive of maternal behavior.

Method

The current study

Data were drawn from an ongoing prospective, longitudinal Danish-Scottish cohort (WARM, Wellbeing And Resilience study examining Mechanisms of transmission of health and risk in parents with complex mental health problems and their offspring). The WARM Study was established to explore early risk and resilience factors among infants of mothers with psychosis-related mental disorders, compare these to a control group of infants of mothers without severe mental illness (Harder et al., 2015). Ethical approval was granted by Health Research Ethics, Capital Region of Denmark (Protocol no: H-2-014-024) and the West of Scotland Research Ethics Service (REC Reference 14/WS/1051). Data reported here were collected in Denmark and Scotland between October 2014 and November 2016.

Participants were Danish or Scottish pregnant women and their infants. Inclusion criteria were: a) a DSM-5 diagnosis of Delusional Disorder, Schizophreniform Disorder, Schizophrenia or Schizoaffective Disorder, Psychosis NOS, Brief Psychotic Disorder, or b) a DSM-5 diagnosis of Bipolar I and II Disorder, or c) a DSM-5 diagnosis of Major Depressive Disorder (current moderate or severe episode or lifetime recurrent moderate or severe), or d) a non-psychiatric control group defined as mothers without any history of treatment or admission for a psychiatric disorder or drug or alcohol addiction. Maternal exclusion criteria for the current study were: a) mother unable to speak English or Danish, b) miscarriage or still birth, c) diagnosis of Autistic Spectrum Disorder, and d)

unable to provide informed and written consent for their own and their unborn child´s participation in the study. Infant exclusion criteria were: a) infants born with a congenital developmental disorder, which can be diagnosed from birth, such as for example Down's Syndrome; or b) miscarriage after antenatal assessments were completed. Participants were recruited through obstetric wards in Capital Region of Denmark, Region of Southern Denmark, and Region Zealand, and in Scotland through perinatal mental health services and midwifery in NHS Greater Glasgow and Clyde through a non-selective procedure (see Harder et al., 2015 for further information). Seventy participants consented to participate in the study. Five participants dropped out before antenatal data collection had finished and were not included in the present study (flow of participants presented in Figure 1).

Insert Figure 1 here

Following the WARM study protocol (Harder et al., 2015), maternal psychopathology was assessed after obtaining written informed consent from all participants to confirm inclusion diagnosis. Assessment of caregiving representations was part of a small battery of questionnaires assessed at a subsequent scheduled meeting. The majority of assessments of maternal psychopathology were conducted at the beginning of the third trimester (M = 30.1 GA weeks; SD = 6.4; range: 14.9-38.3). On average, assessments of antenatal caregiving representations took place one week later (M = 31.1 GA weeks; SD = 7.3; range = 13.9-38.9). Most women completed the PCEQ during the third trimester (76.6%) although a minority of respondents completed it during the first (1.6%) and second (21.9%) trimesters. Research suggests that antenatal caregiving representations undergoes important changes during pregnancy (Cannella, 2005; Stern, 1995). We therefore incorporated the effect of trimester as an important confound of associations between antenatal representations and maternal behavior. All antenatal assessments were conducted

during home-visits or at the obstetric ward according to the mother´s preference. Mother-infant interaction was assessed at 16 weeks of infant age during home-visits.

Measures

Maternal psychopathology. Psychiatric diagnoses were assessed using the psychosis and mood modules of the Structured Clinical Interview for DSM-5 (First, Williams, Karg, & Spitzer, 2016) to confirm inclusion diagnosis. All diagnostic assessments were supervised by a researcher trained on the SCID (AA) and all diagnoses were discussed and confirmed through consensus discussion among the senior researchers (BB, CC, DD, EE).

Caregiving representations. Antenatal caregiving representations were assessed using the Prenatal Caregiving Experience Questionnaire (PCEQ, unpublished instrument, Brennan & George, 2013), a 40-item self-report measure assessing pregnant women´s expectations about their future relationship with their child. Responses are given on a 5-point Likert scale (range 1-5). The PCEQ was translated into Danish by two independent researchers and back translated by a bilingual English-Danish speaking Associate Professor in Psychology. Any translational divergences compared to the original version were resolved by discussion with and guidance from the PCEQ co-authors (XX, YY). A cross-cultural validated four-factor model of the postnatal version of the questionnaire (CEQ Age 1.5-5) was used in the current study (Røhder et al., 2018). There are four subscales: *Enjoyment*, mothers expect positive feelings about the child (α = .709; e.g. *"My baby will be worth all the love and attention I can give him or her"*); *heightened*, mothers expect difficulties in separating from their child (α = .758; e.g. *"I think that I will be lonely when my baby and I are separated"*); *helplessness*, mothers expect their child to be out of control and themselves as unable to take care of child (α = .801; e.g. *"Sometimes I may just lose it and scream at*

him or her or punish too harshly"); and *role reversal*; mothers expect the child to understand and cheer up the mother (α = .672; e.g. *"My baby and I will be really close. I will be able to just sit there and tell him or her if I had a bad day and s/he will understand"*). To our knowledge the PCEQ is the only existing time-efficient, multi-dimensional measure of antenatal caregiving representations. Cross-sectional studies using the PCEQ support the multi-dimensional structure of the measure as well as construct validity in relation to maternal-fetal attachment, social support, and adverse childhood experiences (Brennan, 2017; Røhder et al., 2019).

Maternal behavior. Maternal behavior was assessed during the recovery phase of a 10-minute interaction based on the Still-face paradigm. The infant was placed in an infant chair with the mother placed in front of her infant. Two cameras facing mother (face and shoulders) and infant (full body and face) was used. Coding was based on split-screen recordings displaying both mother and infant. The mother was asked to first play with her infant for three minutes (engagement phase) and then hold a still face (freezing, not displaying emotions, or touching the infant) for two minutes (still face phase). The five-minutes recovery phase was coded using the Coding Interactive Behavior manual (CIB, unpublished manual, Feldman 1998). The decision to score maternal behavior during the recovery phase was based on prior research on the caregiving system (Lyons-Ruth, Bronfman, & Parsons, 1999; Solomon & George, 1996) suggesting that the mother´s caregiving system is activated in situations where the infant´s attachment system is activated and thus best observed in distressing situations. CIB is a global measure that incorporates parent, child, and dyadic affective states and interactive patterns validated for use in dyads with infants 2-36 months of age. The coding consists of 33 items rated on a five-point likert scale allowing half points (range 1-5). Based on item ratings, maternal composites of

sensitivity and intrusiveness, infant involvement and withdrawal, dyadic reciprocity, and dyadic negative states are calculated. The current study used the maternal sensitivity and intrusiveness composites. 'Maternal sensitivity' consists of the items: 'Acknowledging', 'Imitating', 'Elaborating', 'Parent Gaze', 'Positive Affect', 'Vocal Appropriateness', 'Appropriate Range of Affect', 'Resourcefulness', 'Affectionate Touch', and 'Parent Supportive Presence'. The item *parent gaze* was excluded from the original sensitivity composite due to lack of variability (all mothers gazed to the infant). The adjusted sensitivity composite showed high internal consistency ($\alpha = .805$). The original 'intrusiveness' composite consists of the following single items at four months: 'Forcing', 'Overriding', 'Parent Negative Affect/Anger', 'Hostility', and 'Parent Anxiety'. In our sample, there was none or very limited variability in the items 'parental negative affect/anger', 'hostility', and 'parent anxiety'. 'Forcing' is consider "common in the interactions of parents and very young infants (2-6 months)" (Feldman, CIB manual, version 4, 1998, p. 7). In our sample 'forcing' and 'overriding behavior' was not correlated with each other; Pearson´s $r = .027$, $p = .859$. The original intrusiveness composite thus showed poor internal consistency ($\alpha = .192$). Therefore, the single item *overriding behavior* – the most central item in the intrusiveness composite - was used as a proxy of intrusive maternal behavior. All interactions were coded blind to maternal psychopathology diagnoses by the first author and a second judge. Both judges had passed the CIB reliability test from Ruth Feldman. Inter-rater reliability calculated using 20 % randomly chosen interactions of mothers with and without psychopathology rated blindly showed good reliability (ICC (2,1) = .805).

Statistical Analysis

Assumptions for the use of parametric tests were explored and parametric and non-parametric tests used as appropriate. A series of ANOVAs with planned contrasts were

conducted to explore the impact of psychopathology on caregiving representations and maternal behavior. Spearman´s rho correlation was used to evaluate non-parametric associations and intercorrelations among antenatal caregiving representations and maternal caregiving behavior. As assumptions was not met for testing a mediation model, we conducted multiple hierarchical regression analysis using the backward method to explore the predictive validity of psychopathology and antenatal caregiving representations on maternal behavior. To explore potential confounding effects of gestational age, we stratified the regression analyses by trimester.

Missing and Dropout Analysis

As data were deemed missing at random, missing items in the symptom interviews and the PCEQ were analyzed and handled with mean imputation on subscale level. Analyses of dropout and missing data indicated no differences between participants with missing data, participants who dropped out during the study and those that remained in the study.

Results

Sample Characteristics

Demographic information and clinical characteristics of the mothers and their infants are presented in Table 1. Socio-demographic factors (Maternal age, education, relationship status, parity, employment status, nationality, infant gender, and infant age at still face procedure) were not related to maternal behavior and therefore not included as covariates in models predicting maternal behavior.

Insert Table 1

Psychopathology and Caregiving

Initial analyses examined the effect of psychopathology on antenatal caregiving representations and maternal behavior. Descriptive statistics are reported in Table 2. The only significant differences between diagnostic groups emerged on heightened caregiving representations, $F(3,60) = 6.04$, $p = .001$. There were no significant overall effects of psychopathology groups on maternal sensitivity, $F(3,42) = 0.07$, $p = .98$, or maternal overriding behavior, $F(3,42) = 2.34$, $p = .09$. Planned contrast analyses revealed that mothers diagnosed with depression displayed more overriding behavior compared to the non-clinical control group, $p = .04$. While the difference is statistically significant, the relative small group sizes gave an estimated effect of 0.71 difference in averages (95% confidence interval of 0.04 -1.38). Mothers diagnosed with psychosis or bipolar disorder did not differ from non-clinicals in their maternal behavior.

Insert Table 2

Predictors of Perinatal Maternal Behavior

Next, we tested associations between antenatal caregiving representations and maternal behavior (Table 3). As hypothesized, non-optimal representations of 'helplessness' and 'role reversal' were associated with more overriding maternal behavior. Contrary to our hypotheses, 'heightened' caregiving was not associated with maternal behavior and the associations between antenatal representations and maternal sensitivity were not significant.

Insert Table 3

Hierarchical regression analyses exploring the effect of psychopathology and antenatal caregiving representations on maternal sensitivity and overriding behavior respectively are presented in Tables 4 and 5. Antenatal representational 'role reversal' emerged as the only predictor of maternal sensitivity - with higher expectations of a role reversed relationship with the infant associated with less sensitivity with a medium effect size (.36). 'Enjoyment' and 'role reversal' emerged as equally good predictors of overriding behavior at 16 weeks, with medium effect sizes reported (-.29 and .33 respectively).

Insert Table 4 & 5

To explore the potential confounding effect of gestational age, we stratified analysis by trimester. Only one women filled out the PCEQ during the first trimester. The predictive validity of 'role reversal' on maternal sensitivity and maternal overriding behavior disappeared among women in the second trimester but remained for women in the third trimester; β = *-.36, p* = .03 [-.36;-.02] and β = *.37, p* = .02 [.06;.78] respectively. The predictive validity of 'enjoyment' on maternal overriding behavior did not remain significant in either trimesters although a trend was found in the third trimester; β = *-.27, p* = .08 [-1.68;.11].

Discussion

The current study explored associations between psychopathology, antenatal caregiving representations, and maternal behavior among women diagnosed with psychosis, bipolar disorder, and depression compared to non-clinical controls. This is the first study to explore the association between psychopathology and non-optimal caregiving representations during pregnancy using a multi-dimensional questionnaire measure of these representations.

We report that mothers with psychopathology during pregnancy expected more separation difficulties from their children (heightened caregiving) as compared to non-clinical controls. Previous research has also found increase in over-activated caregiving representations in clinical groups (Vreeswijk, Maas, & van Bakel, 2012). Dayton et al. (2010) found that mothers whose representations of their child were termed 'affectively over-activated' during pregnancy (e.g., distorted representations in the WMCI similar to the heightened dimension on the PCEQ) were more hostile in interactions with their one-year old child. Benoit, Parker, and Zeanah (1997) found an association between 'distorted' representations and resistant infant attachment at 12 months. Finally, Brennan (2012) and Røhder et al. (2018) demonstrated an association between 'heightened' caregiving representations and parental distress among mothers of children aged 1.5 and 5 years, which suggest that over-activated representations might be important for maternal well-being and feelings of self-efficacy, which we did not assess in the current study. These findings point to the potential negative effects of antenatal heightened caregiving representations on parental distress, later mother-infant interactions, and child attachment. In our study, we did not observe any significant negative effect of 'heightened' representations on early caregiving behavior. It may be that maternal separation difficulties are more adequate in the early phases of infant life were proximity between infant and mother are needed but problematic at later ages where separation from the mother becomes an important developmental task of the infant. However, we also note that contrary to this interpretation, Korja et al. (2010) reported associations between 'distorted' (over-aroused) representations of the child and non-optimal mother-infant interaction among six months old infants.

Consistent with existing studies of depression and maternal behavior, we found that mothers diagnosed with depression showed more overriding behavior compared to

mothers without psychopathology (Lovejoy et al., 2000). Interactions with the infant at 16 weeks for mothers diagnosed with psychosis and bipolar disorder resembled non-clinical mothers. This is consistent with other studies of mothers with psychosis in remission. For instance, Howard, Thornicroft, Salmon, and Appleby (2004) found that mothers with psychotic disorders admitted to a mother-baby unit did not need social services supervision when discharged. Pawlby et al. (2010) found that mothers with psychotic disorders did not differ from healthy controls in their ability to respond appropriate to their infant´s cues and Snellen, Mack, and Trauer (1999) found that the quality of mother-infant interaction improved when maternal psychotic symptoms declined.

Finally, higher levels of antenatal caregiving representations of 'role reversal' assessed during the third trimester predicted reduced maternal sensitivity and more. overriding behavior in interactions with the infant at 16 weeks. These results suggest that in addition to the previously identified risk of maternal SMI for suboptimal maternal perinatal behavior (Davidsen et al., 2015; Lovejoy et al., 2000), *antenatal* caregiving development may be an equally important psychological domain that should be addressed in research and clinical practice on maternal perinatal health. Attachment and psychodynamic perspectives on the perinatal period (Ammaniti, Tambelli, & Odorisio, 2013; George & Solomon, 2008; Slade et al., 2011) emphasize that all women need to make a transformational representational shift to motherhood. However, although the significance of antenatal caregiving representations for maternal behavior is described in the developmental literature, it's impact may not have been fully considered in relation to developmental psychopathology.

Our findings are the first to demonstrate the predictive validity of antenatal caregiving representations for maternal behavior using a questionnaire measure. Similar results have been found using interview-based measures of caregiving representations

(Crawford & Benoit, 2009; Dayton et al., 2010). Indeed, Crawford and Benoit (2009) reported that the presence of disrupted representations of the unborn child (e.g. role/boundary confusion, fearfulness/dissociation/disorientation, intrusiveness/negativity, affective communication errors, and withdrawal) during pregnancy were predictive of atypical maternal behavior (AMBIANCE) at 12 months. Conceptually, Vulliez-Coady, Obsuth, Torreiro-Casal, Ellertsdottir, and Lyons-Ruth (2013) have suggested that role reversal/confusion encompasses the mother´s need for emotional support from her child. Similarly, qualitative studies have reported that for some mothers living with psychopathology motherhood holds a special significance, often described as "a new beginning", as "providing meaning to their lives" (Dolman, Jones, & Howard, 2013), "an opportunity to *receive* love", or a wish for their children meeting the mothers´ unmet emotional needs (Birtwell, Hammond, & Puckering, 2015). These findings suggest that antenatal development of caregiving representations is an important factor in the mother´s emotional preparation for motherhood. Consequently, representational role reversal could be an important focus for antenatal clinical interventions, in addition to monitoring and treatment of psychopathology.

Strengths and Limitations

A strength of the current study was the transdiagnostic inclusion of a broader range of complex maternal psychopathology, allowing for comparison among different clinical groups. This is contrast to the existing literature, which has mostly focused on maternal depression. Furthermore, all participants were non-selectively, consecutively identified. Second, participants in our study represent mothers living with SMI in the community. As previous research has relied mostly on mothers admitted to inpatient

psychiatric facilities, our study expands this research by exploring maternal behavior among more well-functioning mothers with SMI living in the community.

We acknowledge a number of study limitations, particularly small group sizes, which may have led to lack of power for in consistent detection of group differences. During the recruitment period, we identified more than 400 potential participants, but only 224 of these were referred to the WARM team. Of these, 70 consented to participate in the study (see Figure 1). It is therefore possible that selection bias from both referring staff and women themselves impacted upon the final sample. Women in our sample were mostly in a stable phase of illness, and not experiencing acute, severe episodes of psychopathology. Therefore, the sample might reflect perinatal caregiving among better functioning mothers with SMI-histories. This impacts on the generalizability of our results to the more acute or chronic incidences of SMI.

Finally, the PCEQ is a new instrument with previous studies reporting on postnatal assessments (Røhder et al., 2018). The usefulness of the PCEQ for antenatal screening requires exploration in large community-based samples in order to identify norms and cut-offs for non-optimal caregiving representations.

Conclusion

This study explored the impact of psychopathology on antenatal caregiving representations and perinatal maternal behavior among women diagnosed with lifetime psychosis, bipolar disorder, depression, and non-clinical controls. We found that antenatal caregiving representations of 'role reversal' predict reduced maternal sensitivity and more overriding maternal behavior at 16 weeks. We suggest that in addition to the risk of lifetime psychopathology, future mothers need to undertake a perinatal representational transformation to establish a self-representation as the stronger and wiser, protective parental

figure in the mother-child relationship. Finally, our results provide preliminary evidence for the screening potential of assessing antenatal representational risk in all mothers using a brief questionnaire.

References

Ammaniti, M., Tambelli, R., & Odorisio, F. (2013). Exploring maternal representations during pregnancy in normal and at-risk samples: The use of the interview of maternal representations during pregnancy. *Infant Mental Health Journal, 34*(1), 1-10. doi:10.1002/imhj.21357

Association, A. P. (2013). *Diagnostic and Statistical Manual of Mental Disorders (5th ed.)* (Fifth edition ed.). Washington, DC: American Psychiatric Publishing.

Benoit, D., Parker, K. C., & Zeanah, C. H. (1997). Mothers' representations of their infants assessed prenatally: Stability and association with infants' attachment classifications. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 38*(3), 307-313. doi:10.1111/j.1469-7610.1997.tb01515.x

Birtwell, B., Hammond, L., & Puckering, C. (2015). 'Me and my bump': An interpretative phenomenological analysis of the experiences of pregnancy for vulnerable women. *Clinical Child Psychology and Psychiatry, 20*(2), 218-238. doi:10.1177/1359104513506427

Brennan, J. (2012). *Experiences of Parenting: The Development and Preliminary Validation of a New Measure of the Caregiving System: The Caregiving Questionnaire.* (Master), Mills College, Oakland.

Brennan, J. (2017). *Becoming a Mother. The Transition to Parenthood.* (Ph.D), University of East Anglia, Norfolk, UK.

Cannella, B. L. (2005). Maternal-fetal attachment: An integrative review. *Journal of Advanced Nursing, 50*(1), 60-68. doi:10.1111/j.1365-2648.2004.03349.x

Crawford, A., & Benoit, D. (2009). Caregivers' Disrupted Representations of the Unborn Child Predict Later Infant-Caregiver Disorganized Attachment and Disrupted Interactions. *Infant Mental Health Journal, 30*(2), 124-144. doi:10.1002/imhj.20207

Davidsen, K. A., Harder, S., MacBeth, A., Lundy, J. M., & Gumley, A. (2015). Mother-infant interaction in schizophrenia: transmitting risk or resilience? A systematic review of the literature. *Social Psychiatry Psychiatric Epidemiology, 50*(12), 1785-1798. doi:10.1007/s00127-015-1127-x

Dayton, C. J., Levendosky, A. A., Davidson, W. S., & Bogat, G. A. (2010). The Child as help in the Mind of the Mother: The Influence of Prenatal Maternal Representations on Parenting Behavior. *Infant Mental Health Journal, 31*(2), 220-241. doi:10.1002/imhj.20253

Dolman, C., Jones, I., & Howard, L. M. (2013). Pre-conception to parenting: A systematic review and meta-synthesis of the qualitative literature on motherhood for women with severe mental illness. *Archives of Women's Mental Health, 16*(3), 173-196. doi:10.1007/s00737-013-0336-0

First, M. B., Williams, J. B. W., Karg, R. S., & Spitzer, R. L. (2016). *Structured Clinical Interview for DSM-5 Disorders - Clinical Version (SCID-5-CV)*. Arlington, VA: American Psychiatric Association.

George, C., & Solomon, J. (2008). The Caregiving System. A Behavioral Systems Approach to Parenting. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of Attachment.* (2. Edition ed., pp. 833-856). New York: The Guildford Press.

George, C., & Solomon, J. (2011). Caregiving Helplessness. The Development of a Screening Measure for Disorganized Maternal Caregiving. In J. a. G. Solomon, C. (Ed.), *Disorganized Attachment and Caregiving.* (pp. 133-166). New York: The Guilford Press.

Goodman, J. H., & Liu, C. H.-J. (2014). Maternal Psychopathology and Child Attachment. In A. Wenzel (Ed.), *The Oxford Handbook of Perinatal Psychology*: 'Oxford University Press'.

Harder, S., Davidsen, K. A., MacBeth, A., Lange, T., Minnis, H., Andersen, M. S., . . . Gumley, A. (2015). Wellbeing and resilience: mechanisms of transmission of health and risk in parents with complex mental health problems and their offspring--The WARM Study. *BMC Psychiatry, 15*(1), 310. doi:10.1186/s12888-015-0692-6

425 Howard, L. M., Kumar, R., & Thornicroft, G. (2001). Psychosocial characteristics and needs of
426 mothers with psychotic disorders. *British Journal of Psychiatry, 178*(MAY), 427-432.
427 doi:10.1192/bjp.178.5.427
428 Howard, L. M., Thornicroft, G., Salmon, M., & Appleby, L. (2004). Predictors of parenting outcome in
429 women with psychotic disorders discharged from mother and baby units. *Acta Psychiatrica*
430 *Scandinavica, 110*(5), 347-355. doi:10.1111/j.1600-0447.2004.00375.x
431 Korja, R., Ahlqvist-Björkroth, S., Savonlahti, E., Stolt, S., Haataja, L., Lapinleimu, H., . . . Lehtonen, L.
432 (2010). Relations between maternal attachment representations and the quality of mother–
433 infant interaction in preterm and full-term infants. *Infant Behavior and Development, 33*(3),
434 330-336. doi:https://doi.org/10.1016/j.infbeh.2010.03.010
435 Lovejoy, M. C., Graczyk, P. A., O'Hare, E., & Neuman, G. (2000). Maternal depression and parenting
436 behavior: a meta-analytic review. *Clinical Psychological Review, 20*(5), 561-592.
437 doi:https://doi.org/10.1016/S0272-7358(98)00100-7
438 Lyons-Ruth, K., Bronfman, E., & Parsons, E. (1999). Maternal frightened, frightening, or atypical
439 behavior and disorganized infant attachment patterns. *Monogr Soc Res Child Dev, 64*.
440 doi:10.1111/1540-5834.00034
441 McFarland, J., Salisbury, A. L., Battle, C. L., Hawes, K., Halloran, K., & Lester, B. M. (2011). Major
442 depressive disorder during pregnancy and emotional attachment to the fetus. *Archives of*
443 *Womens Mental Health, 14*(5), 425-434. doi:10.1007/s00737-011-0237-z
444 Oyserman, D., Mowbray, C. T., Meares, P. A., & Firminger, K. B. (2000). Parenting among mothers
445 with a serious mental illness. *American Journal of Orthopsychiatry, 70*(3), 296-315.
446 doi:https://doi.org/10.1037/h0087733
447 Pawlby, S., Fernyhough, C., Meins, E., Pariante, C. M., Seneviratne, G., & Bentall, R. P. (2010). Mind-
448 mindedness and maternal responsiveness in infant-mother interactions in mothers with
449 severe mental illness. *Psychological Medicine, 40*(11), 1861-1869.
450 doi:10.1017/S0033291709992340
451 Radke-Yarrow, M., Cummings, E. M., Kuczynski, L., & Chapman, M. (1985). Patterns of attachment in
452 two- and three-year-olds in normal families and families with parental depression. *Child*
453 *Development, 56*(4), 884-893.
454 Røhder, K., George, C., Brennan, J., Nayberg, E., Trier, C. H., & Harder, S. (2018). The cross-cultural
455 validity of the Caregiving Experiences Questionnaire (CEQ) among Danish mothers with
456 preschool children. *European Journal of Developmental Psychology*, 1-13.
457 doi:10.1080/17405629.2017.1419951
458 Røhder, K., Nystrom-Hansen, M., MacBeth, A., Davidsen, K., Gumley, A., George, C., & Harder, S.
459 (2019). Antenatal Caregiving Representations Among Expectant Mothers with Severe Mental
460 Illness: A Cross-sectional Study *Journal of Reproductive & Infant Psychology*.
461 Siddiqui, A., & Hägglöf, B. (2000). Does maternal prenatal attachment predict postnatal mother-
462 infant interaction? *Early Human Development, 59*(1), 13-25. doi:10.1016/S0378-
463 3782(00)00076-1
464 Slade, A., Cohen, L. J., Sander, L. W., & Miller, M. (2011). The Psychology and Psychopathology of
465 Pregnancy. Reorgainzation and Transformation. In C. H. Zeanah (Ed.), *Handbook of Infant*
466 *Mental Health* (Third Edition ed., pp. 22-39): Guildford Publications.
467 Snellen, M., Mack, K., & Trauer, T. (1999). Schizophrenia, mental state, and mother-infant
468 interaction: examining the relationship. *Australian & New Zealand Journal of Psychiatry,*
469 *33*(6), 902-911. doi:10.1046/j.1440-1614.1999.00641.x
470 Solomon, J., & George, C. (1996). Defining the caregiving system: Toward a theory of caregiving.
471 *Infant Mental Health Journal, 17*(3), 183-197. doi:10.1002/(sici)1097-
472 0355(199623)17:3<183::aid-imhj1>3.0.co;2-q
473 Stern, D. (1995). *Motherhood Constellation: A Unified View of Parent-Infant Psychotherapy*. London,
474 GBR: Karnac Books.

van den Bergh, B., & Simons, A. (2009). A review of scales to measure the mother-foetus relationship. *Journal of Reproductive and Infant Psychology, 27*(2), 114-126. doi:10.1080/02646830802007480

Vreeswijk, C. M. J. M., Maas, A. J. B. M., & van Bakel, H. J. A. (2012). Parental representations: A systematic review of the working model of the child interview. *Infant Mental Health Journal, 33*(3), 314-328. doi:10.1002/imhj.20337

Vulliez-Coady, L., Obsuth, I., Torreiro-Casal, M., Ellertsdottir, L., & Lyons-Ruth, K. (2013). Maternal Role Confusion: Relations to Maternal Attachment and MotherChild Interaction from Infancy to Adolescence. *Infant Mental Health Journal, 34*(2), 117-131. doi:10.1002/imhj.21379

Walsh, J. (2010). Definitions matter: if maternal-fetal relationships are not attachment, what are they? *Archives of Womens Mental Health, 13*(5), 449-451. doi:10.1007/s00737-010-0152-8

Yarcheski, A., Mahon, N. E., Yarcheski, T. J., Hanks, M. M., & Cannella, B. L. (2009). A meta-analytic study of predictors of maternal-fetal attachment. *International Journal of Nursing Studies, 46*(5), 708-715. doi:10.1016/j.ijnurstu.2008.10.013

Table 1

Maternal and infant characteristics

	Psychosis	Bipolar disorder	Depression	Non-clinical control	
	n = 13 (20.0 %)	*n* = 12 (18.5 %)	*n* = 26 (40.0 %)	*n* = 14 (21.5%)	
Maternal characteristics	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*p*
Maternal age (years)	29.1 (5.6)	32.0 (5.7)	29.3 (4.2)	30.7 (3.5)	.33[a]
	n (%)	*n* (%)	*n* (%)	*n* (%)	
Primiparous	8 (61.5)	6 (50.0)	18 (69.2)	11 (78.6)	.47[b]
Living with a partner	9 (69.2)	12 (100)	20 (76.9)	12 (85.7)	.52 [b]
Education, ISCED level 5 or higher	2 (15.4)***	6 (50)*	16 (61.5)*	13 (92.9)	.000 [b]
Employment	1 (7.7)**	6 (50)	13 (50.0)	11 (78.6)	.002 [b]
Danish participants	10 (76.9)	10 (83.3)	13 (50.0)**	14 (100)	.004 [b]
DSM-V diagnosis of Schizophrenia, Bipolar I Disorder, or Recurrent Depression	8 (61.5)	8 (66.7)	22 (84.6)		
Infant characteristics	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	
Infant age (weeks)	18.1 (3.0)	18.6 (2.8)	17.9 (2.6)	18.7 (3.6)	.82
	n (%)	*n* (%)	*n* (%)	*n* (%)	
Infant gender (girls)	4 (44.4)	8 (66.7)	11 (57.9)	10 (83.3)	.19[b]

Note. ISCED = International Standard Classification of Education, 1997. DSM-V = Diagnosis and Statistical Manual of Mental Disorders (5th ed.).

[a] ANOVA; [b] X^2.

Sample size at 16 weeks: Psychosis *n* = 8 (17.4%); Bipolar disorder *n* =10 (21.7%); Depression *n* =17 (37.0%), and non-clinical controls *n* =11 (23.9%).

*$p < .05$; **$p < .01$; ***$p < .001$; all *p*-values are two-tailed and indicate differences from non-clinical controls

Table 2

Group differences in maternal representations and behavior

Variables	Psychosis	Bipolar disorder	Depression	Non-clinical control	
	M (SD)	*M (SD)*	*M (SD)*	*M (SD)*	Cohens´ *f*
Representations					
Enjoyment	4.66 (.27)	4.58 (.36)	4.54 (.34)	4.50 (.25)	.05
Heightened	3.35(1.04)***	2.83 (.85)*	3.14 (.81)***	2.14 (.49)	.43
Helplessness	2.11 (.42)$^{+}$	2.14 (.60)$^{+}$	2.08 (.68)$^{+}$	1.71 (.44)	.16
Role Reversal	3.56 (1.07)$^{+}$	3.08 (.88)	3.39 (.62)	2.98 (.69)	.22
Maternal Behavior					
Sensitivity	3.40 (.49)	3.35 (.47)	3.32 (.47)	3.38 (.45)	.03
Overriding	1.81 (.65)	1.89 (.96)	2.53 (.83) *	1.82 (.96)	.33

Note. *M* = Mean; *SD* = Standard deviation.
$^{+}p \leq .10$, *$p < .05$; **$p < .01$; ***$p < .001$; all *p*-values are two-tailed and indicate differences from non-clinical controls.

Table 3

Correlations between antenatal caregiving representations and perinatal maternal behavior: Spearman's rho

	1.	2.	3.	4.	5.	6.
Enjoyment	-	.16	-.35**	.26*	.11	-.21
Heightened		-	.27*	.29*	-.20	.15
Helplessness			-	.07	-.23	.31*
Role Reversal				-	$-.27^{+}$	.33*
Sensitivity					-	-.55***
Overriding						-

Note. $^{+}p \leq .10$ *$p < .05$ ** $p < .01$ *** $p < .001$; all p-values are two-tailed.

Table 4

Linear Model of Predictors of Maternal Sensitive Behavior at 16 Weeks Infant Age, with 95% bias corrected and accelerated confidence intervals reported in brackets. Confidence Intervals and Standard Errors based on 1000 Bootstrap samples

	Model 1			Model 2		
Variable	*B*	*SE B*	*β*	*B*	*SE B*	*β*
SMI	.06 [-.30;.43]	.18	.06	.02 [-.29;.33]	.15	.02
Enjoyment	.24 [-.31;.78]	.27	.15			
Heightened	-.06 [-24;.13]	.09	-.11			
Role Reversal	-.19 [-.37;-.01]	.09	-.33*	-.21 [-.38;-.04]	.08	-.36*
Helplessness	-.02 [.32;.28]	.15	-.02			
R^2	.16			.13^{+}		

Note. SMI = severe mental illness. Backward entry used.
*$p < .05$. ** $p < .01$ $^{t} < .10$. p-values are two-tailed.

Table 5

Linear Model of Predictors of Maternal Overriding Behavior at 16 Weeks Infant Age, with 95% bias corrected and accelerated confidence intervals reported in brackets. Confidence Intervals and Standard Errors based on 1000 Bootstrap samples

	Model 1			Model 2		
Variable	*B*	*SE B*	*β*	*B*	*SE B*	*β*
SMI	.40 [-.26;1.07]	.33	.20	.38 [-.20;.96]	.29	.18
Enjoyment	-.60 [-1.59;.39]	.49	-.20	-.87 [-1.71;-.04]	.41	-.29*
Heightened	-.11 [-45;.22]	.17	-.18			
Role Reversal	.38 [.05;.71]	.16	.34*	.37 [.06;.68]	.16	.33*
Helplessness	.27 [-.27;.81]	.27	.17			
R^2	.25*			.23*		

Note. SMI = severe mental illness. Backward entry used.

*$p < .05$. ** $p < .01$ $^{t} < .10$. *p*-values are two-tailed.

532