Critical Review:
Does maternal depression affect children's language development between birth and 36 months of age?

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This critical review examines the current literature investigating the association between maternal depression and child language development. A systematic review of the PubMed, CINAHL, and Scopus databases yielded four longitudinal correlation studies, one cross-sectional correlation study, and one longitudinal difference in groups cohort study. Research findings provide suggestive evidence of a negative association between maternal depression and child language development prior to 36 months of age. Conclusions and clinical implications of the research are discussed and suggestions for future research are provided.

Introduction

The first 36 months of life are critical to language development, as it is during this time that the foundations of language are being built. Essential to this development of language is social interaction (Vygotsky, 1986). Given that prior to 36 months of age, a child's social network prominently consists of their caregivers (mainly the mother), the quantity and quality of the mother-child interaction may be critical to the development of a child's language. One factor that may negatively affect mother-child interaction is maternal depression, which is characterized by a myriad of symptoms including anxiety, withdrawal, sadness, and irritability (American Psychological Association, n.d. & Canadian Mental Health Association, n.d). Currently, it is estimated that 10-15% of all new Canadian mothers experience post-partum depression (Lanes, Kuk, and Tamim, 2011). With such a large percentage of new mothers experiencing post-partum depression, it is important to determine if maternal depression is negatively associated with the language development of a child between birth and 36 months of age.

Objectives

Examine the literature to determine if maternal depression is negatively associated with language development during the first 36 months of life.

Methods

Search Strategy
A systematic online computer database search, targeting the PubMed, CINAHL, and Scopus databases was performed in order to find the articles used within this review. Search terms used included the following: Post-Partum Depression AND Language Acquisition,

Post-Partum Depression AND Language Development, Post Partum Depression AND Language Acquisition, Post Partum Depression AND Language Development, Maternal Depression AND Language Acquisition, and Maternal Depression AND Language Development.

Selection Criteria
Articles included within this review met the following criteria: 1) published after 1996, 2) assessed child language using a gold-standard assessment tool, 3) assessed maternal depression using a well accepted screening tool or structured interview, 4) focused on language development prior to and including 36 months of age, 5) only articles written in English were included.

Data Collection
The systematic search of PubMed, CIHAHL, and Scopus yielded four longitudinal correlation studies, one cross-sectional correlation study, and one longitudinal difference in groups cohort study that met selection criteria.

Results

Kaplan et al. (2014) conducted a cross-sectional correlational study, examining the relationship between maternal depressive symptoms and infants' cognitive and communicative development during the first year of life. Recruitment for the study utilized flyers and advertisements in both a parenting magazine and on social media; all respondents were invited to participate. The final sample size included 80 mother-child dyads, of which 29 mothers reported depressive symptoms within the previous two weeks, ranging from mild to severe. Maternal depression was measured using the Beck Depression Inventory – II, a 21-item self-reporting tool (Beck, Steer, and Brown, 1996). The infants' cognitive and communicative development was assessed using subtests from the Bayley Scales of Infant

Development-III (BSID-III) (Bayley, 2006). Masters' students, who were both trained and supervised by an experienced clinical child psychologist, administered the BSID-III (Bayley, 2006). Although it was reported that other questionnaires and interviews were administered the paper did not report what data was obtained from these measures. The questionnaires and structured interviews may have been used to acquire demographic information, which was controlled for within the statistical analysis.

The relationship between maternal depressive symptoms, demographic information and child development at one year of age was analyzed using an appropriate correlation matrix. The authors found a weak but statistically significant negative correlation between maternal depressive symptoms and infant expressive language at 12 months of age. No significant correlation was found between maternal depressive symptoms and either receptive language scores or cognitive language scores. One major strength of this study was that the authors analyzed receptive and expressive language separately, instead of as a total language score allowing for differences to be examined. Secondly, the study found a weak negative correlation between maternal depression and expressive language despite the relative affluence of the sample population. This indicates that had the sample population been more diverse, the negative correlation may have been stronger. This study contains a number of weaknesses that negatively affect its clinical significance. First the sample population was not representative of the general public, making generalizations of findings challenging. Second, the use of a screening tool to measure maternal depression without a corroborating clinical diagnosis may have led to an over estimation of depressive symptoms. Thirdly, maternal depression was only examined during the two weeks prior to when data collection occurred. This study is clinically significant because it demonstrates that the negative association between maternal depressive symptoms and language development can be found in children as young as 12 months of age.

Due to aforementioned weaknesses this study offers weak suggestive evidence that maternal depressive symptoms can negatively affect an infant's development of expressive communication during the first year of life.

Keim et al. (2011) performed a longitudinal correlational study investigating the association between maternal psychological health (anxiety, depression, or stress) and infant developmental outcomes (visual, motor, language or general cognitive development). The sample population was drawn from

a larger study and its follow-up cohorts. Selection criteria were well documented, with a final sample population of 358 mother-infant dyads. Notably, the sample population consisted mainly of relatively well-educated and affluent mothers. Depressive symptoms were measured across three time points: at less than 20 weeks gestation, 24 – 29 weeks gestations, and 4 months post-partum. Antenatal depressive symptoms were measured using the Center for Epidemiologic Studies Depression (CES-D; Radloff, 1977) scale and post-partum depressive symptoms were measured using the Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987), which are both well-accepted self-reporting screening tools. Infant developmental outcomes were measured at 12 months of age, using the Mullen Early Learning Scale (MELS) (Mullen, 1995). Self reported self-esteem, maternal education, income and other demographic information were collected using an assortment of questionnaires and phone interviews.

An appropriate multiple regression analysis was used to investigate the relationship between maternal psychological health factors and developmental outcomes at 12 months of age after adjusting for confounding variables. From this analysis maternal depressive symptoms during pregnancy were not found to be associated with language outcomes, as measured by the MELS (Mullen, 1995). However, a non-linear positive association was found between maternal post-partum depressive symptoms and receptive language. No association was found between chronic maternal depression and expressive or receptive language when investigated using appropriate linear regressions.

This study contains a number of weaknesses that negatively affect its clinical significance including an unrepresentative sample and the use of screening tools to measure maternal depressive symptomology. Additionally, the study used an infant development test that was published over 20 years ago, and which does not have updated normative data. This makes the infant outcome measurements suspect because the normative data are outdated. Further, test reviewers have asserted that the normative data within the MELS was inadequate when initially published and individual child scores should be interpreted with caution. The reviewers' concerns included an unrepresentative sample population and the data being collected over two long time periods and then combined (Dumont, Cruse, Alfonso, & Levine, 2000).

Given the aforementioned weaknesses the positive non-linear relationship found between maternal depression and receptive language is equivocal and generally the body of evidence within this study is suspect.

In 1999, **The NICHD Early Child Care Research Network** performed a longitudinal difference of groups cohort study, examining the effects that maternal depression and mother-child interaction styles had on a child's functioning at 36 months of age. The final sample included 1,215 families who were followed from the child's birth to 36 months of age, with data gathered at 1, 6, 15, 24 and 36 months. Demographic information was collected using questionnaires at the 1 month time period and was updated periodically. Mother-child interactions were assessed through direct observation both at home and in a lab environment. Maternal depression was measured across all time periods using the CES-D Scale (Radloff, 1977). Cognitive functioning was assessed with the school readiness composite from the Bracken Basic Concept Scales (Bracken, 1984) and language development was assessed at the 36-month laboratory visit using the Reynell Developmental Language Scale (RDLS; Reynell 1991).

Children were grouped according to their mother's depressive symptoms (never, sometimes, or chronically depressed) and outcomes at 36-months were investigated using an appropriate analysis of co-variance. Outcomes investigated included; behaviour problems and cooperation reported by the mother, observed compliance composite score, school readiness scores, and expressive language and verbal comprehension scores. This analysis found that children whose mothers were either chronically or sometimes depressed had statistically lower scores on school readiness, verbal comprehension and expressive language than children whose mothers were never depressed. It was also found that children whose mothers were chronically depressed performed worse than those whose mothers were only sometimes depressed. Within the two depressive groups higher scores on maternal sensitivity predicted better outcomes across all investigated categories. The major strengths of this study included the large sample size, multiple time periods during which data was gathered and the use of a gold standard language scale. The major weakness of this study was that mother-child interactions were only observed during 15-minutes of play over each time period. Clinical implications of this study include the need to identify the length of a mother's depression and the need to target maternal sensitivity in intervention.

Given the aforementioned strengths and weaknesses this study provides strong suggestive evidence that maternal depression is negatively associated with child language development at 36 months of age.

Piteo, Yelland, and Makrides (2012) conducted a longitudinal correlation study investigating the relationship between post-partum depression, home environment, and infant development (cognitive, language, and motor) at 18-months of age. This study's 345 participants were drawn from the control group of another study (Makrides et al., 2010). Post-partum depression was measured 6-weeks and 6-months after the child's birth, using the self-reported EPDS (Cox, Holden & Sagovsky, 1987). The home environment data was obtained using a 30-item parent reported questionnaire, completed during the infant's developmental assessment at 18-months of age. Infant development was measured using the BSID-III (Bayley, 2006); administration parameters were not disclosed.

Children were divided into two groups, those whose mothers demonstrated depressive symptoms (n=69) and those whose mothers did not (n=276). Between–group differences for descriptive demographic data were investigated using appropriate Chi-Square tests and were found to be statistically insignificant. While controlling for confounding demographic data, developmental outcome differences across participant groups were investigated using an appropriate linear regression. A mediation model was then used to investigate the effects of maternal depression on infant development when the home environment was considered. The study did not find a statistically significant difference in any developmental outcomes between the two groups at 18-months of age. It was however found that the home environment was a strong predictor of developmental outcomes.

The major strengths of this study are its large sample size and that it measured maternal depression across two time periods. One major weakness of this study is its use of a self-reported screening tool to measure maternal depression rather than acquiring a clinical diagnosis. A second weakness was that the sample population included a relatively high proportion of economically and socially advantaged mothers, which may have skewed findings.

Given the aforementioned strengths and weaknesses this article provides suggestive evidence that maternal depression is not associated with poorer language outcomes at 18 months of age.

Quevedo et al. (2011) conducted a longitudinal correlation study investigating what maternal depression factors affect a child's language development during the first year of life. The study included 296 mother-child dyads recruited from maternity wards in Pelotas, Brazil between September 2007 and September 2008 and who also received

prenatal care from the Brazilian National System of Public Health. Maternal depression was assessed across two time periods, 30-60 days post-partum and 12 months post-partum. Child language development was measured at the 12 month time period. Data was obtained using the BSID–III (Bayley, 2006) to assess child language development, structured interviews to assess maternal depression and questionnaires to obtain the socio-economic status of each dyad. Administration parameters for the BSID-III (Bayley, 2006) were not disclosed.

An appropriate linear regression showed that maternal depression significantly predicted infant language even after controlling for confounding variables. Results of a multiple comparison revealed lower language in infants whose mothers displayed depressive symptoms over multiple time periods compared to those with mothers without depressive symptoms or depressive symptoms at only one time period, although details of these comparisons were not provided. One of the major strengths of this study was that maternal depression was assessed using structural interviews, rather than self-reporting tools. Another strength was that maternal depression was measured across two time points. A major limitation of this article was that they commented on the data related to the relationship between chronic maternal depression and child language development but did not provide a breakdown of the data. Further due to an insufficient number of severely depressed individuals a comparison of the affects of depressive severity could not be completed. The relationship found between maternal post-partum depression and child language development is both statistically and clinically significant, as maternal post-partum depression is often under diagnosed. This study highlights the importance of accurate and timely diagnosis, in order to limit the effects of maternal depression on child language development.

Given the aforementioned strengths and limitations, this study provides suggestive evidence that chronic maternal depressive symptoms are associated with poorer language outcomes in infants at one year of age.

Stein et al. (2008) conducted a longitudinal correlation study examining how children's language development at 36 months was affected by postnatal depression, maternal caregiving, and socio-economic factors (SES). Participants were drawn from two large antenatal clinics located in London, England and Oxfordshire, England, as well as a number of post-natal baby clinics. The final sample population included 1036 mothers and 944 children. Data was collected at 3, 10 and 36 months of child's age, with various data collected across the time periods. Data regarding maternal depressive

symptomology was collected across all time periods, maternal caregiving data was collected at 10 and 36 months and child language development was collected exclusively at 36 months. Child language data was collected with the RDLS (Reynell, 1991), maternal depression was measured with the EPDS at 3 and 10 months (Cox, Holden & Sagovsky, 1987) and with the General Health Questionnaire (Goldberg, 1982) at 36 months, demographic information was collected with face-to- face interviews and maternal caregiving was gathered during home visits.

Initially, appropriate bivariate correlations were used to examine the relationships between independent variables and child language scores. Subsequently, structural equation modelling (SEM) was completed to investigate more complex relationships between maternal caregiving, maternal depressive symptoms, SES and child language development; appropriate statistical cut-offs were used within the SEM. Finally a two group comparison investigated the moderating effects of SES. The bivariate correlation analysis indicated that a weak but statistically significant negative correlation exists between maternal depressive symptoms when an infant is 3 and 10 months of age and child language development at 36 months of age. Additional analysis using SEM indicated that depressive symptomology did not have a direct effect on language; rather it indirectly affected language by negatively affecting maternal caregiving patterns. Maternal depressive symptoms were also found to have a greater effect on caregiving in the more disadvantaged population than in less disadvantaged populations. Furthermore, poorer caregiving at 10 months was shown to predict poorer caregiving at 36 months, and was in turn associated with poorer language development.

One of the major strengths of this study was the large sample population, which provided statistical strength to the findings of this study. Secondly, the study measured maternal depression across three time periods and also measured maternal caregiving across two time periods. Further the use of home observations provided detailed and reliable information regarding maternal caregiving practices. The major weakness of the study is that the authors used a short screening tool to assess levels of depressive symptoms within mothers. Furthermore, because the screening tool used initially was not valid at the 36-month time point a different screening tool was used to assess maternal depression at the last time point. The use of multiple screening tools weakens confidence in the findings, as screening tools may overestimate depressive symptoms. These findings are clinically significant because they indicate that maternal depression indirectly affects child language

development by altering maternal caregiving patterns. Therefore, intervention should target maternal responsiveness and other caregiving patterns. The findings also provide evidence for the need to target interventions within disadvantaged populations, as SES buffers the effects of maternal depression.

This study provides suggestive evidence that maternal depression indirectly affects child language development. The factor that limits the significances of this study's findings is the manner in which they measured maternal depressive symptoms.

Discussion

Included in this critical appraisal were six studies that investigated the association between maternal depression and child language development. Findings from these six studies were mixed. Four studies found a negative association between maternal depression and child language development, one study found no association, and one study found a positive non-linear association between maternal depression and *receptive* language development. Despite mixed results, the evidence as a whole provides suggestive evidence that maternal depression is negatively associated with child language development.

A major strength of the studies that reported a negative association (Kaplan et al., 2014; The NICHD, 1999; Quevedo et al., 2011; Stein et al., 2008) was their large sample sizes, which provided increased statistical power to their observed findings. Specifically, The NICHD (1999) and Stein et al. (2008) both had sample populations with over 900 dyads. Furthermore, the studies were relatively consistent in the tests used to evaluate language development, with two using the BSID-III (Bayley, 2006) and two using the RDLS (Reynell, 1991). The longitudinal design was another strength of The NICHD (1999), Quevedo et al. (2011) and Stein et al. (2008). This design allowed the authors to examine the effect of chronic versus acute depressive symptoms as well as the absence of depression on child language development. This further investigation indicated that maternal depressive symptoms across multiple time periods were associated with lower language scores.

A common weakness across several studies (Kaplan et al., 2014; Quevedo et al., 2011; Stein et al., 2008) was the unrepresentative sample populations. These studies included a high proportion of well-educated and socially advantaged mothers, making generalization of findings and clinical implications challenging. Additionally, the use of screening tools rather than

diagnostic interviews to assess depressive symptomology may have overestimated the presence of depression within the sample populations. Nevertheless, given the large sample sizes, screening tools were logistically and financially appropriate.

Two of the six studies included in this review failed to find the above negative correlation. Piteo, Yelland, & Makrides (2012) found no association between maternal depression and language development. Keim and colleagues (2011) found no pattern with expressive language, but found a positive non-linear association between maternal depression and *receptive* language development. However, the positive association that Keim and colleagues (2011) reported was equivocal given that the developmental test the authors used to assess language development contains outdated norms. Additionally, reviewers Dumont, Cruse, Alfonso, & Levine (2000) expressed concern for the collection methodology and unrepresentative distribution of the normative data of the test.

Conclusion

The literature gathered from this systematic review of PubMed, CINAHL, and Scopus databases provide suggestive evidence of a negative association between maternal depression and child language development.

Clinical Implications and Future Research

Timely and accurate diagnosis and intervention of maternal depression are critical for both the mother's quality of life, as well as the child's language development as a negative association was found in children as young as 12 months old (Kaplan et al., 2014; Quevedo et al., 2011). Accurate and timely diagnosis and intervention are also important because chronic depressive symptomology is associated with worse language outcomes (NICHD, 1999). These interventions should target increasing maternal sensitivity and maternal responsiveness. This recommendation is supported by the findings that maternal depression has an indirect effect on language development through altered caregiver interaction styles, and that higher maternal sensitivity predicts better language outcomes for children of mothers with depression (Stein et al., 2008; NICHD, 1999). Finally, extra support for lower SES families may be warranted given that higher SES acts as a protective factor against negative language outcomes (Stein et al., 2008).

The literature base related to maternal depression and language development would benefit from further studies that investigate the association between severity of depression and child language outcomes.

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