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The Long-Term Effects of Maternal Depression: Early Childhood Physical Health as a Pathway to Offspring Depression

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A B S T R A C T

Purpose: Cross-sectional and retrospective studies have highlighted the long-term negative effects of maternal depression on offspring physical, social, and emotional development, but longitudinal research is needed to clarify the pathways by which maternal depression during pregnancy and early childhood affects offspring outcomes. The current study tested one developmental pathway by which maternal depression during pregnancy might negatively impact offspring mental health in young adulthood, via poor physical health in early childhood.

Methods: The sample consisted of 815 Australian youth and their mothers who were followed for 20 years. Mothers reported on their own depressive symptoms during pregnancy and offspring early childhood. Youth completed interviews about health-related stress and social functioning at age 20 years, and completed a questionnaire about their own depressive symptoms 2 to 5 years later.

Results: Path analysis indicated that prenatal maternal depressive symptoms predicted worse physical health during early childhood for offspring, and this effect was partially explained by ongoing maternal depression in early childhood. Offspring poor physical health during childhood predicted increased health-related stress and poor social functioning at age 20. Finally, increased health-related stress and poor social functioning predicted increased levels of depressive symptoms later in young adulthood. Maternal depression had a significant total indirect effect on youth depression via early childhood health and its psychosocial consequences.

Conclusions: Poor physical health in early childhood and its effects on young adults' social functioning and levels of health related stress is one important pathway by which maternal depression has long-term consequences for offspring mental health.

IMPLICATIONS AND CONTRIBUTION

This study is unique in highlighting offspring physical health and its psychosocial consequences in young adulthood as a pathway of the long-term negative effects of maternal depression on offspring mental health. Findings can help to inform interventions designed to prevent the negative consequences of maternal depression on offspring physical and mental health.

Maternal depression during and directly after pregnancy has profound effects on offspring physical health early in life, and has been linked to problems such as low birth weight, growth retardation, diarrheal episodes, and feeding problems [1–6]. Additionally, maternal depression represents a significant public health cost, with children of depressed mothers showing lower rates of receiving appropriate immunizations [7], higher rates of hospitalization [8], and higher health expenditures [9]. Thus, current evidence points to a strong association between maternal depression and offspring physical health throughout infancy and childhood.

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Maternal depression during pregnancy likely compromises offspring physical health through a number of different mechanisms. First, depression leads to negative health behaviors, such as substance use and poor nutrition [3], which can affect the developing fetus. Importantly, prenatal depression also predisposes mothers to higher rates of depression later in life, which could continue to impact offspring development throughout early childhood [10–12]. Second, depression has been linked to dysregulation in the hypothalamic-pituitary-adrenal (HPA) axis [13] and elevated inflammation [14,15], which could affect developing biological systems in the fetus. In support of this hypothesis, several studies have shown that mothers' prenatal stress or depression leads to alterations in the development of the HPA axis and immune system in offspring [16–19]. Such physiological alterations predispose offspring to health problems such as lower birth weight [18,20] and chronic illness [18,21].

Poor physical health during childhood, in turn, can have social and emotional consequences for the offspring of depressed women. A variety of early physical health problems, such as low birth weight or chronic illness, predict increased rates of psychiatric disorders during adolescence and adulthood [22–25], with depression an especially common diagnosis [23,26]. Thus, maternal depression puts some children at risk for health problems during early childhood, and these difficulties with physical health might in turn lead to increased rates of depression in offspring. Yet, research on long-term mental health outcomes in offspring is typically cross-sectional, with retrospective reports of the variables of interest, rather than longitudinal designs. Furthermore, few studies have acknowledged the interplay between offspring physical health and mental health outcomes by examining childhood physical health as one potential pathway from maternal depression to offspring depression.

It is also crucial for research on the interplay between physical and mental health to examine mechanisms by which poor physical health in childhood might predict increased depression later in life. Two potential pathways linking poor childhood health and increased depression involve ongoing stress and disability related to poor health [27] and poor social functioning [28]. A range of early health problems, including preterm birth, low birth weight, and chronic illness predict difficulties such as academic underachievement, school absence, and reduced productivity at school [27,29]. This ongoing health-related stress and impairment is one pathway by which early childhood physical illness might lead to later depression. In addition, both frequent, minor illnesses and severe chronic illness have been linked to problems with social adjustment, including fewer interactions with friends and distress in social relationships [28,30]. Thus, social difficulties are another pathway by which early childhood physical health problems might lead to later depression. Nevertheless, these specific mechanisms of the effects of poor childhood health on later mental health outcomes have not been examined in longitudinal studies.

The current project addresses these issues by examining the longitudinal relationships among maternal depression, offspring physical health, and offspring depression, and by exploring two potential mechanisms of the effects of offspring physical health on later depression: ongoing health-related stress and problems with social functioning. We hypothesize that maternal depressive symptoms during pregnancy will predict risk for increased health problems for offspring in early childhood, possibly through ongoing maternal depression in early childhood. In addition, we hypothesize that childhood health problems will predict higher youth depressive symptoms in young adulthood. Finally, we also predict that health-related stress and poor social functioning will serve as two pathways by which early childhood health affects later youth depression. We will use a large community sample to examine whether this model is true for both children with and without chronic illness. This is an important question, given the potentially different effects of frequent, minor health problems and more serious chronic illness on psychosocial outcomes.

Method

Participants

Participants were 815 youth drawn from a larger sample of 7,775 children born between 1981 and 1984 studied as a birth cohort for the Mater Misericordiae Mothers' Hospital-University of Queensland Study of Pregnancy [31]. At youth age 15 years, 815 mother-child pairs were selected for a follow-up study of youth risk for depression based on mothers' patterns of elevation of scores on the Delusions Symptoms States Inventory (DSSI), a 7-item self-report measure of depression and anxiety. Families with youth at age 15 years were selected to represent a range of symptom presence, chronicity, and severity of maternal depression, and were over-selected for maternal depression relative to the general population. From the original sample, 991 families were targeted for inclusion in the follow-up, and 815 consented and were included. Children in the high-risk subsample (n = 815) were not significantly different from the original birth cohort in terms of gender, $\chi^2(1, N = 7{,}775) = .53$, $p = .48$; income, $t(7147) = .81$, $p = .42$; or mother's education, $t(7612) = 1.70$, $p = .09$.

The adolescent sample at age 15 years was 50.6% male and 49.4% female. The families were largely lower middle class and predominantly Caucasian (91.4% Caucasian; 3.6% Asian; 5% other or not reported). The majority of mothers worked outside the home (66%), and were married to the father of the target youth (66%; 21% married to someone else; 13% no partner).

At youth age 20 years, 705 youth from the original 815 participants completed follow-up questionnaires and interviews. Finally, when youth were ages 22–25 years, participants were contacted for a final follow-up to provide biological specimens and complete additional questionnaires. Of the 705 youth who participated in the age 20 assessment, 475 (57% female) participated in the age 22–25 questionnaires. Youth who participated in the final assessment had a similar income range ($M = 3.05$, $SD = 2.1$) and ethnic distribution ($\chi^2 = 2.62$, $p = .62$) to the original sample. In addition, youth who participated in the age 22–25 follow-up did not differ from those who did not participate in the follow-up in terms of prenatal maternal depression ($t(814) = -.73$, $p = .46$), maternal depression during early childhood ($t(814) = 1.10$, $p = .27$), early childhood physical health ($t(506) = .45$, $p = .66$), health-related stress at age 20 years ($t(703) = -1.25$, $p = .21$), social functioning at age 20 years ($t(703) = .70$, $p = .49$), or youth depressive symptoms at age 20 years ($t(631) = 1.30$, $p = .19$). However, males had a higher dropout rate than females ($\chi^2 = 26.34$, $p < .001$).

Procedure

Mothers completed questionnaires during pregnancy, 3–4 days after the child's birth, 6 months after birth, and at youth ages