[Archived] Prenatal/Perinatal Stress and Its Impact on Psychosocial Child Development

Janet DiPietro, PhD

Johns Hopkins University, USA

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Introduction

From time immemorial, there have been stories about the effect of a mother's emotions on a developing foetus. The belief that a foetus may be harmed by negative maternal emotions related to stress and anxiety has its roots in cultural tradition and folklore that span the globe. A significant amount of scientific inquiry has attempted to determine the validity of such beliefs by examining the manner in which maternal stress and anxiety may be related to pregnancy outcomes and postnatal development in children.[1-3]

Subject

It has been purported that maternal stress during pregnancy acts as a developmental teratogen (a substance that can negatively affect development) as can be the case with drugs or alcohol. Articles in magazines and newspapers often perpetuate this belief, thus (ironically) exacerbating

stress in pregnant women, who may be unable to control difficult life circumstances. This report will provide a review of evidence in the debate regarding whether or not maternal stress during pregnancy causes poor developmental outcomes in children.

Problems

Measuring and defining stress is a complicated undertaking. A woman's appraisal of whether something is stressful is affected by many factors, including aspects of her personality, such as her anxiety level and outlook on life. Objectively speaking, a woman who reports a great deal of stress during pregnancy may not be experiencing a more stressful time than any other woman. She may simply be more susceptible than other women to forceful negative reactions when confronted with daily hassles. Women who report feeling stressed, anxious or depressed during pregnancy also report feeling this way through at least their child's second year of life.[4] It is therefore difficult to distinguish stress from other psychological or personality characteristics. In addition, it is difficult to separate effects of maternal stress that are the result of biological changes to the developing foetus from effects imposed by postnatal differences in parenting by mothers who are stressed.

Research Context

A woman's thoughts are not transmitted to the foetus because there are no direct neural connections between them. However, maternal stress and emotions produce a cascade of hormonal reactions, changes in blood flow to the uterus, and other alterations that directly influence the intrauterine milieu. In fact, given the intricate physiological relationship between mother and foetus, it would be somewhat surprising if dynamic aspects of the maternal environment did not serve to shape foetal development. The key word here is "shape," not "damage." Studies of animals (primarily rodents and non-human primates) allow experimental manipulation of prenatal stress in a manner in way that humans cannot. Findings from animal studies often contradict one another, with some demonstrating that prenatal stress impairs development while others show that it facilitates adaptative developmental functioning.

Key Research Questions

Here we pose the following questions regarding prenatal influences in human pregnancies on postnatal developmental outcomes:

- Do maternal stress and negative emotions contribute to preterm delivery and low birthweight which may, in turn, have ramifications for development?
- Do maternal stress and negative emotions directly affect the foetal nervous system, thereby resulting in alterations in cognitive, behavioural or emotional development after birth?

Recent Research Results

The answer to the first question is a qualified “no.” That is, while some, but not all, studies detect an association between prenatal stress exposure and smaller babies or earlier deliveries,[5-7] the magnitude of effects when detected are small and unlikely to negatively influence subsequent child development. This includes studies that capitalize on “experiments in nature” to evaluate whether stressful events that affect a population, as opposed to personality characteristics, are associated with negative outcomes.[8-9] A meta-analysis, which is a statistical review of all studies on a topic, concluded that maternal anxiety, which is highly comorbid with maternal stress, was unrelated to pregnancy outcomes.[10]

The second question has been informed most predominantly by studies that rely on maternal report of child developmental outcomes. However, because women who are anxious or stressed view their children as more difficult or worrisome, such studies cannot provide valid information about this relationship. Outcomes of some studies that did directly measure child development include a link between prenatal stress or anxiety and slower maturation in infancy or early childhood and reduced attention levels.[11-13] However, others have found the opposite: that prenatal psychological distress is associated with faster neural and behavioural maturation.[14-15] In general, the relatively few existing studies that measure child outcomes report sporadic and inconsistent associations of relatively small magnitude.

Studies that purport a link between maternal stress and subsequent psychiatric disorders should be equally interpreted with caution due to the inability to ascertain the roles of shared genetic contribution and the postnatal rearing environment. For example, while there is a well-established relationship between prenatal cigarette use and childhood ADHD, this association is explained primarily by inherited traits’[16] that is, women who smoke cigarettes are different from women who do not in a manner that is consistent with more prevalent ADHD symptoms in their offspring. The same may be likely for prenatal stress exposure.

Research Gaps

The most apparent research gap is the paucity of empirical studies on the topic that:

- measure features of child developmental outcomes, as opposed to relying on maternal reports about child difficulties which are directly contaminated by maternal psychological functioning, and
- adequately control for maternal stress in the postnatal period.

In addition, there is a lack of large-scale studies that include exposed and non-exposed siblings to allow appropriate evaluation of the role of inheritance and rearing in significant findings.

Conclusions

While there is some evidence that negative prenatal maternal emotions or experiences result in smaller or earlier delivered infants, results across studies are neither uniform nor compelling. Of those that detect associations, there is some evidence suggesting that earlier, as opposed to later exposures, may be more influential. However, the magnitude of effects, when detected, is small and unlikely to independently contribute to negative child developmental outcomes.

There is not nearly enough quality data to determine that prenatal maternal stress either benefits or damages child development and as such, it should not be regarded as a developmental teratogen.

Perhaps the most promising and newer line of research is to reduce the emphasis on the construct of maternal psychological stress during pregnancy and instead focus on examining associations between neuroendocrine and physiological parameters during pregnancy in relation to child outcomes. In particular, products of the *hypothalamic-pituitary-adrenal axis* such as *cortisol*, which manages the body's response to stress, has engendered increasing attention. Contrary to expectations, there is little to no correspondence between cortisol and maternal stress or other negative emotional states during pregnancy.[12,13] Shifting the focus from psychological constructs to biological ones may be more productive in understanding complex associations. There is some existing evidence that variation in maternal cortisol levels, independent of psychological stress, has consequences for child development, although again, some studies find facilitative effects while others find negative ones.[12,17]

Implications

Faced with insufficient and conflicting scientific data, pregnant women and their providers should adopt a common-sense approach to managing prenatal stress and determining when stress should be mitigated. The assumption that “stress is bad, so stress will hurt my baby” is unjustified. Worrying about one’s level of stress or anxiety is clearly counter-productive.[18] In fact, it is evident from studies of both animals and humans that moderate, but not overwhelming, stress can facilitate development. Ultimately, our understanding of the relationship between a mother’s psychological state and development in the foetus she carries will likely reveal complex relations with regard to child psychosocial development. Public policy issues in this area of research would include maternal employment and maternity leave. In point of fact, it is not uncommon for pregnant women to work until the time of birth. We hardly need research on the role of prenatal maternal stress in child development to deduce that this may not be an optimal societal expectation. Women who work at demanding, stressful jobs throughout pregnancy may enter labour, delivery, and the ensuing years of child dependency with depleted energy reserves. Furthermore, the implications of maternal stress on the postnatal environment that is created for the infant are likely to be of far greater consequence than potential biological effects of prenatal exposures. Nonetheless, because it is up to each woman to subjectively appraise whether an event or circumstance is stressful, public policy to govern the behaviour or activities of pregnant women in the interest of improving child developmental outcomes should not be established.

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