

Prenatal parenting

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Parenting begins before birth. This includes prenatal maternal and paternal bonding with the baby, and biological effects on fetal development. Recent research has confirmed how prenatal maternal stress can alter the development of the fetus and the child, and that this can persist until early adulthood. Children are affected in different ways depending, in part, on their own genetic makeup. The fetus may also have a direct effect on prenatal maternal mood and later parenting behaviour via the placenta. The father is important prenatally too. An abusive partner can increase the mother's prenatal stress and alter fetal development, but he can also be an important source of emotional support. New research suggests the potential benefits of prenatal interventions, including viewing of prenatal scans and cognitive behavioural therapy.

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Introduction

Parents can alter the development of their child, even before birth. Several different ways in which this can occur will be discussed in this review. The mother's emotional state during pregnancy can have a direct influence on fetal development by fetal programming. Her obesity can also alter the development of her fetus and child. The mother's emotional state during pregnancy is a predictor of her mood postnatally, so if she is depressed prenatally she is at strong risk of being depressed postnatally, and this can also have an effect on her parenting. The partner has a major part to play during pregnancy, especially by his or her effects on the mother's emotional state. An abusive partner can be very detrimental to a woman's prenatal emotional state, whereas a supportive

partner may buffer her against depression or anxiety. The feelings of bonding or attachment between a parent and baby can start prenatally, and continue after the baby is born. Again this is mostly observed between the mother and her unborn child, but the father can start to have feelings of attachment prenatally. It is well known that maternal smoking, alcohol and drug consumption during pregnancy can affect fetal development. However, evidence from animal studies suggests that paternal alcohol consumption may also have an effect on the offspring, reducing cognitive development, and increasing anxiety and depression, via epigenetic changes in the sperm [1]. Most of the research on these topics has been psychological, but the underlying biology is starting to be explored, as are interventions that start in pregnancy and can help child outcome.

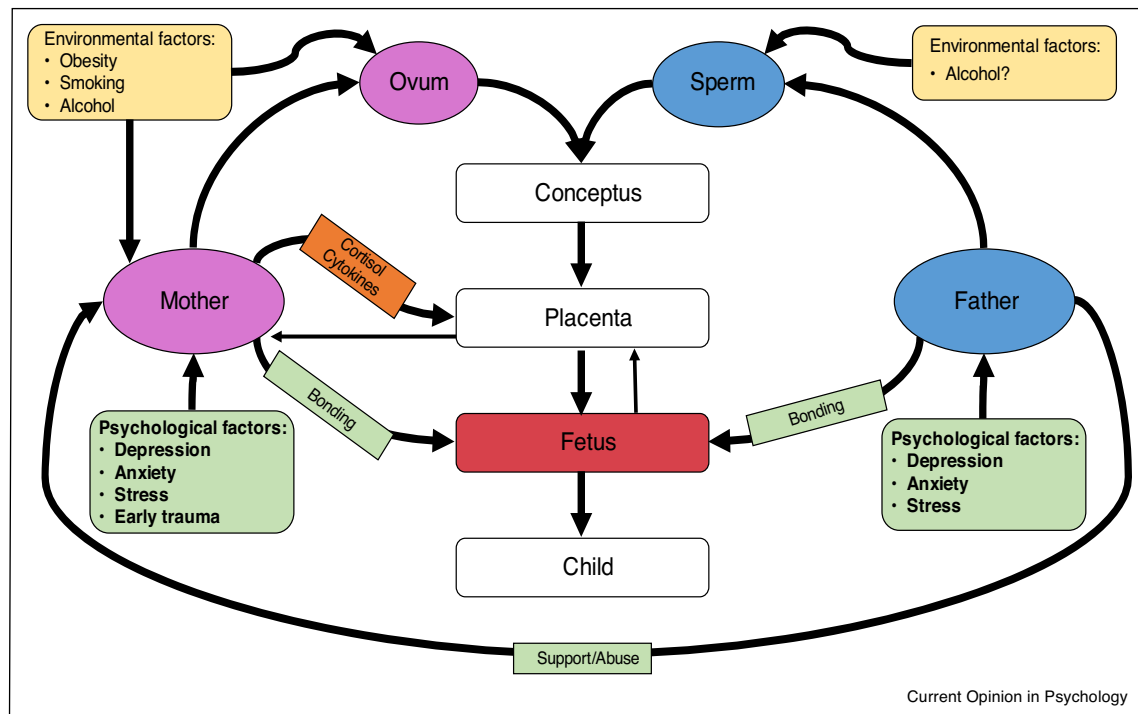
Maternal mood in pregnancy

Women have as many symptoms of depression and anxiety during pregnancy as they do postnatally [2]. These can have a direct effect on the development of her baby (see fetal programming below), as can other experiences of stress, including exposure to natural disasters [3] such as an ice storm in Canada [4], or to man-made traumas, such as 9/11 Yehuda *et al.* [5]. Many women have pregnancy specific anxiety, an especial concern about the outcome of their pregnancy, and some recent studies have found that this is especially predictive of alterations in the child (*e.g.* Hompes *et al.* [6]). Many women who are depressed in pregnancy have been subjected to early trauma themselves, with evidence to suggest that early trauma predicts prenatal rather than postnatal depression [7]. This history can be especially important with respect to child psychological outcome [8]. Blakemore *et al.* have also found that childhood trauma exposure increased the risk for low birthweight associated with prenatal mood disturbance [9]. It is not clear why such early trauma in the pregnant mother exacerbates the effects of her mood on fetal development and growth, but pregnancy is a time when she may be more aware of her own parenting or care as discussed by Fraiberg *et al.* [10] in "The ghosts in the nursery", and more recent studies on intergenerational transmission suggest possible biological mechanisms also [11] (Figure 1).

Fetal programming

Fetal programming is the concept that the environment in the womb, during different sensitive periods for specific outcomes, can alter the development of the fetus, with a long lasting effect on the child [12]. If the mother is stressed, anxious or depressed whilst she is pregnant, this can have a direct effect on the development of her fetus

Figure 1



Prenatal parenting. Potential pathways through which both mother and father may affect child outcome before birth.

[13^{••}]. The child is somewhat more likely to be born smaller for gestational age, and also to be born earlier. But most of the effects that have been documented are on neurodevelopment outcomes, with altered emotional, behavioural and cognitive processing, including increased risk of symptoms of anxiety and depression, attention deficit hyperactivity disorder (ADHD) and conduct disorder. The effects have been shown to last at least until early adulthood [14,15]. It is not only extreme or toxic stress that is detrimental, or a diagnosed mental illness, but increased levels of daily hassles [16] or milder symptoms of anxiety or depression may also be important.

A UK cohort study (ALSPAC Study) has shown that if a pregnant mother was in the top 15% for symptoms of anxiety or depression, her child had double the risk for a probable mental disorder at age 13 years [17^{••}]. The risk increased from about 6% to about 12%. This study allowed for a wide range of possible confounders, including postnatal maternal mood, parenting, paternal mood, and socioeconomic status, thus showing that there were prenatal effects independent of postnatal and other factors that also contribute to child outcome. Most children were not affected, and those that were, were affected in different ways. These different outcomes probably depend both on the genetic vulnerabilities of each child [18], and on the nature of the postnatal care.

The term fetal programming does not imply that these changes during the *in utero* period are irreversible. Indeed, we know that they are not. For example, sensitive mothering in the early postnatal period can prevent some of the cognitive effects of in utero exposure to cortisol [19] (see section on underlying biology below). The brain continues to develop throughout gestation, and long afterwards, and it can continue to be modified, but it is very plastic, and subject to alteration at the beginning.

Prenatal attachment or bonding

There is good evidence that a mother can start to bond with her baby while she is pregnant and that this can continue into her relationship with her baby after birth. For example Rossen *et al.* [20] have shown that higher prenatal bonding predicted higher postnatal bonding, and that maternal depressive symptoms in trimesters two and three were related to poorer mother-infant bonding 8 weeks postnatally. Mazzeschi *et al.* [21] have also shown that the maternal attitude to the baby during pregnancy was correlated with adjustment to the baby and parenting stress postnatally. Women who are depressed during pregnancy are generally less likely to form strong prenatal bonds with their unborn baby [22]. It is also interesting that a mother's mood during pregnancy [23^{••}] and also her alcohol consumption [24] are related to her sensitivity to her infant postnatally, independently of her postnatal

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