
Maternal-Fetal Bonding

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ABSTRACT: A complex biological and psychological series of events commence at fertilization and continue through parturition between the preborn human organism and his or her mother, which extends far beyond the physical connection between an adult patient and contained tissue. This guideline reviews evidence in support of various aspects of this bond and its implications for care of the maternal patient.

Key Words: pregnancy, attachment, bonding, interventions

Background

During pregnancy, an intense bond develops between mother and child. This bond is crucial for both the emotional and physical well-being of the child. The normal development of this bond progresses from knowing the child exclusively through the lens of the maternal body to later learning and appreciating who the child is as an individual.¹ In early pregnancy, the only signs of the developing pregnancy are through the mother's body. The mother develops physically visible signs such as swollen breasts and a discoloration of the cervix that make visible the developing life that is not yet large enough to be seen on his/her own. As pregnancy progresses, the child becomes more recognizable through detection of the heartbeat, distinct fetal movements, and ultrasound images. The mother is thus able to bond to a specific human being who is distinct from herself. Mother and child are then separated at time of delivery when the cord is cut. The bond that had been forming persists and allows the mother to now care for her infant outside of the womb.

The forming of this bond between the mother and child involves interactions at both the physiological and psychological levels. The physiologic

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interplay between mother and child via hormones and signals created and transferred through the placenta have been detailed in obstetric textbooks.² An example of this is estrogen metabolism in which the fetal adrenal glands produce the initial precursor which is modified by the placenta and then secreted in different forms into both the maternal and fetal systems. Similarly, signals from the placenta alter maternal metabolic homeostasis to allow the mothers metabolism to preferentially transfer to the fetus the nutrients he/she needs.

Beyond hormones, there is a permanent physiologic bond created between the mother and the child through microchimerism, that is “the long term presence within an individual of a low level of cells derived from a different individual.”³ During pregnancy, fetal cells enter the mother and become established. These fetal cells can persist for decades following pregnancy.^{4,5} There is evidence that these fetal cells can even integrate into and influence the maternal brain.^{6,7} Similarly, maternal cells can enter the fetus. This has been demonstrated by detecting HLA-disparate maternal cells in immunocompetent offspring well into adult life.⁸ This exchange of cells occurs very early in pregnancy and is actually increased in instances of induced abortion.^{9,10}

As the physical signs of pregnancy become translated into the mother’s psychological experience, it leads to development of a psychological bond.¹¹ This transition into the role of mother also leads to change in self-concept.¹² There is an ongoing development of maternal-fetal bonding that tends to strengthen and mature throughout the pregnancy.¹³⁻¹⁶ In early pregnancy, the mother is not able to know specific characteristics of her child and can only imagine who her child is. She must then transition from these prenatal representations of a “fantasized child” to postnatal representations of her “actual child.”¹⁷ The mother must come to know the child in the womb both through his/her connection to the mother and as a separate being with different characteristics, physical needs and emotions.¹⁸

When assessing strategies to increase maternal-fetal bonding, it is important to be able to assess the degree to which bonding is occurring. Historically, maternal-fetal attachment has been defined as “the extent to which women engage in behaviors that represent an affiliation and interaction with their unborn child.”¹⁹ In much of the literature there is an emphasis on improving maternal-fetal attachment. There is now an increasing focus on maternal-fetal “bonding” versus “attachment.” While these constructs are similar, the term bonding emphasizes the role of the mother in assuming her role of caring for the child. Attachment has historically been focused more on the child’s reliance on the parent to meet his/her needs. Thus, the literature is shifting toward a greater use of the term “bonding” while older instruments to assess these constructs have used the term “attachment.”

Specifically, there are three widely used surveys to assess the bond between mother and unborn child. In 1981, Cranley published the Maternal-Fetal

Attachment Scale.¹⁹ This questionnaire focuses primarily on self-evaluation of maternal behaviors in five subscales: differentiation of self from fetus, interaction with fetus, attributing characteristics and intentions to the fetus, giving of self, and role taking. Future researchers chose to focus on more emotional assessments of bonding versus behavioral. Muller published the Prenatal Attachment Inventory which is a 29-item instrument that uses a Likert scale to assess the degree of affectionate relationship for the fetus with statements such as “I feel love for the baby.”²⁰ The Maternal Antenatal Attachment Scale developed by Condon is a 19-item questionnaire also focused on emotional attachment.²¹ In contrast to the scale published by Cranley, Condon’s scale is more specifically focused on attachment to the fetus as a person versus being focused on the actions assumed within the motherhood role.

These scales have been used to correlate the degree of maternal-fetal bonding with important prenatal and postnatal outcomes. There is a positive association between maternal-fetal attachment scale scores and health practices such as smoking cessation during pregnancy.²²⁻²⁴ Multiple studies have demonstrated the link between antenatal bonding and postnatal bonding.²⁵⁻²⁸ This in turn correlates with better attunement to infant states and more accurate interpretation of infant cues²⁹ and can predict better social affective developmental outcomes of the infant.³⁰ For the mother, the quality of maternal-fetal bonding independently predicts postpartum depressive and anxiety symptoms.³¹

Clinical Q&A

Q. What Factors are Associated with Improved Maternal-fetal Bonding?

The quality of maternal-fetal bonding is strongly associated with the quality of the mother’s other significant relationships. In one study, the most important determinant of maternal-fetal attachment identified was perceived social support.³² In another, the quality of the maternal-fetal relationship was best predicted by the romantic caregiving responsiveness to her partner and the woman’s own psychological health.³³

Q. What Factors Increase Risk for Poor Maternal-fetal Bonding?

The capacity of a mother to successfully bond with her preborn child can be influenced by a history of interpersonal trauma or unhealthy relationships in her own life.³⁴⁻³⁶ These traumas can lead to early maladaptive schemas and insecure attachment styles within the mother that impair the mother’s ability to bond with her child.³⁷⁻³⁹ Depression, anxiety, and poor social support are all associated with poor maternal-fetal attachment.^{32,40-43}

In addition, teenagers are at a particularly high risk for impaired bonding. Teenagers tend to develop attachments more slowly than adults do. In one cohort, the risk of persistent poor bonding remains elevated in teenagers with low first trimester attachment scores and history of pregnancy termination.⁴⁴

Q. What Interventions have been shown to Increase Maternal-fetal Bonding?

For women at risk of poor maternal-fetal bonding, there are many suggestions for strengthening this relationship. Given the variable reasons mothers may have poor bonding, there is unlikely to be a standardized approach. Instead, interventions should be tailored to the underlying risks for poor bonding.⁴⁵

Multiple studies have assessed the role of educational interventions with high success rates. Topics have included physiology of pregnancy and childbirth, awareness of the feelings and perceptions of the embryo, the concept of attachment, attachment behavior, control of anxiety and negative thoughts, patterns of proper sleep, exercise and nutrition during pregnancy, and relaxation training.⁴⁶⁻⁴⁹ These educational programs have been linked to improvement in infant mental health variables from birth all the way to the first year.^{46,50}

Simple interventions to increase awareness of fetal characteristics at prenatal visits may also impact bonding. When midwives explain the fetal position by taking the hand of each participant and touching the head or the buttocks of the fetus, it has been correlated with increased maternal awareness of fetal position and improved maternal-fetal attachment.⁵¹ A randomized controlled trial showed that women who were taught to do fetal kick counts at 28-32 weeks gestation had significantly higher maternal-fetal attachment scores after 1 month of counting.⁵² A more recent trial found conflicting results about the impact of fetal movement counting, which was likely due to baseline characteristics of the populations studied.⁵³

Ultrasound is likely to be more beneficial in the early stages of maternal-fetal bonding before a clear mental construct of the fetus as a person is developed. In the mid-trimester, a 3D ultrasound appears to be more impactful for helping to develop this construct than a 2D ultrasound and positively impacts bonding.⁵⁴ The impact of the ultrasound seems to be mediated by the clarity of the images.⁵⁵ By the time a woman reaches the third trimester, ultrasound appears to be beneficial only for select mothers, such as those with high levels of depressive symptoms at baseline.⁵⁶

Finally, interventions that improve maternal health and wellbeing can strengthen the mother's ability to bond with her fetus. A randomized controlled trial demonstrated that listening to music during pregnancy is

linked to lower psychosocial stress and increased maternal-fetal bonding.⁵⁷ Another program focused on teaching women to sing lullabies also found it was a positive experience that allowed the mothers to express complex emotions they were experiencing.⁵⁸ A composite intervention that included dancing and singing sessions resulted in higher prenatal attachment scores than controls who did not have prenatal courses.⁴⁸ Deliberate involvement in a Qi exercise group resulted in higher post-test maternal-fetal interaction scores.⁵⁹ A pilot study showed a 2-week program of prompting mindfulness behaviors via a text messaging system enhanced maternal-fetal bonding.⁶⁰

Q. What is the Impact of Prenatal Genetic Testing on Maternal-fetal Bonding?

There are concerns that there are social pressures to conform with prenatal testing which may unintentionally burden expectant mothers.⁶¹ After completing an exploratory analysis, sociologist Rothman concluded that if the decision to continue pregnancy rests on the results of prenatal testing, it creates a state of “tentative pregnancy.” That is, the state of total attachment normally demonstrated early in pregnancy is delayed. Instead of the child being seen as good by nature of his or her existence, the child must be deemed “worthy” of surviving depending on the test results. The mother delays attachment early in pregnancy and then must try to catch-up after she decides to continue pregnancy.¹

Further studies have provided evidence that the decision to have prenatal screening and/or testing delays, if not permanently impairs, maternal-fetal bonding.⁶² In a qualitative study of first trimester screening in Denmark, most patients did look forward to having an ultrasound but said they would terminate if abnormal.⁶³ Having a quad screen can delay the developmental trajectory of prenatal attachment even if low risk results are obtained.⁶⁴ In a separate observational study, mothers who were highly informed about genetic testing were again found to have delayed attachment to their fetuses but were able to catch up after results were received.⁶⁵ Expert testimony to the Senate Subcommittee on Science, Technology, and Space of the Committee on Commerce, Science, and Transportation summarized these studies and clinical experience with the concern that the anxiety and lack of joy with prenatal diagnoses attaches a stigma to the child and causes “irreparable damage. . . to the family bond.”⁶⁶ Though data are limited, it is likely that all women who wrestle with the decision of if they should continue a pregnancy are at risk for similar challenges to impaired early bonding.

Q. What is the Impact of Previous Pregnancy Loss on Maternal-fetal Bonding?

There is mixed data concerning the impact of previous pregnancy loss on maternal-fetal bonding. A longitudinal study demonstrated that a history of miscarriage decreased maternal-fetal attachment in the first trimester, but those differences resolved by the third trimester.⁶⁷ Among Iranian women, those who had a history of pregnancy loss scored lower on behaviors related to differentiation of self from fetus (items like “I can imagine myself taking care of the baby” and “I picture myself feeding the baby”) but they scored the same on interactions with the fetus, attribution of characteristics to the fetus, giving of self, and role-taking.⁶⁸ However, in another cross-sectional study, researchers were unable to identify significant Prenatal Attachment Inventory score differences between parents with and without a previous pregnancy loss.⁶⁹

Summary of Recommendations and Conclusion

The following recommendations are based on good and consistent scientific evidence (Level A):

- 1) Quality of maternal-fetal bonding is linked to postnatal attachment and indicators of infant psychological wellbeing.
- 2) Mothers with insecure attachments and interpersonal trauma are at increased risk for poor maternal-fetal bonding.
- 3) Educational interventions can improve maternal-fetal bonding in at-risk mothers.

The following recommendations are based on limited and inconsistent scientific evidence (Level B):

- 1) In at-risk women, ultrasound may have a role in improving maternal-fetal bonding.
- 2) Prenatal diagnostic testing and the resultant “tentative pregnancy” can negatively impact maternal-fetal bonding.

The following recommendations are based primarily on consensus and expert opinion (Level C):

- 1) An emphasis should be placed on maternal-fetal “bonding” versus “attachment” because this better reflects the directional relationship of the mother caring for the child and learning to meet his or her needs.

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