Understanding Pregnancy Anxiety

Concepts, Correlates, and Consequences

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Will my baby be healthy?

I am worried about giving birth.

Am I going to be a good mother?

THERE ARE MANY different reasons why women feel anxious about their pregnancies. A woman who has a medical risk condition such as hypertension or diabetes might worry about the adverse effects on her child and herself. Someone who experienced previous infertility or stillbirths may worry about the viability of the baby. A first-time mother is likely to worry about the many impending changes to occur in her life, and whether she will be able to care for her baby well, especially if she has limited financial resources or little support from her family. Many women also worry about birth defects and whether the baby will be healthy.

Pregnancy is a transition period in a woman's life course characterized by physiological, cognitive, emotional, and social changes, so it is natural that pregnant women are often concerned about the future. However, worries related to the pregnancy can contribute to high levels of pregnancy anxiety, also referred to by researchers as pregnancy-specific or pregnancy-related anxiety. This type of situation-specific anxiety has emerged as one the most potent psychological predictors of adverse birth outcomes and is also implicated in poorer infant and child development. Despite its demonstrated importance, pregnancy anxiety is a relatively undeveloped concept in maternal and child health research, and there is no consensus yet regarding how best to define and measure it. Our aim in this article is to remedy this confusion. Clearly defining and developing the concept is an essential prerequisite to translating research findings into clinical practice and policy. Before researchers studying pregnancy anxiety can advocate routine prenatal screening and propose evidence-based preconception and prenatal interventions to reduce adverse outcomes, they need to be clear about what they are measuring, what they have found, and why it is so important.

This article has four objectives: (a) To define and describe the concept of pregnancy anxiety and its multiple dimensions within the context of the existing literature, (b) to summarize evidence linking pregnancy anxiety to birth outcomes and child development, (c) to present findings that identify characteristics of women and their pregnancies that contribute to high levels of pregnancy anxiety, and (d) to highlight possible clinical implications and interventions.

Abstract

Pregnancy anxiety is a particular emotional state tied to pregnancy-specific concerns, such as worries about the health of the baby and childbirth. A growing body of research demonstrates that pregnancy anxiety is an important risk factor for preterm birth and other adverse birth and child development outcomes. This article defines and describes the concept of pregnancy anxiety, provides a summary of evidence linking pregnancy anxiety to outcomes, and identifies characteristics of women and their pregnancies that contribute to high levels of pregnancy anxiety. The authors also discuss possible clinical implications and interventions to reduce pregnancy anxiety.

History and Significance of the Concept

RESEARCH INTEREST IN the concept of pregnancy anxiety can be traced back at least as far as the 1950s. In 1956, Pleshette, Asch, and Chase conducted a study to understand common sources of anxiety during pregnancy and the postpartum period. They asked 50 pregnant women to report whether or not they had experienced 24 different "anxieties about herself and the baby" and included questions such as "Are you afraid the baby might die before it is born?" and "Do you have any illness that you think might get worse by having a baby?" The most commonly reported anxieties were fears about being torn or cut during delivery (64%), pain during labor (60%), losing the baby (50%), and fetal abnormality (50%). Two decades later, Light and Fenster (1974) developed a 62-item inventory to assess "maternal concerns during pregnancy" related to the baby, childbirth, self, family, medical care, and finances. In a subsequent study of 100 pregnant women receiving prenatal care in clinics and private practices, the most frequently reported concerns on this inventory were whether the baby would be healthy and normal (94%), the baby's condition (93%), her own appearance as an expecting mother (91%), and unexpected things that might happen during childbirth (89%; Glazer, 1980). Despite advancements in prenatal care and labor and delivery practices over the past few decades, these concerns are still prevalent today. Standley, Soule, and Copans (1979) and Lederman (1984) also developed interviews to assess "prenatal anxiety" and "psychosocial conflicts during pregnancy," respectively. Although research on pregnancy anxiety has been in existence for some time (Lederman, 1984; Levin, 1991; Reading, 1983), extensive systematic and prospective research did not immediately follow. All of this work, and particularly that of Lederman, served as a foundation for Dunkel Schetter and colleagues' study of the concept of pregnancy anxiety which began in the 1980s.

What Exactly Is Pregnancy Anxiety?

TODAY AN INCREASINGLY large body of literature examines the effects of pregnancy-related anxiety on birth and developmental outcomes, but what exactly is anxiety specific to pregnancy and how is it distinct from anxiety in general?

General Anxiety

Any definition of the term pregnancy anxiety should be informed by an understanding of general anxiety and its disorders. Anxiety is a strong, negative emotional state that is accompanied by unease, worry, and unwanted intrusive thoughts. Worry, or concern over future events, is a defining cognitive feature of anxiety (Borkovec & Inz, 1990). Worries are often accompanied by a threatening sense that one is unable to predict, control, or obtain desired results in upcoming situations (Barlow, 1988). Thus, anxiety is characterized as a future-oriented emotional state that results from perceptions of uncontrollable threat.

Researchers typically distinguish between *state* anxiety, which changes over time depending on the situation, and *trait* anxiety, which refers to a relatively unchanging personality characteristic (Spielberger, 1985). Anxiety can thus be transitory and brought on by a specific situation (i.e., a state) or it may refer to a stable condition that predisposes an individual to experience anxious states consistently and in response to many different situations (i.e., a trait). According to theories of emotion, anxiety can be thought of as resulting from an interaction between an individual and the situation or environment (Fridja, 1986). For example, a woman with high levels of trait anxiety might experience states of anxiety in response to many different situations, even those that others would not find distressing such as a routine prenatal exam. On the other hand, certain high-threat situations such as an earthquake might provoke state anxiety even among those who are not typically "anxious."

It is important to note that most people experience anxiety at some point in their lives and that some degree of anxiety is not necessarily a bad thing. Emotions, even those that are negative, are important because they motivate individuals to respond to their environments (Fridja, 1986; Keltner & Gross, 1999). For example, a pregnant woman with a moderate level of concern or worry about her baby's health might be inclined to seek medical advice more often and engage conscientiously in health-promoting behaviors such as taking vitamins and eating healthy. However, if she feels that she cannot control the outcome of her pregnancy or cannot cope with the anxiety, the emotion may become problematic rather than adaptive. For example, it may result in unhealthy high-risk behaviors such as smoking and drinking alcohol that affect both her and her child's health. When anxiety levels are persistently high and they cause significant distress and interfere with functioning, a clinical disorder may be present. Anxiety disorders such as generalized anxiety disorder, panic disorder, and specific phobias are among the most prevalent psychiatric disorders in women (Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012).

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Pregnancy is a transition period in a woman's life course characterized by physiological, cognitive, emotional, and social changes.

Pregnancy Anxiety

Pregnancy anxiety is an emotional state that is akin to state anxiety but distinct because it is specifically rooted in concerns among pregnant women in the context of their pregnancies. Building on the general definition of anxiety as a negative emotional state that results from perceptions of threat, we define *pregnancy anxiety* in our work as a negative emotional state that is tied to worries about "the health and well-being of one's baby, the impending childbirth, of hospital and health-care experiences (including one's own health and survival in pregnancy), birth and postpartum, and parenting or maternal role" (Dunkel Schetter, 2011, pp. 534–535). Pregnancy anxiety can thus be thought of as

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Pregnancy anxiety can be thought of as an interaction between a woman's general predisposition toward anxious emotional states and the conditions of her pregnancy.

an interaction between a woman's general predisposition toward anxious emotional states and the conditions of her pregnancy. Those conditions include medical risk conditions such as hypertension that might affect pregnancy outcomes, history of complications in previous pregnancies or births, and also psychosocial factors such as whether or not the pregnancy was planned, lack of prenatal care, available social support, low income, and lack of other resources. For example, women with high levels of trait anxiety may be hypervigilant during pregnancy and inclined to interpret ambiguous stimuli, such as inconclusive test results or bodily sensations like cramping, as threatening. On the other hand, certain situations such as a high-risk medical condition or an unintended pregnancy with inadequate support from the baby's father can be sufficiently threatening to induce anxiety even among women who are not typically anxious. Regardless of origin, anxiety during pregnancy has been shown to pose risk above and beyond medical conditions and traditional risk factors.

Measurement of Pregnancy Anxiety

Pregnancy anxiety has been assessed through self-report instruments used in interview and questionnaire formats that were developed specifically to capture worries and concerns unique to pregnancy. There are at least 15 different pregnancy-specific stress and anxiety measures in the literature by one count (Alderdice, Lynn, & Lobel, 2012). Among the notable measures designed to measure pregnancy-specific anxiety or worries are the Pregnancy-Related Anxiety Questionnaire (Van den Bergh, 1990) and its revised version (Huizink, Robles de Medina, Mulder, Visser, & Buitelaar, 2002). Also of note are the Cambridge Worry Scale (Green, Kafetsios, Statham, & Snowdon, 2003) and the Prenatal Distress Questionnaire (Yali & Lobel, 1999) although they do not purport to measure anxiety per se but rather general distress during pregnancy.

Over time, our group has developed two separate instruments for the assessment of pregnancy-specific anxiety or pregnancy anxiety. One of them was modeled after other emotion instruments such as the Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988) and assesses how often a woman experienced particular emotions specifically with regard to being pregnant in the past week. The list we use includes four adjectives related to anxiety—anxious, concerned, afraid, and panicky—which are embedded in about 10 to 12 other adjectives (see Figure 1). This approach is similar to many other negative emotions measures such as the State Trait Anxiety Inventory (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) , a widely used and well-validated measure of subjective feelings of general anxiety, except that the instruction set is context-specific and refers explicitly to the participant's feelings about this pregnancy. This simple and brief measure provides a reliable indication of pregnancy anxiety: Scores have been shown to predict length of gestation better than general state anxiety or perceived stress (Roesch, Dunkel Schetter, Woo, & Hobel, 2004) and have been associated with earlier delivery as well as increased risk of preterm birth (Kramer et al., 2009). In addition, this measure has been associated with mechanisms of the effect, namely higher levels of corticotropin-releasing hormone , a hormone that plays a role in the timing of delivery (Mancuso, Dunkel Schetter, Rini, Roesch, & Hobel, 2004), and higher cortisol (Kane, Glynn, Hobel, & Sandman, 2013).

The 4-item pregnancy anxiety index has strong face validity and demonstrated predictive validity, but it was not designed to assess the specific imagined or real threats about

Figure 1. Measure of Pregnancy-Specific Anxiety

In the past week, how often have you felt _____ about being pregnant...	Never	Rarely	Sometimes	Often	Always
A. Anxious (or worried)*	1	2	3	4	5
B. Confident	1	2	3	4	5
C. In conflict (had mixed feelings)	1	2	3	4	5
D. Lucky	1	2	3	4	5
E. Concerned*	1	2	3	4	5
F. Excited	1	2	3	4	5
G. Upset	1	2	3	4	5
H. Happy	1	2	3	4	5
I. Afraid*	1	2	3	4	5
J. Special	1	2	3	4	5
K. Panicky*	1	2	3	4	5
L. Pleased	1	2	3	4	5
M. Healthy	1	2	3	4	5

*These four starred items are used to compute a pregnancy anxiety score.

Source: Roesch et al., 2004.

Figure 2. Pregnancy-Related Anxiety Scale

	Not at all	Somewhat	Moderately	Very much
1. I am confident of having a normal childbirth.	1	2	3	4
2. I think my labor and delivery will go normally.	1	2	3	4
3. I am fearful regarding the health of my baby.	1	2	3	4
4. I am worried that the baby might not be normal.	1	2	3	4
5. I am afraid that I will be harmed during delivery.	1	2	3	4
	Never	**Sometimes**	**Most of the time**	**Almost all of the time**
6. I am concerned or worried about how the baby is growing and developing inside me.	1	2	3	4
7. I am concerned or worried about losing the baby.	1	2	3	4
8. I am concerned or worried about having a hard or difficult labor and delivery.	1	2	3	4
9. I am concerned (worried) about taking care of a new baby.	1	2	3	4
10. I am concerned (worried) about developing medical problems during my pregnancy.	1	2	3	4

Source: Rini et al., 1999.

which women are anxious. The second measure developed by our research group offers some insight into the concerns that are most relevant to women at various points during their pregnancies. This 10-item measure (Rini, Dunkel Schetter, Wadhwa, & Sandman, 1999) asks women to report the frequency or extent to which they worried or felt concerned about their health, their baby's health, labor and delivery, and caring for a baby (see Figure 2). It includes five items about childbirth adapted from Lederman's (1984) Prenatal Self-Evaluation Questionnaire (e.g., "I am afraid that I will be harmed during delivery"), four items about the baby (e.g., "I am worried that the baby could be abnormal") and one item about taking care of the baby ("I am worried about taking care of a new baby"). This measure has predicted timing of delivery controlling for other individual difference measures such as a mother's mastery, self-esteem, and dispositional optimism in a multiethnic sample (Rini et al., 1999). It has strong psychometric properties in both English and Spanish (Rini et al., 1999).

We have used both of these measures successfully in our research predicting birth outcomes, but each serves a slightly different purpose. A measure such as our four-item measure assesses emotional responses to pregnancy, whereas the 10-item measure assesses sources of concern and worry that might lead to distress. The selection of the best measure of pregnancy-specific anxiety depends on the research question or clinical purpose but considering demonstrated reliability and validity is always wise.

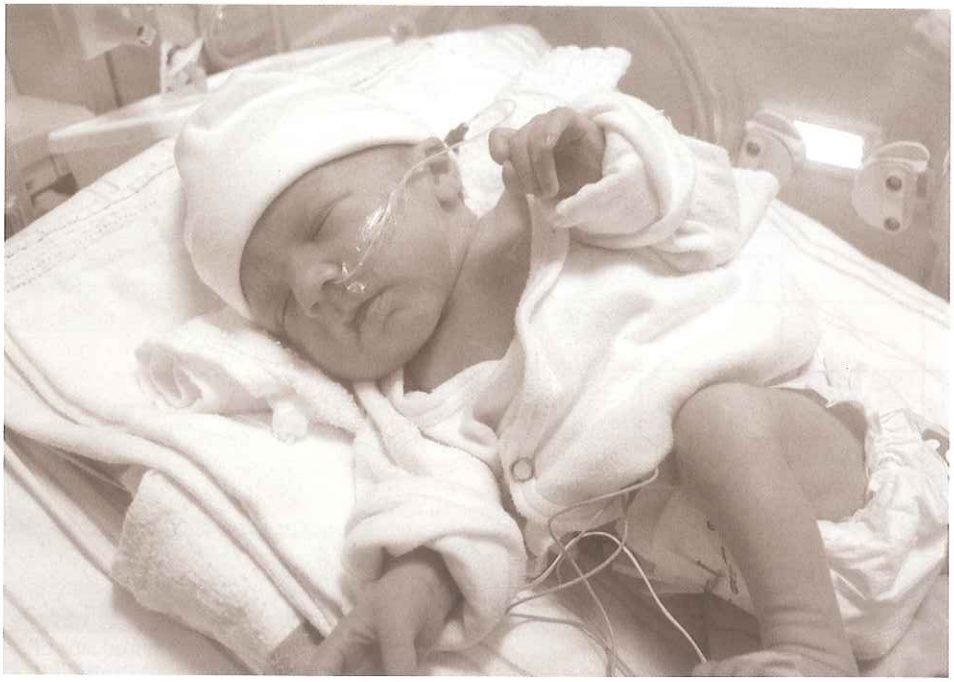
Pregnancy Anxiety and Birth Outcomes

Revived interest in pregnancy anxiety in recent years ensued from research findings linking it to preterm birth. Preterm birth occurs before 37 weeks gestation. Approximately 12% of babies born in the U.S. are born preterm, and rates of preterm birth are high in the U.S. compared to other developed nations (Hamilton, Hoyert, Martin, Strobino, & Guyer, 2013). There are also persistent and problematic racial, ethnic, and socioeconomic disparities in the rates of preterm birth in the U.S. For example, about 17% of births among African-American women in 2011 were preterm, whereas the rate for white women was 10.5% (Hamilton et al., 2013). This disparity is especially concerning because preterm birth results in greater health risks for the infant and often carries tremendous emotional and financial costs for families (Institute of Medicine, 2007). Advances in medical care have improved survival rates among preterm infants, but rates of infant mortality are still higher among babies born before 37 weeks than those born at term. Infants who survive have a greater risk of developmental disorders and health problems throughout the lifespan.

Risk factors for preterm birth include medical history and current pregnancy conditions such as chronic hypertension, asthma, low pre-pregnancy weight, preeclampsia, gestational diabetes, and infections, but a large number of preterm births are not predicted or explained by known obstetric risk factors (Institute of Medicine, 2007). By some estimates, more than a third of adverse birth outcomes are not predicted by prenatal assessments of obstetric risk (Shiono & Klebanoff, 1993). As a result, researchers have looked to other circumstances in women's lives that may contribute to shortened gestation such as high levels of stress and lack of social support.

Currently, a body of systematic research provides convincing evidence that maternal stress and anxiety contribute to at least some cases of preterm birth (for reviews, see Dunkel Schetter, 2011; Dunkel Schetter & Glynn, 2011; Hobel, 2004). However, there are many different kinds of stress that can affect pregnant women, and certain types of prenatal maternal stress may be more potent predictors of particular adverse birth outcomes than others. Stressors that affect pregnant women can be broadly categorized as general forms of stress and general pregnancy stress. General stress includes conditions and experiences that can affect individuals at any point during the lifespan such as life events and their impact, daily hassles or stressors, chronic stress, catastrophic events and their effects, and perceived stress (Dunkel Schetter & Glynn, 2011). Researchers may assign the label of prenatal maternal stress or pregnancy stress when women experience these general stressors during pregnancy. On the other hand, maternal stress may refer to distress tied to pregnancy-specific conditions such medical risk, an unwanted or mistimed pregnancy, physical symptoms, or worries about the baby and parenting responsibilities (Yali & Lobel, 1999). Here we focus on a specific emotional response to pregnancy–anxiety–and not on other forms of distress such as depression, anger, hostility, or general distress.

We have chosen to focus this review on pregnancy-related anxiety rather than other forms of maternal stress because anxiety regarding a particular pregnancy has emerged as a stronger predictor of birth and developmental outcomes than other general forms of stress or anxiety experienced during pregnancy. In fact, there is considerable



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Preterm birth occurs before 37 weeks gestation.

prospective evidence in several studies of diverse populations regarding the adverse effects of pregnancy anxiety on preterm birth (reviewed in Dunkel Schetter, 2011; Dunkel Schetter & Glynn, 2010). For example, one large epidemiological study conducted by Kramer and colleagues (2009) followed 4,885 women in Montreal, Canada, beginning in the second trimester of their pregnancies. Interviews during the second trimester assessed many types of acute and chronic stressors such as relationship strain, domestic violence, job-related stress, life events, and several others. These researchers also included a four-item measure of pregnancy-related anxiety in which women rated how often they felt anxious, concerned, afraid, and panicky about being pregnant on a 5-point scale (Mancuso et al., 2004). Among the many psychosocial measures examined in this rigorous study, pregnancy anxiety was the only significant predictor of preterm birth after adjustment for medical and obstetric risk, perception of pregnancy risk, and depression. In sum, this large study and others described below indicated that when women are highly anxious about their pregnancies, they are likely to deliver their babies earlier.

Our research group has conducted several studies aimed at understanding the role of psychosocial factors in adverse birth outcomes such as preterm birth. Each of the studies in this program of research assessed a variety of stress measures and carefully coded medical risk factors from medical charts. The three studies that examined pregnancy anxiety found that women with higher levels of this type of context-specific anxiety had shorter gestations or increased risk of delivering before 37 weeks gestation even when known risk factors for preterm birth were taken into account (Rini et al. 1999, Roesch et al. 2004; Wadhwa et al. 1993). For example, in a sample of 418 African-American, Latina, and Non-Hispanic White women pregnancy anxiety experienced over the course of pregnancy predicted gestational age (Roesch et al., 2004), and the relationship between pregnancy anxiety and length of gestation persisted after controlling for known risk factors such as history of diabetes, smoking, maternal age, and parity, suggesting that the effects of pregnancy anxiety are not explained by realistic worries over high-risk pregnancies. In another of our studies, pregnancy anxiety was assessed with a 10-item scale that assessed worries about the baby's growth, loss of the baby, and harm during delivery, and a few reverse-coded items concerning confidence in having a normal childbirth (Rini et al., 1999). These items in combination with general state anxiety predicted length of gestation even after controlling for medical risk factors, ethnicity, education, income, and personal resources (mastery, self-esteem, and optimism).

Other research groups report similar findings. A study of nearly 2,000 White and African American pregnant women in North Carolina found that pregnancy-related anxiety in mid-pregnancy predicted spontaneous preterm birth after controlling for a wide range of other risk factors (Dole et al. 2003). Another large epidemiological study of a predominantly African-American sample in Baltimore found that high pregnancy anxiety increased risk of delivery before 37 weeks gestation (Orr, Reiter, Blazer, & James, 2007). Taken together with our early studies and that by Kramer and colleagues (2009), this body of evidence strongly suggests that high levels of pregnancy anxiety play a role in predicting preterm birth. We are engaged now in intervention work to reduce anxiety in pregnancy, which may add to this evidence base in the future.

Why might pregnancy anxiety differ from other forms of maternal stress in its power to predict preterm birth? One possibility is that pregnancy anxiety is more tightly linked to physiological stress response processes than other forms of maternal stress. Pregnancy anxiety is unique in that it is directly linked to a woman's emotional and physical experiences of a specific pregnancy. Research shows that pregnancy anxiety is associated with increases in biomarkers of stress, such as corticotropin-releasing hormone and cortisol, and to developmental outcomes for the fetus and infant mediated by effects on maternal and fetal physiology. The reason for these notable physiological changes may be rooted in the nature of anxiety, which is often manifested in the body as well as in the mind. Individuals who are anxious experience cognitive and emotional symptoms such as worry and emotional distress, but they also frequently experience somatic symptoms such as muscle tension, increased heart rate, difficulty sleeping, and gastrointenstinal discomfort. These bodily sensations reflect alterations in the functioning of the sympathetic nervous system, the neuroendocrine system, and the cardiovascular system—systems that also play an important role in fetal development and the timing of delivery. Stressors such as financial strain or close relationship difficulties that may occur during pregnancy can also activate physiological stress responses, although there is wide individual variability in this regard as a function of a woman's coping and available social and personal resources. Thus, pregnancy anxiety appears to tap into the cognitive, affective, and behavioral experiences that strongly influence maternal physiology.

Pregnancy Anxiety and Developmental Outcomes

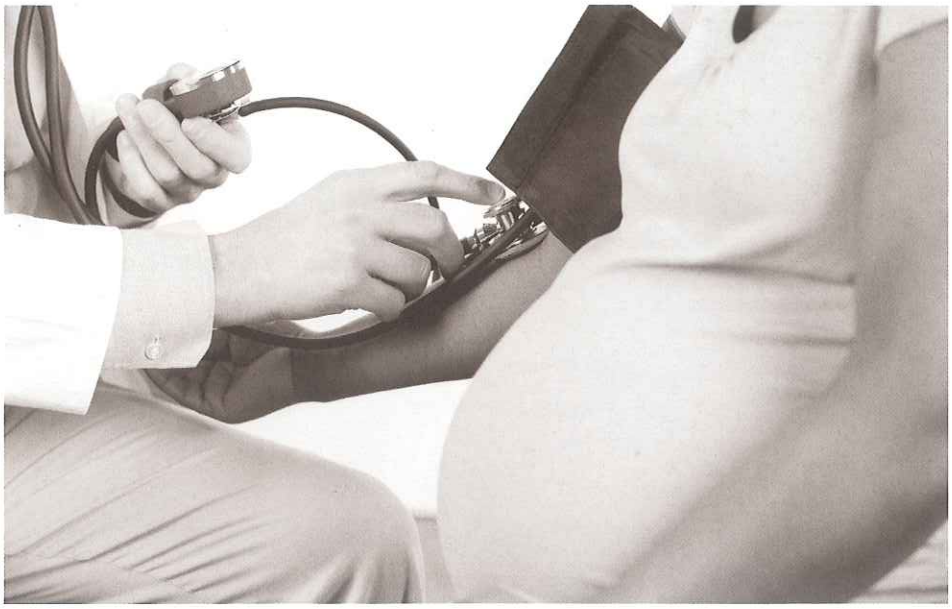
EVEN IF A woman does not deliver her baby before the due date, pregnancy anxiety seems to have lasting effects on the behavioral and psychological development of her offspring. A growing body of research suggests that higher levels of pregnancy anxiety predict a wide range of less optimal infant and child outcomes independent of whether the child was preterm or low birth weight, even after accounting for levels of postnatal maternal

stress or anxiety. Offspring of mothers with higher pregnancy anxiety exhibit worse cognitive and motor performance in infancy, (Davis & Sandman, 2010; Huizink, Robles de Medina, Mulder, Visser, & Buitelaar, 2003) and poorer attention regulation compared to infants of mothers who had lower levels of pregnancy anxiety (Huizink et al., 2002). Furthermore, the effects of maternal pregnancy anxiety for a child's development extend beyond infancy. In one cohort of mothers recruited during pregnancy, maternal pregnancy anxiety scores during gestation predicted more negative temperament in their 2-year-old children (Blair, Glynn, Sandman, & Davis, 2011), poorer executive function, and decreased gray matter density in brain regions associated with cognitive function at 6 to 9 years old (Buss, Davis, Hobel, & Sandman, 2011; Buss, Davis, Muftuler, Head, & Sandman, 2010), and greater anxiety at 6 to 9 years old (Davis & Sandman, 2012). Taken together, these studies show that exposure to maternal pregnancy anxiety during gestation can have a lasting and significant impact on children's emotional and cognitive development up to pre-adolescence.

These results are consistent with the broad theory of fetal programming (Barker, 1998). This theory posits that the prenatal environment, including a mother's physical and social context, her behavior, and her emotions, can permanently affect the development of the fetus and predispose offspring to physical and mental health adversities throughout the life span. Evidence in animal and human models, including the studies described above that specifically focus on programming by pregnancy anxiety, supports this theory. However, the mechanisms underlying fetal programming by pregnancy anxiety and other maternal psychological characteristics remain unclear.

Predictors and Correlates of Pregnancy Anxiety

What do researchers know about who is most likely to experience pregnancy anxiety? In one early study of 100 pregnant women receiving prenatal care in clinics and private practices, greater reported pregnancy-related concerns were associated with younger maternal age, less education, lower income, shorter duration of marriage or relationship, and among clinic patients as compared to private practice patients (Glazer, 1980). In our work, we have been examining the specific psychological and social factors that contribute to pregnancy anxiety (Dunkel Schetter, 2013; Gurung, Dunkel-Schetter, Collins, Rini, & Hobel, 2005; Robbins & Dunkel Schetter, 2011).



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Clinically significant anxiety disorders and other psychiatric conditions during pregnancy and postpartum should be taken very seriously and treated using the highest standard of care.

Demographic Characteristics

Socioeconomic status. Consistent evidence points to higher levels of pregnancy anxiety among women with lower income (Gurung et al., 2005; Rini et al., 1999). However, associations with education are less clear with some studies showing that more education was associated with lower pregnancy anxiety (Arch, 2013; Da Costa, Larouche, Dritsa, & Brender, 1999; Standley et al., 1979), higher pregnancy anxiety (Dunkel Schetter, 2013; Robbins & Dunkel Schetter, 2011) or no association (Levin, 1991).

Race/ethnicity. A few studies have reported that levels of pregnancy anxiety are higher among racial/ethnic minority women than among White women (Arch, 2013; Mancuso et al., 2004) although one study found no difference between African-American women and White women on a composite measure of pregnancy anxiety averaged over three time points during pregnancy (Parker Dominguez, Dunkel-Schetter, Glynn, Hobel, & Sandman, 2008). Other studies have found no significant differences between racial/ethnic groups after adjustment for income, marital status, medical risk, and other important factors (Gurung et al., 2005; Rini et al., 1999). In our most recent work on demographic correlates of pregnancy anxiety, we found higher rates of pregnancy anxiety among African-American and Latina women as compared to White women (Dunkel Schetter, 2013; Robbins & Dunkel Schetter, 2011).

Age. Studies provide conflicting evidence regarding the relationship of maternal age to anxiety. Most studies show that younger age is associated with higher levels of anxiety (Arch, 2013; Burstein, Kinch, & Stern, 1974; Da Costa et al., 1999; Glazer, 1980; Levin, 1991; Rini et al., 1999; Standley et al., 1979) whereas others find no relationship between maternal age and pregnancy anxiety (Saisto, Salmela-Aro, Nurmi, & Halmesmäki, 2001) or mixed findings depending on the timing of assessment (Gurung et al., 2005). Most likely this is a curvilinear effect with women who are of youngest and oldest maternal age having higher anxiety. Teen pregnancies are likely to invoke more anxiety as are pregnancies among women more than 35 years old. However, to our knowledge, no studies of teen pregnancy have measured pregnancy anxiety nor has attention been devoted to advanced maternal age.

Psychosocial Correlates

General anxiety. Several studies have tested for associations between pregnancy-specific anxiety and general trait or state anxiety. These studies have consistently shown that women who are anxious in general tend to score higher on measures of pregnancy anxiety. Of note, the correlations between the two constructs are typically moderate, suggesting that there is overlap but that there is also something unique about pregnancy anxiety (Green et al., 2003; Gurung et al., 2005; Huizink, Mulder, Robles de Medina, Visser, & Buitelaar, 2004; Rini et al., 1999).

Personal resources. Personal resources include generalized beliefs about oneself (self-esteem), one's future (dispositional optimism), and one's perceived ability to control important outcomes (mastery or

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Childbirth classes may help to alleviate anxiety about the hospital setting, obstetric practices, and interactions with medical staff.

perceived control). Levels of pregnancy anxiety tend to be higher among women with lower personal resources (Gurung et al., 2005; Lobel, DeVincent, Kaminer, & Meyer, 2000; Rini et al., 1999). That is, women inclined to be anxious about a pregnancy also tend to be women who have lower self-esteem, lower mastery, and lower optimism.

Relationships and social support. Married women and women who report higher levels of social support during their pregnancies tend to have lower levels of pregnancy anxiety. While being married has been associated with lower pregnancy anxiety (Da Costa et al., 1999; Gurung et al., 2005; Rini et al., 1999), the supportiveness and quality of a woman's relationship with her partner is important as well. In one study, poorer marital satisfaction was associated with higher pregnancy anxiety (Da Costa et al., 1999). Two additional studies showed that women who reported greater social support from the baby's father also had lower levels of pregnancy anxiety (Gurung et al., 2005; Saisto et al., 2001).

Attitudes toward pregnancy. Women who reported early in the second trimester that they had wanted to become pregnant and that the pregnancy was intended had lower levels of pregnancy anxiety both early in pregnancy and late in pregnancy (Gurung et al., 2005). However, other studies show no effect of whether or not the pregnancy was planned (Da Costa et al., 1999).

Medical and Pregnancy Characteristics

Medical risk. Pregnancy anxiety is naturally likely to be higher among women who have medical risk conditions, in particular, poor past pregnancy outcomes, current pregnancy complications, and risky behaviors such as smoking. Women at high risk because of complications in the current or past pregnancies or because of general health problems may experience anxiety in pregnancy as a result of these risk conditions. For example, one study found that women with gestational diabetes reported greater worry about health during pregnancy compared to healthy controls (Sjögren, Robeus, & Hansson, 1994). However, there is little work exploring how a woman's awareness of her own medical risk and potential complications with fetus and childbirth contributes to pregnancy anxiety, or whether some women are worried despite an absence of risk factors.

Parity. Women who have given birth before are typically lower in pregnancy-related anxiety (Burstein et al., 1974; Gurung et al., 2005; Saisto et al., 2001). The experience of a previous pregnancy means they have already been through pregnancy and childbirth at least once and know what to expect. One study of 1,400 women in Finland showed that women who have never given birth before are more likely to be afraid of childbirth, which may contribute to the higher levels of pregnancy anxiety among these women (Rouhe, Salmela-Aro, Halmesmäki, & Saisto, 2009). However, the same study reported women who have given birth before may also have high levels of fear if their previous delivery experiences were negative.

How Does Pregnancy Anxiety Change Over Pregnancy?

Research evidence suggests that the stress response varies over the course of pregnancy, such that events that occur early in pregnancy are appraised as more stressful than those experienced later in pregnancy (Glynn, Dunkel Schetter, Wadhwa, & Sandman, 2004). Variations in levels of anxiety do not follow exactly the same pattern, but rather seem to be characterized by high levels early and late in pregnancy, with a dip at mid-pregnancy. In terms of general anxiety symptoms, levels tend to be the highest during the first and third trimesters (Field et al., 2010; Teixiera, Figueiredo, Conde, Pacheco & Costa, 2009). Similarly, one study found that women had significantly higher pregnancy-specific stress in the first and third trimesters than in the second trimester (Da Costa et al., 1999). In our work, we have found evidence of a similar trajectory: pregnancy anxiety tends to be highest in the first trimester, drops during the second trimester, and then heightens again during the final trimester.

Variation in pregnancy anxiety across pregnancy likely depends on the facet of pregnancy anxiety being assessed, as the nature of a pregnant woman's worries is likely to shift over the course of pregnancy. For example, in one study of 1,072 pregnant women in England, miscarriage was the most frequently reported major worry at 16 weeks gestation (Statham, Green, & Kafetsios, 2008). As pregnancy proceeds and the viability of the fetus is established, fears of miscarriage are allayed but new worries may arise such as worries about going into labor too early (Green et al., 2003). Worries about childbirth may be present throughout pregnancy, but some of these worries are likely to become most salient as the baby's due date approaches. For example, one study found that fear of childbirth was higher in the second half of pregnancy than earlier in pregnancy (Rouhe et al., 2009), and we see the same effect in our work. By developing a better understanding of what makes women anxious at various points throughout their pregnancy, providers may eventually be better able to target their efforts to allay concerns.

Implications and Interventions

Research evidence to guide treatment of pregnancy anxiety is extremely limited, and we are unaware of any intervention approaches that effectively lowered pregnancy anxiety in randomized controlled trials. Therefore, we offer the following suggestions for potential future directions and interventions based on our insights after studying the construct carefully for many years. These recommendations are offered as a supplement to mental health assessment and screening procedures that are already integrated into prenatal and postpartum care practices and intended to address the specific issue of anxiety related to pregnancy. Clinically significant anxiety disorders and other psychiatric conditions

during pregnancy and postpartum should be taken very seriously and treated using the highest standard of care. However, the following recommendations may be useful in helping women who are moderately distressed as a result of pregnancy-specific worries and concerns.

Screen for pregnancy anxiety. A first step in alleviating pregnancy anxiety is to identify women with elevated levels. The questionnaires developed by our team are short and designed for easy use in diverse populations. Having women complete a simple screener once per trimester during prenatal appointments could help clinicians to target those who are most in need of care.

Screening women for pregnancy anxiety in prenatal care settings may be especially advantageous because responses to a screening questionnaire can serve as a starting point for conversations between pregnant women and their health care providers. For example, a woman who is very worried about labor and delivery might benefit from reassurance by her physician that she is in good hands. She could also be encouraged to attend childbirth classes and to take a tour of the hospital where she is planning to give birth so that she gains a better sense of control over upcoming events. A woman with high blood pressure who reports concerns about her baby's health could be provided with recommendations about lifestyle changes to reduce risk. Such an approach could help women to gain a sense of control over outcomes while also capitalizing on the opportunity to teach women how positive health behaviors can serve as a means of reducing distress.

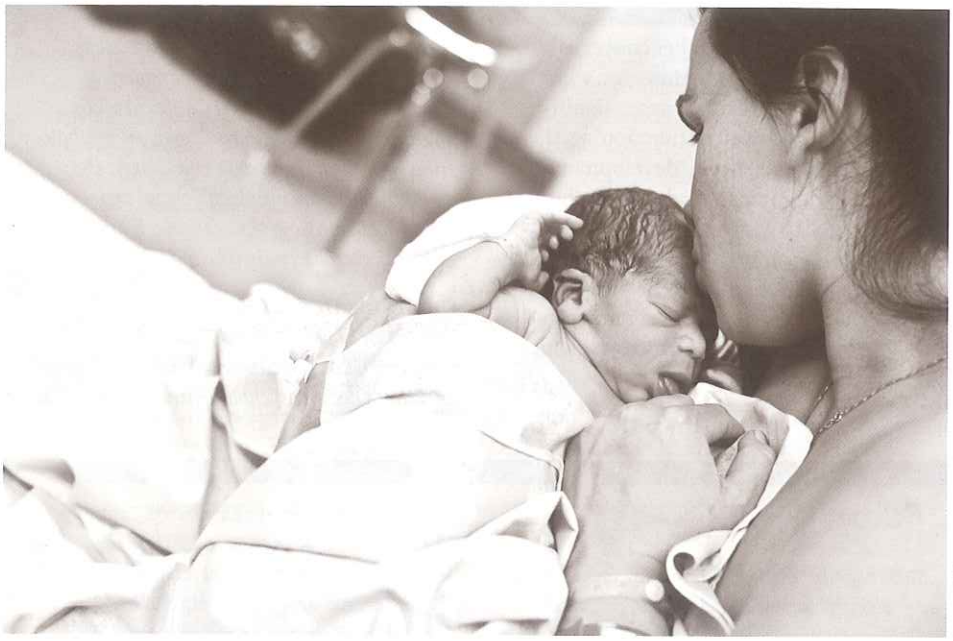
Emphasize childbirth education. Concerns about childbirth are among the most frequently reported worries during pregnancy, but women who are prepared for childbirth are less likely to be anxious about it (Standley et al., 1979). Childbirth classes offer an opportunity to educate women about the many unknown factors that fuel these fears, and may help to alleviate anxiety about the hospital setting, obstetric practices, and interactions with medical staff.

Provide support before and after diagnostic tests. Worries about the health of the baby are another frequently reported concern among pregnant women. The many blood tests, ultrasounds, and diagnostic procedures that are a routine part of prenatal care may arouse fears about what could be wrong with the baby, especially for women who are generally anxious. Researchers and clinicians should work toward an understanding of how best to engage in conversations with patients when scheduling, conducting, and reporting results of these tests.

Balance risk and resilience. With the advent of Internet message boards, pregnancy blogs, and other online sources of information, there is a limitless supply of cautionary tales and threatening stories surrounding pregnancy and childbirth. Pregnant women are also bombarded with a variety of *dos* and *don'ts* in the popular media, in pregnancy books and magazines, and even from well-meaning friends and relatives. For a woman with an anxious predisposition, this information may be overwhelming because of its emphasis on all of the things that could go wrong. Of course, it is important to educate women about behavioral risks for preterm birth and other adverse outcomes, and to encourage healthy practices during pregnancy. On the other hand, it is also important to acknowledge that the vast majority of the more than 4 million babies born in the U.S. each year arrive healthy and full-term. A woman who is moderately anxious about her pregnancy may find this thought comforting. Unless she has a serious medical condition or is engaging in risky behaviors, it is very likely that her baby is developing just as it should be. Her experience of childbirth will probably be painful, but it is also highly probable that it will be safe and that she will receive good care.

This resilience-based approach to pregnancy outcomes sharply contrasts with current clinical and research priorities, which are often narrowly focused on understanding and preventing adverse outcomes. Because of the position of authority occupied by researchers and clinicians, it is especially important that they are careful to present research findings and communicate information in a way that provides women with a sense of control over outcomes and fosters their ability to care for themselves and their families rather than generating additional anxiety.

As a final note, we do not wish to suggest that all women who worry about their pregnancies are destined for adverse outcomes. Our intention is not to compound the negative effects of pregnancy anxiety by making women worry about being worried, or anxious about the fact that they are



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The vast majority of the more than 4 million babies born in the U.S. each year arrive healthy and full-term.

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anxious. Some worry about the health of the baby, childbirth, and other concerns is normal during pregnancy. However, when anxiety reaches a level that causes significant distress and impaired functioning, the consequences for birth and developmental outcomes are significant and women should be encouraged to address these concerns by seeking treatment. In the future, we hope that researchers will recognize the significance of the construct, and conduct rigorous studies to identify how to best reduce pregnancy anxiety.

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