

PSYCHOSOCIAL PREDICTORS OF PRENATAL ANXIETY

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A growing body of research indicates that maternal stress in general, and anxiety in particular, during pregnancy are significant risk factors for adverse birth outcomes. Researchers know very little empirically about the specific psychological and social factors that contribute to perceptions of stress and anxiety for women during pregnancy. To address this critical gap in the literature, this study investigates a variety of factors that may contribute to prenatal anxiety, including mastery, attitudes toward the pregnancy, social support, life events, and demographic factors. Structured interviews were conducted at three intervals in pregnancy (18–20 weeks, 28–30 weeks, and 35–36 weeks) in a sample of 453 European American, African American, and Latina pregnant women. Results from cross-sectional analyses indicated that prenatal anxiety was higher among women who were low in mastery,

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who had less positive attitudes toward their pregnancy, and who experienced a larger number of life events during pregnancy. In addition, longitudinal analyses revealed that women who had less favorable attitudes toward their pregnancies, and who were lower in mastery, reported increases in prenatal anxiety from early to late pregnancy. Separate analyses for each ethnic group showed that predictors of prenatal anxiety varied by ethnicity. Whereas only income level predicted European American women's anxiety levels, attitudes toward the pregnancy and life events predicted prenatal anxiety for African American women; and mastery, baby's father support, and life events predicted anxiety for Latinas. These findings enable us to further examine the complex emotional processes and their concomitants and evolution in pregnancy, and to consider prenatal interventions for women to reduce risk for adverse emotional and medical outcomes.

Stress in general, and anxiety in particular, are risk factors for adverse birth outcomes for mother and infant (Dunkel-Schetter, 1998; Dunkel-Schetter, Gurung, Lobel, & Wadhwa, 2001; Hedegaard, Henriksen, Secher, Hatch, & Sabroe, 1996; Istvan, 1986; Kramer, 1987; Lobel, 1994; McAnarney & Stevens-Simon, 1990; Nordentoft et al., 1996). As a result, it is critical to understand the factors that contribute to prenatal stress and anxiety in order to unravel the various aspects of the emotional states of pregnancy and their risks. Thus, the primary goal of this study was to examine the extent to which personal, interpersonal, and contextual factors may enhance or reduce perceptions of prenatal anxiety. Drawing from a cognitive appraisal model of the stress process (Lazarus & Folkman, 1984), we assessed how factors influencing appraisals of stress, namely attitudes toward the pregnancy (i.e., the degree of wantedness), personal mastery, and social support, predict both concurrent and prospective anxiety.

STRESS, ANXIETY, AND PREGNANCY

Conceptualizations of stress have varied in the literature, and past assessments included in pregnancy include stress exposure (stressors), emotional responses, and appraisals of stress (Lobel & Dunkel-Schetter, 1990). Life events and state anxiety are the constructs most often assessed in pregnancy research (see Lobel, 1994; Woo, 1997, for reviews). For example, Nordentoft et al. (1996) studied 2,432 Danish women at 20 weeks gestation using an extensive life events inventory. They found that severity of life events was associated with preterm delivery after controlling for education, age, and cohabitation. Similarly, in a multi-center study of 2,593 women in the United States (Copper et al., 1996), anxiety was significantly associated with preterm delivery after controlling for race, age, marital status, insurance, education, and sub-

stance abuse. Further research in our lab on prenatal stress has pointed to prenatal anxiety as a significant risk factor for adverse outcomes such as preterm delivery (Dunkel Schetter, 1998; Rini, Dunkel-Schetter, Wadhwa, & Sandman, 1999; Roesch, Dunkel-Schetter, Woo, & Hobel, 2004).

STRESS AND APPRAISAL

According to Lazarus and Folkman's (1984) stress framework, cognitive appraisals and coping are two critical mediators of responses to stressful events. A person's subjective perception of stress will depend on the objective features of the situation (e.g., exposure to major life events) as well as the way one appraises those events. A person experiences distress when primary appraisals of threat exceed secondary appraisals of coping ability (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986). One's primary appraisals can be influenced by personality factors such as mastery or optimism, and by one's attitude toward the event. One's secondary appraisal will depend in large part on the personal resources a person brings to the situation, such as social support (Major, Richards, Cooper, Cozzarelli, & Zubek, 1998).

Depending on the circumstances, women may perceive pregnancy in positive as well as negative terms. Thus, the degree to which pregnancy is perceived as stressful may vary widely among women—pregnancy and impending motherhood are life events that are particularly susceptible to the process of appraisal (Park, Moore, Turner, & Adler, 1997). It is a period of life transition that millions of women experience every year involving varying amounts of physiological and psychological demand. Importantly, a pregnant mother's responses to this period in her life may have direct and significant effects on both her own outcomes and those of her fetus and its development (Dunkel-Schetter, 1998; Paarlberg, Vingerhoets, Passchier, Dekker, & Van Geijn, 1995; Wadhwa, Sandman, Porto, Dunkel-Schetter, & Garite, 1993). Although pregnancy can be a wonderful experience for many women, a variety of biomedical (e.g., medical high risk conditions), psychological (e.g., an unwanted pregnancy), and social factors (e.g., lack of support from the baby's father or family) may also make it a time of stress (Nuckolls, Cassel, & Kaplan, 1972). Sociodemographic factors such as age, education, income, and ethnicity also play a major role in the experience of stress, as is increasingly clear in recent research (Taylor, Repetti, & Seeman, 1997).

We selected prenatal anxiety as our main focus because it has implications for the etiology of preterm delivery (Lobel, 1994; Roesch et al., in press; Wadhwa et al., 1993). For example, Roesch et al. found that pregnancy-specific anxiety over the course of pregnancy was associated

with shorter gestation after controlling for a number of risk factors, including history of diabetes, smoking, maternal age, and parity. Similarly, Wadhwa et al. found that fear of labor and fear of pregnancy outcome predicted shorter gestation, and Rini et al. (1999) replicated these findings in a larger sample with stronger measures and more control variables. Preterm delivery is a health problem of epidemic proportions in the United States, especially among African American women. The consequences of preterm delivery are costly to mother, infant, and the health care system both immediately and over the early years of infant development.

Drawing on a transactional and process model of stress (Lazarus & Folkman, 1984), we selected variables that would be posited to influence primary (i.e., attitudes toward pregnancy and mastery) and secondary (i.e., social support) appraisals of pregnancy. Women with positive attitudes toward pregnancy, and those higher in mastery and with more social support, should be lower in prenatal anxiety during pregnancy. We examined the influence of these three factors and demographic variables on levels of and changes in prenatal anxiety in a sample of women in Los Angeles from three major ethnic groups (African American, Latin American, and European American) over the course of pregnancy.

Attitudes Toward Pregnancy. An attitude toward an event can be broken down into two main components: one's affective expectations and feelings regarding the event, and the degree to which one wants the event to occur. Affect can influence both what people think (Bower, 1995; see Forgas, 1995, for a review) and how people think (Sedikides, 1995). Often the two (affect and desire for something to occur) are experienced simultaneously, each interacting with and facilitating the other. To distinguish the focus of our study from affect, moods, and feelings, we concentrated on the degree to which respondents wanted the pregnancy, reasoning that this, in itself, would be a critical precursor to moods and appraisals of stress. Not wanting the pregnancy could cause negative feelings which could spill over and prevent mothers from seeking support or from fully recognizing or accepting support that is provided. Not wanting the pregnancy may also lead to negative expectancies that could accentuate the stressfulness of the experience and thereby increase any adverse physiological consequences of such stress.

Although little research has explicitly used this conceptualization of attitudes, research on factors such as optimism and control suggests that attitudes toward an event (as specified herein) will influence the stress associated with it (Seegerstrom, Taylor, Kemeny, & Fahey, 1998; Smith & Wallston, 1992; Stanton & Snider, 1993). Optimists cope better with stress, experience less negative mood's and may have better health behaviors (Carver, Scheier, & Weintraub, 1989). It follows that individual's

who are looking forward to an event; who feel they can predict, modify, or terminate an event; or who have some choice or control in its occurrence will appraise the event as being less stressful when it occurs (Cohen & Edwards, 1989; Taylor, Helgeson, Reed, & Skokan, 1991; Thompson & Spacapan, 1991; Vinokur & Caplan, 1986).

Mastery. Mastery is another variable that could influence the appraisal of stress. Mastery is a relatively stable tendency of an individual, and is defined as "the extent to which one regards one's life-chances as being under one's own control in contrast to being fatalistically ruled" (Pearlin & Schooler, 1978, p. 5). Conceptually similar to perceived control, locus of control, and self-efficacy, it has been used in many studies of stress and appraisal (Cox & Ferguson, 1991; Frone, Russell, & Cooper, 1995; Herman-Stahl & Petersen, 1996; Pearlin & Skaff, 1995; Skaff, Pearlin, & Mullan, 1996; Wallston, 1992). For example, Aldwin, Sutton, and Lachman (1996) demonstrated a strong relationship among mastery, coping, depression, and stress in three studies using large community samples. In the realm of parent-child interactions, feelings of mastery among parents may improve not only their coping with stressful events, but may also have indirect beneficial effects on their children, teaching them to develop a sense of control by striving to confront stressful events actively (Rogers, Parcel, & Menagham, 1991). Given the evidence for the beneficial effects of mastery, perceived control, and related concepts (e.g., Major et al., 1998), it is an important personal attribute that is useful in fully understanding the experience of stress in pregnancy and in birth outcomes (Rini et al., 1999). For example, Rini et al. showed that women high in mastery had higher birth weight babies.

Social Support. Social support and close relationship processes play a major role in both the psychological well-being of pregnant mothers as well as in determining the course of labor and birth outcomes (for reviews see Dunkel-Schetter, et al. 2001; Paarlberg et al., 1995; Sarason, Sarason, & Gurung, 2001). There are many different approaches to studying social support. We have conceptualized and measured several constructs and sought the best ways to combine these (e.g., Collins, Dunkel-Schetter, Lobel, & Scrimshaw, 1993). For example, Gurung, Dunkel-Schetter, Collins, and Hobel (1998) used structural equation modeling and compared three main types of support (perceived, received, and network), two primary sources of support (friends and family and baby's father), and three major functions of support (tangible, informational, and advice). The best fitting model (Chou & Bentler, 1995) separated social support by source. Correspondingly, we focused on one source here and assessed support received from the baby's father. A number of different studies indicate his role as a major source of support during pregnancy (Casper & Hogan, 1990; Collins et al., 1993; Lantican

& Corona, 1992; Giblin, Poland, & Ager, 1990; Zayas & Busch-Rossnagel, 1992), and this support has been shown to significantly predict pregnancy-related outcomes including prenatal care utilization and emotional distress (e.g., Kalil, Gruber, Conley, & Syntiac 1993; O'Hara, 1996). In contrast to the baby's father, support from the family does not seem to be as significant a predictor of pregnancy outcomes in general. In addition, support from the baby's father has been found to be especially important among certain ethnic groups (e.g. Sagrestano, Feldman, Killingsworth-Rini, Woo, & Dunkel-Schetter, 1999; Zambrana, Scrimshaw, Collins, & Dunkel-Schetter, 1997). Given the tangible, emotional, and informational support that the baby's father can provide, we expected this variable to influence the mother's appraisal of her pregnancy and attenuate anxiety.

SOCIODEMOGRAPHICS AND STRESS

It has become clear that many psychological predictors of stress are nested within geographic, developmental, occupational, and social environments (Taylor et al., 1997). Not all individuals in the same environment facing similar stressors are affected in the same way. Factors like social class, race, age, and marital status are well-established predictors of all-cause mortality and of a variety of specific diseases, and are also reliably associated with differences in exposure to stress, the practice of health behaviors, and coping strategies (Taylor et al., 1997). These factors could also influence the appraisal of stress and are essential components in our analysis.

THE PRESENT STUDY

The goal of this study is to examine the theoretical correlates of one of the most important components of prenatal stress. Specifically, we examine the associations between prenatal anxiety and specific personal, interpersonal, and demographic factors hypothesized to increase or decrease levels of anxiety during this important developmental time. Specifically, we hypothesized that positive attitudes toward the pregnancy, higher mastery, and greater social support would be associated with lower levels of anxiety (measured concurrently) and with decreases in anxiety during the course of the pregnancy (measured prospectively). The design of this study is innovative in many ways. Despite the abundance of research conducted on the stress experience and utilizing some of the variables that we study, much of the past evidence is based on cross-sectional data. Prospective studies with community samples such as this one are relatively rare. This study also introduces a novel approach to

the study of attitudes toward pregnancy; that is, it is one of the first to conceptualize and measure such attitudes in any detail.

METHOD

The current study is part of a larger investigation of psychosocial factors and birth outcomes conducted in the Los Angeles area (the Behavior in Pregnancy Study or BIPS). The BIPS consisted of a large sample of pregnant women recruited from public clinics in a major metropolitan hospital, from a large health maintenance organization, and from private physician offices in the same geographical area. All patients delivered at one hospital with few exceptions. The larger study involved three prenatal interviews and one postpartum interview, together with assessments of medical records for maternal and infant outcomes and collection of many laboratory measures. This report is concerned only with the findings related to the psychological perception of stress and anxiety in the months before the delivery of the infant.

PARTICIPANTS

To be eligible for this study, women had to be at least 18 years of age, able to speak either English or Spanish, and at 20 weeks or less gestation. The current sample was composed of 453 African American, Latina, and White women enrolled in the project who satisfied the prerequisites and completed all three prepartum interviews. Patients who delivered a stillborn baby, had a multiple gestation birth, or did not have spontaneous labor were excluded from the study. The study sample was comprised of 193 African Americans (43%), 160 Latinas (35%), and 100 Non-Hispanic Whites (22%). The Latina sample was mostly English speaking with a majority of them being born in the United States. Half the sample reported being married. The sample was moderate to low in education ($M = 13.06$ years of education, $SD = 2.39$ years) and most had a low annual family income (26% earned less than \$10,000; 19% earned between \$10,000 to \$20,000; 26% earned between \$20,000 to \$40,000; 22% earned between \$40,000 and \$100,000; and 5% earned over \$100,000). The current pregnancy was the first for 38% of the women (nulliparous). With respect to parity, 37.6% of the patients were nulliparous (first delivery), 34% had delivered once before, 17% had delivered twice before, and 12% had 3 or more previous births.

In order to control for biological and medical risk factors and complications during pregnancy that may influence stress and the variables in this study, a medical risk variable was scored based on 37 conditions posing risk, such as factors in medical history, intrapartum complica-

tions, and obstetric/gynecological history risk (a complete listing is available from the authors). The most frequently occurring medical conditions included women who had anemia (29.9%), vaginal infection (28.2%), history of gynecological surgeries (24.2%), flu syndrome (20.3%), low weight gain during the second trimester (20.1%), vaginal bleeding (19.6%), urinary tract infection (18.2), low body mass index (12.9%), pulmonary problems (11.3%), fever in pregnancy (10.2%), uterine anomaly (6.7%), previous preterm births (6.5%), hypertension (4.3%), and history of diabetes (3.8%). The medical risk variable ranged from 1.00 to 9.00. Mean medical risk for this sample was = 2.73 ($SD = 1.58$). For the current pregnancy, 11% of the sample delivered preterm (<37 weeks gestation).

MEASURES

State Anxiety. A 10-item short version of the State-Trait Anxiety Inventory (STAI; Spielberger, 1983) was used to assess subjective feelings of stress in terms of degree of negative mood and tendency to see events and actions in a negative light. Each participant was asked to indicate how she had been feeling during the few days preceding the interview with questions such as "I feel calm," and "I feel anxious," each rated on a 4-point scale ranging from 1 (*Not at all*) to 4 (*Very much*). This version of the instrument showed good psychometric properties and is suitable for use on repeated occasions and in pregnancy research (e.g., Istvan, 1986). Cronbach alpha for the STAI at each time point in this study were .85 (Time 1), .84 (Time 2), and .86 (Time 3).

Pregnancy Specific Anxiety (PSA). Four pregnancy-specific stress items were derived from a factor analysis of a larger pool of items of positive and negative affects (see also Roesch, Dunkel-Schetter, Woo & Hobel, 2004). The measures were developed in a pilot study by Wadhwa et al. (1993) and then further validated in Rini et al. (1999). Evidence from both studies suggest good reliability, predictive validity, and stability over time (see Rini et al. 1999 for specific discriminate validity, concurrent validity, and content validity information). Participants were asked to think about "how they have felt about being pregnant" in the week preceding the interview, specifically how often they had felt *anxious*, *concerned*, *afraid*, and *panicky*. Responses to these four items were provided on a scale ranging from 1 (*Not at all*) to 5 (*Very much*). These items were administered at all three time points. Cronbach alpha for the PSA at each time point in this study were .72 (Time 1), .71 (Time 2), and .67 (Time 3).

STAI and PSA were highly correlated at each time point, ranging from $r = .46$ (Time 3 measures) to $r = .51$ (Time 1, $p < .01$), loaded together in fac-

tor analyses, and correlated with preterm similarly in bivariate analyses. Although we presumed them to tap into different aspects of the stress process, state anxiety is more general, possibly capturing a tendency to anxiety beyond pregnancy, whereas pregnancy anxiety is more contextually tied. The fact that they are so closely related in this study and had the same correlates (full correlational tables available on request) meant they were best combined. This strengthened our assessment of anxiety in pregnancy and reduced the likelihood of errors due to chance. We formed a composite Prenatal Anxiety Index by standardizing and summing these two measures.¹ This composite index was used as the dependent measure in all analyses.

Attitude Toward Pregnancy (ATP). We used four questions to assess the mother's feelings about her pregnancy early in the pregnancy. Taken from a larger set of items, the ATP was designed to assess attitudes toward pregnancy based on previous work by Lederman (1984) and others (e.g., Zambrana et al., 1997). Two items were selected to capture whether the pregnancy was wanted or not. The first item asked which of a set of feelings that women sometimes have when they are pregnant best fit the participant at that point in time (including that day and the previous week). Response choices were 1 (*Having a baby is something I really want*), 2 (*Having a baby now is OK*), and 3 (*Having a baby now is not what I want*). A second item asked the participant if she ever wished she were not pregnant. Responses ranged from 1 (*Never*) to 5 (*Almost always*). Two further questions were particularly relevant to the first part of the pregnancy. The first asked the woman if she had ever considered ending the pregnancy or arranging for an adoption "even a moment." Responses ranged from 1 (*Never*) to 4 (*Seriously*). The last question asked the woman to think first about the time just before she got pregnant with the baby, and then asked which of three response options best fit how she felt at that time. The responses were, "I wanted to get pregnant," "I wanted a baby at some point but not right away," and "I did not want to get pregnant." Items were standardized and summed to form an overall index of attitudes toward the pregnancy. Items were scored such that high scores on this index represent more favorable attitudes. The internal consistency of the index as measured by Cronbach's alpha was .85.

Mastery. A 7-item scale developed by Pearlin and Schooler (1978) was used to measure mastery. Participants were given a list of statements about one's self in general (e.g., "I have little control over the things that

1. All analyses were also conducted on each stress measure separately. Findings were similar for each measure and to those attained when using the composite.

happen to me" or "What happens to me in the future mostly depends on me"). They were asked to read each statement and to indicate their agreement using a scale ranging from 1 (*Strongly agree*) to 5 (*Strongly disagree*). Past research has established the validity of this scale (e.g., Hobfoll, London, & Orr, 1988) and internal reliability for this study was high (.91).

Social Support. A 6-item revised version of the UCLA-Social Support instrument (UCLA-SSI) was used to assess the amount of social support the participants received from the baby's father (see Collins et al., 1993). Based on the forms of social support identified in the theoretical and empirical literature, the questionnaire included two items to assess each of three main types of support: (a) material aid and assistance with tasks, (b) information and advice; and (c) listening and showing interest and concern. Participants were asked if they received each type of support since becoming pregnant and responded on a 5-point scale ranging from 1 (*Never*) to 5 (*Always*). An index of the support received from the baby's father was computed by averaging responses across the six items. Cronbach alpha for the social support measure was .84.

Life Events. A 25-item inventory was completed at the first and third interviews. It was adapted from measures used in Lobel & Dunkel-Schetter (1990) and Zambrana et al. (1997) to measure the number of stressful life events participants experienced one year prior to and during the course of pregnancy. Events included changes of where or with whom participants lived, having serious arguments several times with one person, and the death of a loved one. Life events stress scores at each time point were computed by summing the number of events that occurred.

PROCEDURE

Research nurses at one participating hospital and one HMO described the study to patients during prenatal visits, and patients were formally enrolled after completing informed consent procedures. Participants were then assessed in prenatal care settings on three occasions during the second and third trimester of pregnancy, at which times they completed questionnaires and were interviewed in either English or Spanish by a trained interviewer (Time 1 [$M = 18.39$ weeks, $SD = 4.41$], Time 2 [$M = 27.88$ weeks, $SD = 3.29$], Time 3 [$M = 35.80$ weeks, $SD = 3.39$]). Sociodemographic data and measures of social support and attitude toward the pregnancy were collected at Time 1. Mastery was measured at Time 2. Measures of stress and anxiety were collected at all three time points.

TABLE 1. Means, Ranges, and Standard Deviations of Major Variables

	Range	M	SD
Age	16–43	28	1.58
Years of education	3–18	13.00	2.43
Medical Risk	0.00–9.00	2.73	1.58
Income ^a	1.00–13.00	5.49	2.99
Mastery	1.00–5.00	3.62	.97
Received Social Support—Baby's Father	1.00–5.00	3.79	.93
Attitudes Toward Pregnancy	–11.20–3.20	0	2.86
Stressful Life Events	0.00–17.00	5.89	3.30
Pregnancy-specific Anxiety—Time 1	1.00–5.00	2.88	.91
Pregnancy-specific Anxiety—Time 3	1.00–5.00	2.86	.85
State Anxiety—Time 1	1.00–3.89	2.16	.61
State Anxiety—Time3	1.00–3.80	2.05	.58

^aIncome level of 1 = < \$2,500.00; 13 > \$ 100,000.00.

RESULTS

The results are presented in three parts. First, we present descriptive statistics on all the major variables in the study, as well as associations among them. In order to better understand the temporal course of the psychological variables under study and to fully capitalize on our longitudinal data, we also present statistics reflecting the consistency of measures across time. Next, we test our main hypotheses using correlational and hierarchical multiple regression analyses.

SAMPLE CHARACTERISTICS

Table 1 presents the means, standard deviations, and ranges for each of the primary measures in the study. In general, women tended to report relatively high levels of support from the baby's father and high levels of mastery. The mean ratings of attitudes toward the pregnancy showed that on average most of the women had very positive attitudes toward the pregnancy. Mastery, social support, and attitudes all showed a negative skew reflecting a positive stance on the part of the average women in this study; however, a wide range of stressful life events were reported. The mean number of stressful life events reported was high (6 events), with a substantial number of women reporting high numbers of events. For example, a frequency distribution showed that 80 women experienced between 10 and 17 life events.

Analyses of variance testing for ethnic differences in the three main variables in the study showed that African Americans, Latinas, and European American women did not differ significantly in their levels of mastery or amount of social support received from the baby's father. However, European American women reported significantly more favorable attitudes toward the pregnancy ($M = 13.33$, $SD = 1.82$) than Latinas ($M = 12.61$, $SD = 2.21$) and African Americans ($M = 12.04$, $SD = 2.28$; $F(2, 450) = 14.45$, $p < .001$). ANOVAs also showed significant differences in the three ethnic groups on the sociodemographic variables. European American women were older ($M = 30.31$, $SD = 4.70$) than Latina ($M = 26.70$, $SD = 5.38$) and African American women ($M = 26.91$, $SD = 5.51$), more educated ($M = 14.98$ years, $SD = 1.98$) than Latina ($M = 11.87$ years, $SD = 2.56$) and African American women ($M = 13.01$ years, $SD = 1.89$), and they earned more ($M = 8.15$, $SD = 3.41$) than Latina ($M = 4.69$, $SD = 2.34$) and African American women ($M = 4.82$, $SD = 2.37$). In addition, a significantly higher percent of the European American women were married (83%) compared to Latina (53%) and African American women (29%). The difference between Latinas and African American women was also significant.

Table 2 presents the zero-order correlations between the main variables in the study. Consistent with prior research (e.g., Major et al., 1998; Park et al., 1997), mastery, social support, and attitudes toward pregnancy showed small but significant positive associations with each other. Women with higher mastery also had more social support and more favorable attitudes toward pregnancy. Age and income were moderately correlated with attitudes toward pregnancy and the reported number of life events. Married, older, and higher income women were significantly more likely to have positive attitudes toward the pregnancy.

PREDICTING PRENATAL ANXIETY

We used hierarchical multiple regression analyses to test whether the mother's prenatal anxiety could be predicted by considering her sociodemographic characteristics, mastery, social support, and attitudes. Separate regressions were carried out to predict early prenatal anxiety (Time 1) and late prenatal anxiety (Time 3).² The sociodemographic characteristics of the mother (age, marital status, in-

2. Analyses predicting prenatal perceived stress at Time 2 were similar to those predicting perceived stress at Time 3, so only the latter are reported (controlling for Time 1 perceived stress in both cases).

TABLE 2. Zero-Order Correlations Among Major Study Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Age	—									
2. Income	.39**									
3. Marital Status ^a	.37**	.45**								
4. Medical Risk	.14**	.05	-.07							
5. Parity ^b	.21**	-.25**	-.09*	.06						
6. Social Support—Baby's Father	.00	.17**	.27**	-.05	-.07					
7. Life Events	-.05	-.12**	-.18**	.22**	-.00	-.26**				
8. Attitude Toward Pregnancy	.19**	.28**	.32**	.04	.20**	.36**	-.35**			
9. Mastery	-.02	.12**	.10*	.04	-.18**	.12*	-.16**	.13**		
10. Prenatal Anxiety—Time 1	-.13**	-.12**	-.17**	.12**	-.01	-.18**	.34**	-.31**	-.17**	
11. Prenatal Anxiety—Time 3	-.22**	-.20**	-.18**	.02	.04	-.06	.23**	-.28**	-.25**	.59**

Note. ^aMarital status coded Single = 1[comma here] Married = 2; ^bParity coded[comma here] number = number of previous births.. * $p < .05$ (two-tailed); ** $p < .01$ (two-tailed).

TABLE 3. Hierarchical Regression Analysis Predicting Early Prenatal Anxiety

	β	ΔR^2	F_{change}	Total R^2
Step 1		.04	2.95**	.04
Marital Status ^a	-.11*			
Parity ^b	.02			
Medical Risk	.13**			
Age	-.05			
Income	-.03			
White/Non-White	-.02			
Latina/African American	.05			
Step 2		.14	20.36***	.18
Attitude towards Pregnancy	-.19***			
Mastery	-.12**			
Received Social Support	-.05			
Life Events	.23***			

^aMarital status coded Single = 1, Married = 2; ^bParity coded, number = number of previous births. * $p < .05$; ** $p < .01$; *** $p < .001$.

come) were entered first as a block, together with control variables assessing medical risk and parity, and two dummy coded variables to represent ethnicity (one comparing European American women to African American women and Latinas, and another comparing African American women to Latinas). The second block was composed of the mother's ratings of her mastery, her attitudes toward the pregnancy, the social support she received from the baby's father, and a measure of the number of life events she reported experiencing in the last 6 months. In preliminary analyses, interaction terms between the three psychological constructs and life events were entered in the third step in separate regression equations (six separate regression analyses, e.g., support \times life events, support \times attitudes, support \times mastery). None of the interaction terms was significant and they were dropped from later analyses. Table 3 shows the results of the final analysis.

Early Prenatal Anxiety. When predicting the mother's stress early in the pregnancy (18–20 weeks), her sociodemographic and medical characteristics significantly predicted 4% of the variance, $F(7, 445) = 2.95$, $p < .01$ when entered on Step 1. Only two variables were significant unique predictors at this step: Women who were not married to the baby's father ($\beta = -.11$, $p < .05$) and women with higher medical risk reported

more anxiety ($\beta = .13, p < .01$). The main test of our second hypothesis concerned the variables in the second step. In support of our hypothesis, the variables entered in the second step of the analysis predicted a further 14%, $F(4, 448) = 20.36, p < .001$, of the variance. Three of the main constructs of interest were significantly related to anxiety. As predicted, women with more positive attitudes toward the pregnancy reported significantly less anxiety ($\beta = -.19, p < .001$), and women with a higher sense of mastery reported lower levels of perceived prenatal stress ($\beta = -.12, p < .01$). Finally, women who experienced more stressful life events reported greater anxiety ($\beta = .23, p < .001$).

Although ethnicity was not a significant predictor of early anxiety, the significant effects of ethnicity found in the pregnancy literature (e.g., Dunkel-Schetter et al., 2001) and in studies of other ethnically diverse samples (e.g., Gurung, Taylor, Kemeny, & Myers, in press) raises the possibility that the predictors of prenatal anxiety might differ across ethnic groups which called for group comparisons. To explore this issue, we conducted separate regression analyses for each ethnic group. These analyses revealed a number of important differences. In contrast to the results from the overall sample, income was the only significant predictor of anxiety for the European American sample ($\beta = -.25, p < .01$); women with higher income levels reported lower prenatal anxiety. Among African American women, attitudes toward pregnancy ($\beta = -.18, p < .05$) and number of life events ($\beta = .20, p < .01$) were both found to be significant predictors of anxiety, explaining 11% of the variance, $F(4, 201) = 6.52, p < .001$, over that predicted by the demographic variables (3%). None of the demographic variables were significant for these women. Finally, for the Latina sample, attitudes toward pregnancy were not significant, but mastery ($\beta = -.22, p < .01$), social support from the baby's father ($\beta = -.17, p < .05$), and number of life events ($\beta = .29, p < .001$) were all significant predictors of anxiety, explaining 25% of the variance, $F(4, 153) = 14.13, p < .001$, over that predicted by the demographic variables (9%).

Predicting Late Prenatal Anxiety. Next we conducted a second hierarchical multiple regression analysis. Prenatal anxiety at Time 1 was entered at Step 1 to control for it in predicting later prenatal anxiety levels. Sociodemographic characteristics of the mother (age, ethnicity, marital status, income) were entered as a block on Step 2, together with medical risk and parity. Finally, the mother's ratings of her mastery, her attitude toward the pregnancy, the social support received from the baby's father, and the number of stressful life events were entered on Step 3. Again, interaction terms between the three main constructs of interest and life events (at Time 3) were entered on the fourth step in preliminary and separate regression equations. Once more, none of the interaction

terms were significant and they were dropped from later analyses. Table 4 shows the results of the final analyses.

When predicting changes in the mother's prenatal anxiety from early in pregnancy to near the end of the third trimester (30–34 weeks), her early levels of prenatal anxiety predicted 33% of the variance in later anxiety, $F(1,426) = 210.61, p < .000; \beta = .57, p < .001$. The sociodemographic characteristics predicted an additional 3% of the variance when entered at Step 2, $F(8, 416) = 2.85, p < .006$; however, age was the only significant unique predictor at this step. Women who were older reported smaller increases in prenatal anxiety from Time 1 to Time 3 ($\beta = -.12, p < .05$). In support of our third hypothesis, the variables entered on the third step of the analysis predicted an additional 3% of the variance, $F(4,415) = 5.44, p < .001$. Women with more positive attitudes toward the pregnancy ($\beta = -.13, p < .01$) and women higher in mastery ($\beta = -.15, p < .001$) showed smaller increases in anxiety over time. Plotting changes in prenatal anxiety (mean splits on attitudes toward pregnancy and mastery plotted separately and for early and late prenatal anxiety) showed that women low in mastery and attitudes toward pregnancy showed higher levels of anxiety throughout the pregnancy. Social support received from the baby's father and life events in the last six months were not significant predictors.

Once again, to explore possible ethnic group differences in the predictors of late prenatal anxiety, we conducted separate regression analyses for each ethnic group. Again, these analyses revealed a number of important differences between groups. In contrast to the results for the overall sample, there were no significant predictors of changes in anxiety for the European American sample once early prenatal anxiety was entered into the model. For the African American women only, age ($\beta = -.15, p < .05$) was found to be a significant predictor of changes in prenatal anxiety. Older women experienced smaller increases in anxiety. For the Latina sample, attitudes toward pregnancy ($\beta = -.20, p < .05$) and mastery ($\beta = -.18, p < .05$) were both found to be significant predictors of changes in prenatal anxiety, explaining an additional 6% of the variance in late stress, $F(4, 142) = 3.12, p < .05$, after early stress accounted for 24% of the variance ($p < .001$) and demographic variables accounted for 5% of the variance (*ns*).

DISCUSSION

This study examined levels of and changes in anxiety during pregnancy in a multiethnic community sample of pregnant women. Consistent with Lazarus and Folkman's (1984) transactional model of stress and coping, personal and interpersonal factors, specifically, mastery, atti-

TABLE 4. Hierarchical Regression Analysis Predicting Late Prenatal Anxiety

	β	ΔR^2	F_{change}	Total R^2
Step 1		.33	210.61***	.33
Perceived Prenatal Stress Time 1	.56***			
Step 2		.03	2.87**	.36
Marital Status ^a	-.03			
Parity ^b	.02			
Medical Risk	-.04			
Age	-.12*			
Income	-.08			
White/Non-White	-.03			
Latina/African American	.03			
Step 3		.03	5.43***	.39
Attitudes toward Pregnancy	-.13**			
Mastery	-.15***			
Received Social Support	.08			
Life Events	.03			

^aMarital status coded Single = 1, Married = 2; ^bParity coded, number = number of previous births. * $p < .05$; ** $p < .01$; *** $p < .001$.

tudes, and social support, predicted concurrent perceptions of anxiety and changes in anxiety over a 4-month period during an important developmental period in the middle of pregnancy

This study is one of the first to focus on attitudes toward pregnancy as a predictor of anxiety (c.f., Zambrana et al. 1997). Our evidence indicates that wanting the baby and feeling positively about the pregnancy are strongly related to lower perceived anxiety at all stages of the pregnancy. Our interview assessments spanned a large part of the 9-month duration of pregnancy, starting fairly early in gestation and extending to the time period right before delivery. At each stage, early attitudes toward pregnancy (i.e., whether a baby was wanted or not at 18–20 weeks gestation) were a significant predictor of anxiety after sociodemographic variables and life event stress were controlled for in the model. The strong associations between positive attitudes toward pregnancy, greater social support received, and lower exposure to life events are consistent with theoretical predictions that coping resources together with a favorable attitude about an event (in this case a developmental and reproductive experience) attenuates the experience of stress and may lead to better psychological outcomes (Folkman et al., 1986;

Holahan & Moos, 1991; Lazarus & Folkman, 1984; Major et al., 1998; Schiaffino & Revenson, 1992).

Our correlational analyses provide some understanding of the factors that influence a woman's attitude toward her pregnancy. Older, more educated, higher earning, and married women had significantly more positive attitudes toward the pregnancy, as did women with more support from the baby's father and fewer stressful life events. The ethnic differences seen in the separate analyses are also noteworthy; attitudes toward pregnancy predicted African American women's early prenatal anxiety and Latinas late prenatal anxiety, but not European American women's anxiety at any time point. Although the weak effects for European American women may be partly a function of the reduced power in these analyses (European American women made up the smallest portion of our overall sample), these analyses point to some potential group differences in the relevant variables.

Ethnicity clearly provides an important and often overlooked context for understanding the more immediate environments in which people live, and the factors that could influence their appraisal of and attitudes toward events. Cultural views of pregnancy could also be a factor. Among Mexican women, for example, the word for labor (*dolor*) means sorrow or pain, and the expectation of giving birth can produce a great deal of fear (Keinan, 1998). Some ethnic differences have been also found in levels of perceived and received social support, which could influence attitudes toward the pregnancy (Sagrestano et al., 1999). Further investigation of stress processes in pregnancy within specific ethnic and cultural groups is needed to examine these issues.

The findings concerning the role of mastery and social support are consistent with past research (e.g., Goldenberg et al., 1991; Lachman & Weaver, 1998; Rini et al., 1999). Mastery significantly predicted both concurrent anxiety at the first assessment and changes in prenatal anxiety from the early to the late phase of the study. These results suggest that mastery or the generalized belief that one's outcomes are under one's own control, appears to be beneficial in terms of predicting how anxious a woman is during her pregnancy. Believing one is in control may provide a positive filter that influences how events are appraised and relatedly, influence stress responses such as anxiety (*c.f.*, Major et al., 1998).

As compared to previous work on pregnancy (*c.f.*, Collins et al., 1993; Dunkel-Schetter et al., 2001), this study found social support received from the baby's father was not a significant predictor of early anxiety within the entire multiethnic sample. Social support received from the baby's father was, however, a significant predictor of early anxiety for the Latina sample. This finding highlights the possible differential im-

portance of this construct across ethnic groups. Zero-order correlations show a significant relationship between support and anxiety in each ethnic group but it disappears when other variables like attitudes toward the pregnancy are entered, suggesting that different predictors of an emotional state (such as anxiety) may have differential importance in each ethnic group. More generally, the findings suggest that more complex causal models may underlie the associations between social support and outcome within specific ethnic and cultural groups. We are exploring this in current projects.

Our choice of analyses and our results have important implications for how ethnicity is studied in future. As Wyatt (1994) has noted, large epidemiological studies often use traditional grouping variables, such as race, in studies of health and disease. Because ethnicity and socioeconomic status are correlated when SES or social position is controlled, ethnic group comparisons sometimes suggest high levels of similarity (Zuckerman, 1990). The results of this study indicate that controlling for ethnicity may obscure important group differences. For example, in the analyses of changes in perceived prenatal anxiety, results for the Latina and African American women showed markedly different results. Whereas only income was a significant predictor of perceived prenatal anxiety for European American women, many constructs predicted perceived prenatal anxiety for the two other groups of women. Although the lack of significance could be due to sample size differences, findings such as these are often obscured in analyses controlling for ethnicity. It is clearly beneficial to examine the different ethnic groups individually to better understand processes unique to them.

In conclusion, the present study provides evidence that attitudes, mastery, and social support can influence emotion and stress processes in pregnancy. Stress research has focused disproportionately on life events and not as often on the emotional components of the stress process. Disentangling emotions, in particular experiences and contexts that are stressful, may prove useful in the study of emotion. This study particularly highlights (1) the role played by attitudes toward an event—in this case, whether the pregnancy was desired or not—in emotional outcomes and (2) the importance of looking at ethnic groups individually, not just as a control variable. Given that prenatal anxiety predicts pre-term delivery and shorter gestational age (Roesch et al., in press), these results may be useful in unraveling the emotional trajectories of the prenatal period with implications for the prevention of pre-term birth and other birth outcomes. The specification of particular emotional states and their study may prove very fruitful in numerous other contexts in which behavioral, health, and well-being consequences are significant.

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