

**Behavioral Medicine
and Women**
A Comprehensive Handbook

Edited by

ELAINE A. BLECHMAN, Ph.D.
KELLY D. BROWNELL, Ph.D.

Forewords by

W. STEWART AGRAS
BONNIE R. STRICKLAND

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Pregnancy and Childbirth

Christine Dunkel-Schetter
Marci Lobel

Relative to other topics in behavioral medicine concerning women, pregnancy is unique. Millions of women experience it every year, requiring extensive prenatal health care services; yet pregnancy is not a disease. And, in contrast to many other health-related experiences, pregnancy lasts a finite and predictable amount of time—approximately 9 months. Nonetheless, all pregnancies involve some degree of physical and psychological challenge, and in the case of first births, the period of life transition can last considerably longer than the time of gestation.

In the majority of cases, pregnancy is uncomplicated and proceeds smoothly to a delivery of a healthy infant. However, in a sizeable minority of cases, any number of complications can arise; these require more extensive medical observation and tests, and pose difficulties for the mother and fetus. For women whose medical complications are most severe, possible adverse outcomes include fetal demise, infant mortality, and infant morbidity. These adverse outcomes are sufficiently frequent in the United States and many other parts of the world as to warrant special research and prevention efforts. Such efforts, aimed at improving the outcomes of pregnancy for as many women as possible, have been mounted in the last decade by the World Health Organization and by several government agencies in the United States.

Thus, pregnancy has important public health implications for significant proportions of the large population of women around the world who experience it. Finally, pregnancy by its very nature is at the intersection of many biopsychosocial systems. A woman's social context, affective state, and behavior interact with her biological state in numerous and important ways during pregnancy, birth, and the postpartum period. It is for these reasons that we have been engaged in research on psychosocial processes in pregnancy and birth for a number of years.

GENERAL MODELS

For the past 25 years, there has been increased scientific interest in psychological and sociocultural factors during pregnancy. Understanding the experience of pregnancy for women of diverse backgrounds and resources provides promising avenues for predicting various outcomes of pregnancy, and possibly for intervening to improve them. For example, maternal psychosocial factors such as stress may influence any or several of the following endpoints: (1) maternal physiological, medical, and psychosocial states during pregnancy; (2) fetal behavior or states; (3) maternal and infant outcomes at birth (labor and delivery); (4) maternal postpartum condition; and (5) infant outcomes during early and later development.

A general model of psychosocial processes in pregnancy includes prenatal risk factors, mediating processes, and outcomes. Specific birth outcomes that have received the most attention are low birthweight (less than 2,500 grams); preterm labor and delivery (delivery at earlier than 37 weeks' gestation); labor complications (such as failure to progress); neonatal and infant complications (respiratory, cardiac, infection); and maternal postpartum depression (moderate to severe). Psychosocial risk factors that have received the greatest share of attention are psychosocial stress, employment and work strain, social support, and health behaviors. Mediating processes of interest include physiological ones (e.g., neuroendocrine and immune system processes) and behavioral ones (e.g., substance use, prenatal care utilization).

Despite the fact that this area of research is relatively new, it is already too large and too complex to summarize briefly. Therefore, we focus mainly on the three most commonly studied psychosocial risk factors (psychological stress, physical strain, social support) and on two specific and interrelated birth outcomes (preterm delivery, low birthweight). For information about a broader range of topics, we refer readers to recent reviews cited at the end of this chapter.

PSYCHOLOGICAL STRESS

Research on psychological stress and birth outcomes has grown remarkably in the past decade. Although other concepts (e.g., state anxiety or generalized distress) are occasionally considered, stress is most often conceptualized and measured as the negative impact of major life events. Current research indicates continuing and growing evidence for significant effects of prenatal life event stress, anxiety, or distress on preterm delivery and on fetal growth retardation—both of which contribute to low birthweight. Results from recent prospective and case-control studies indicate that women who experience high levels of stress during pregnancy are more likely to deliver low-birthweight or preterm infants, even after the effects of other factors such as smoking and medical risk are accounted for. For example, a study of approximately 5,500 Danish women found that preterm delivery was almost twice as common in those experiencing high stress in the 30th week of their pregnancy, independent of the medical condition and education of the women, and after smoking was controlled for.

Animal studies, particularly studies of nonhuman primates, are even more conclusive regarding the role of prenatal environmental stress in adverse birth outcomes. These studies are generally experimental in design, involving one group that is exposed to stress

and another that is not. For example, researchers at the University of Wisconsin have examined the effects of stress on pregnant rhesus and squirrel monkeys. One recent study found that infant monkeys born to mothers exposed to mild stress throughout pregnancy had lower birthweights and showed signs of delayed neuromotor development. Similar results have been shown in infant monkeys exposed to repeated stress *in utero*, but not for those exposed to stress only once during midpregnancy. Thus, these and other nonhuman primate studies point to a key role for chronic (as opposed to acute) stress in producing adverse outcomes. There are also indications in human research that chronic stress is more influential than acute stress in terms of risk for low birthweight and its precursors, although investigators have not completely tested this issue. One reason is that it is very difficult to distinguish acute and chronic forms of stress at the human level, because they are frequently linked. For example, acute stressors often lead to chronic sequelae, and chronic stressful conditions may contribute to the occurrence of acute events or may be punctuated by them.

An important issue, with implications for the mechanisms whereby stress exerts effects on preterm delivery or fetal growth, is the timing of stress in pregnancy. Speculation and some preliminary evidence suggest that stress late in pregnancy is more deleterious than early prenatal stress, but the issue of the timing of stress has not been well investigated in human studies as yet. One hypothesis is that an accumulation of stress above certain threshold levels poses a risk of preterm labor and delivery via neuroendocrine changes that lead to early or excess uterine activity (an "accumulation-to-threshold" theory). Another hypothesis suggests that stress has steady detrimental effects, much like a drippy faucet, via adverse influence on health behaviors or other mediators that foster healthy fetal growth (a "dose-response" theory). For example, stress has been associated with greater substance use, poorer diet, and lower utilization of prenatal care, all of which are important to birth outcomes. A third hypothesis involves critical periods in pregnancy, such as the first trimester for fetal organ development, or the third trimester for early labor (a "critical-intervals" or "vulnerable-intervals" theory). Such vulnerable periods can be linked to physiological processes taking place in each trimester that may be affected differentially by stress. At present, insufficient evidence exists to indicate whether these hypotheses are valid or invalid. However, prenatal stress may have multiple effects that operate selectively in different groups of women with different medical risk factors or psychosocial profiles. Prenatal stress may also pose a variety of risks simultaneously for women who experience the highest levels of stress.

PHYSICAL STRAIN

In addition to the strong interest during the last decade in the effects of psychological stress in pregnancy, attention has also been focused on employment and work-related variables as possible prenatal risk factors. Past research on employment per se has been equivocal with respect to risk for adverse birth outcomes. This is not surprising if one considers the large variability in type and duration of work, in physical strain at work, and in other variables, each of which may operate differentially with respect to birth outcome.

Psychological stress research is pertinent to understanding work-related stress, because measures of life events, anxiety, or general distress reflect stress at work in

addition to stress in other life domains. However, it is possible to distinguish physical strain from these forms of psychological stress. "Physical strain" or "exertion" refers to physical effort or activity in general, or to specific straining behaviors such as prolonged standing or heavy lifting. Research on physical exertion in general, or on specific behaviors during pregnancy, has also been inconsistent, but studies that focus on combinations of specific physical activities show more consistent results. For example, higher rates of low birthweight and preterm delivery have been found in employed women who do more standing, carrying, and other effortful activities. In one study of over 4,000 pregnant women, those whose work involved daily standing and walking for more than 5 hours were three times as likely to have a preterm delivery.

Although research on physical exertion or strain has developed from inquiries into effects of employment in pregnancy, it should not be considered exclusively among women in the labor force. Household and child care responsibilities performed by women not employed for pay are frequently strenuous. A recent study evaluated a sample of over 200 women, both employed and nonemployed, and found that extent of standing, lifting, bending, and getting up and down in the second trimester was associated with lower birthweight, even after demographic factors, medical risk, and substance use were controlled for. These effects held for nonemployed as well as employed women.

How does physical strain influence birth outcome? Fatigue associated with physical activities is thought to be one important mediator of the effects of physical strain on birth outcomes. Explanations for these effects also include the effects of physical activity on cardiovascular and neuroendocrine functioning. However, physical exercise undertaken voluntarily for fitness or pleasure does not appear to be associated with adverse birth outcomes, at least for women who are at low risk and are physically fit prior to pregnancy. The degree of choice in one's physical activities, the ability to refrain from or reduce them on occasions (and altogether at some point in pregnancy if one wishes), and other aspects of physical exercise seem to differentiate it from physical strain. The adverse effects of physical strain shown in some studies may also be attributable to the psychologically stressful nature of activities that involve exertion, rather than to exertion per se, since strain and stress often occur together. Thus, psychological stress must be controlled for in studies of physical strain, in order for investigators to be certain that the effects are from physical strain or exertion specifically. Very little research to date has considered this important issue.

Finally, there is some evidence that modifications in conditions of employment or daily activities can reduce risk of preterm delivery in women at risk. Studies in Europe and the United States suggest that sick leave or bed rest, when medically indicated, may be beneficial for reducing preterm delivery and low birthweight. These studies are consistent with the premise that physical activity may pose risk under some conditions, but unfortunately they do not clarify what conditions specifically. Does rest relieve physical strain, alleviate psychological stress, or lead to other effects (e.g., an increase in social support)? We need further information regarding the specific benefits of interventions to fully clarify these issues.

SOCIAL RELATIONSHIPS

Research on social relationships in connection with pregnancy and birth is multifaceted. The term "social relationships" is used here to incorporate the study of social integration

(the existence of relationships with others, especially in the family). Research has concentrated on prenatal social support and research on social support and research on social support with better prenatal outcomes. Items needed for research on social support are most likely to be found more on who provides support, for example, social support levels of stress appear to be related to social support.

A second area of research that often involves the delivery of emotional support, delivered to women who have been unprepared for a randomly assigned intervention during pregnancy. In babies, fewer researches appear to have an intervention and birth outcomes in two other areas, especially help in methods of intervention a

Finally, birth outcomes. The positive effect of social support on birth outcomes has been observed even in countries where social support is not observed even in research on social support during pregnancy across cultural

(the existence of spouse, family, friends); social network (size, composition, and interaction with others); and social support (availability and receipt of assistance and comfort, especially in times of stress). Research on social relationships and pregnancy outcomes has concentrated on three issues. First, correlational studies have examined the effects of prenatal social support, integration, or networks on birth outcomes, often in conjunction with research on prenatal stress. Inconsistencies in definition and measures of social support and in outcome variables make it difficult to summarize conclusions from this research. However, it appears that some types and sources of social support are associated with better pregnancy outcomes. Tangible assistance (e.g., helping with tasks or providing items needed to live) and emotional support (e.g., comfort, affection, or listening) appear most likely to be beneficial; in contrast, the benefits of informational support depend more on who is the provider and the context in which information is offered. In addition, different subgroups of women appear to respond differently to social support. For example, social support effects have varied with ethnicity, socioeconomic status, age, and levels of stress in past research. In general, groups with the greatest need for social support appear to benefit most.

A second area of research on social relationships in pregnancy is intervention research that has examined the effects of providing prenatal support (often in combination with other resources) on outcomes at birth and postpartum. Interventions most often involve home visits by midwives, nurses, or social workers, who provide a blend of emotional, informational, and instrumental assistance. Such interventions are usually delivered to women deemed vulnerable because of medical or social conditions. Results have been uneven but sometimes promising. For example, Oakley and her colleagues randomly assigned British working-class women with prior low-birthweight infants to an intervention or control group. Midwives visited intervention women three times during pregnancy and called them often; women in the comparison group did not receive the intervention. Women in the intervention group subsequently had larger babies, fewer preterm labors, and experienced other benefits. Results of intervention research appear to differ by subgroups of women, as do results of correlational support and birth outcome research. For example, one investigation found that the benefits of an intervention were limited to African-American women at high risk and did not occur in two other ethnic groups studied. Other studies suggest that young mothers are especially helped by supportive interventions. Despite these encouraging findings, flaws in methods of the vast majority of studies weaken the conclusions that can be drawn from this line of research. Furthermore, research has not clarified which elements of intervention are most effective and for whom.

Finally, both correlational and experimental studies have examined the effects of having a labor companion and of getting support during labor on labor and delivery outcomes. The presence of a supportive person during birth seems to have a consistently positive effect on birth outcomes. Randomized trials in the United States and other countries have shown that both emotional and informational support have beneficial effects on length of labor, medication use, birth complications, and even on type of delivery (i.e., cesarean section vs. vaginal delivery). It should be noted that the labor coach need not be a close relation to the woman in labor. Strong positive effects are observed even when women are assisted in labor by strangers. Of the three bodies of research on social support and birth outcomes reviewed, that on the effects of social support during labor and delivery is the most definitive, and also the most consistent across cultural and ethnic groups.

INDIVIDUAL CHARACTERISTICS

Our conclusions thus far have not fully addressed various individual factors that must be considered in connection with psychological stress, physical exertion, and social relationships in pregnancy. These are a woman's age, ethnicity, socioeconomic status, parity (i.e., having had a prior birth experience), and medical risk status. Special issues arise when one is considering psychosocial risk factors in pregnant teens; women of ethnic minority background or low socioeconomic status; primiparas (i.e., women giving birth for the first time); and women with a history of chronic disease, gynecological problems, or complications in the current pregnancy.

Unfortunately, these individual factors all pose increased risk and they often co-occur. An understanding of psychosocial risks and resources in pregnancy requires careful attention to interactions and intervening processes involving these variables. For example, studies by our group and others of low-income African-American women have shown that a higher risk of low birthweight can be partially accounted for by higher rates of psychological stress. Moreover, our research has shown that the association of prenatal stress to birthweight and preterm delivery is stronger in women with existing medical risk conditions than women without such conditions. The bulk of our work has focused on pregnancies in low-income, ethnic minority women which has sensitized us to the intricacies of understanding psychosocial processes in a sociocultural context.

CONCLUSION

In this chapter, we have reviewed evidence that suggests that prenatal stress, physical strain, and social support influence important birth outcomes such as low birthweight and preterm delivery. This research has also raised a number of issues. We highlight three important questions here: (1) what are the behavioral and physiological mechanisms that account for the effects of these psychosocial variables on birth outcomes? (2) are there different effects for chronic versus acute conditions occurring in pregnancy? And might there be critical prenatal periods of heightened sensitivity to stress, strain, or support? (3) are some groups of women more sensitive or vulnerable to the effects of prenatal psychosocial variables? Previous research has not fully addressed these issues, which we believe are critical to improving our understanding of psychosocial processes in pregnancy.

National statistics indicate that American women suffer among the highest rates of low birthweight births and infant mortality of any industrialized nation, and disadvantaged women in the United States experience disproportionate rates of adverse birth outcomes. Given the social, financial, health, and health-care consequences of this public health problem, researchers must continue to examine the many factors that contribute to it. Sufficient evidence has now accumulated to implicate specific psychosocial conditions as risks and benefits to pregnant women. Therefore, we must now focus our attention on screening for psychosocial risk factors, on targeting the vulnerable pregnant women who can be assisted, and on determining how to intervene to enhance the psychosocial conditions in the lives of these women. This work will require the expertise of many disciplines including psychology, medicine, nursing, social welfare, and public health. In sum, the needs of women and their children can best be met by interdisciplinary research and programmatic efforts reflecting the biopsychosocial nature of pregnancy and birth.

FURTHER READING

- Berendes, H., Klessel, S., & Yaffe, S. (Eds.). (1991). *Advances in the prevention of low birthweight*. Washington, DC: National Center for Education in Maternal and Child Health.
- Series of state-of-the-art papers on issues in prevention of low birthweight including an excellent discussion by Brooks-Gunn on support and stress during pregnancy and a useful review on social support intervention research in pregnancy by Elbourne and Oakley.
- Dunkel-Schetter, C., Sagrestano, L. M., Feldman, P., & Killingsworth, C. (1996). Social support and pregnancy: A comprehensive review focusing on ethnicity and culture. In G. R. Pierce, B. R. Sarason, & I. G. Sarason (Eds.), *The handbook of social support and the family*. New York: Plenum.
- An up-to-date review of research on (1) social support and birth outcomes including correlational, prenatal intervention, and labor support studies, and on (2) support in pregnancy and emotions and behavior during pregnancy followed by a discussion of culture and ethnicity emphasizing Latinas and how these factors influence social support in pregnancy.
- Hedegaard, M., Henriksen, T. B., Sabroe, S., & Secher, N. J. (1993). Psychological distress in pregnancy and preterm delivery. *British Medical Journal*, 307, 234-239.
- Study showing that higher levels of emotional distress late in pregnancy, but not in midpregnancy, were associated with an increased likelihood of preterm delivery in a large sample of Danish women.
- Henriksen, T. B., Hedegaard, M., Secher, N. J., & Wilcox, A. J. (1995). Standing at work and preterm delivery (1995). *British Journal of Obstetrics and Gynaecology*, 102, 198-206.
- Study of 4,000 Danish women found that those who stood or walked at work more than 5 hours per day in the second trimester of pregnancy had a higher incidence of preterm delivery compared to those who worked in pregnancy but stood or walked less.
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- An excellent review of risk factors, both established ones and promising ones.
- Lobel, M. (1994). Conceptualizations, measurement, and effects of prenatal maternal stress on birth outcomes. *Journal of Behavioral Medicine*, 17, 225-272.
- One of the most recent and rigorous reviews focused specifically on stress and anxiety in pregnancy and effects on birth outcomes.
- McAnarney, E. R., & Stevens-Simon, C. (1990). Maternal psychological stress/depression and low birth weight: Is there a relationship? *AJDC*, 144, 789-792.
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- Molfese, V. J. (1989). *Perinatal risk and infant development: Assessment and prediction*. New York: Guilford Press.
- Book providing in-depth treatment of the issues of perinatal risk assessment and the problems in this area.
- Norbeck, J. S., & Anderson, N. J. (1989). Psychosocial predictors of pregnancy outcomes in low-income black, Hispanic, and white women. *Nursing Research*, 38, 204-209.
- Study reporting that associations of stress, support, and anxiety to birth outcomes differ in ethnic groups. Urban black, white, and Hispanic women in San Francisco were studied.
- Oakley, A., Rajan, L., & Grant, A. (1990). Social support and pregnancy outcome. *British Journal of Obstetrics and Gynaecology*, 97, 155-162.
- Intervention study providing social support to women at risk and showing positive effects on outcomes.

Schneider, M. L., & Coe, C. L. (1993). Repeated social stress during pregnancy impairs neuromotor development of the primate infant. *Journal of Developmental and Behavioral Pediatrics*, 14, 81-87.

Comparison of infant monkeys born to (1) mothers exposed to mild stress throughout pregnancy, (2) mothers exposed to one stress episode in midpregnancy, and (3) undisturbed mothers, showing the first group had infants who had significantly poorer motor abilities, impaired balance, and other neuromotor problems.

Woo, G. (1995). *Strain in daily activities during pregnancy: Associations of physical exertion, psychological demand, and personal control with birth outcomes*. Unpublished doctoral dissertation, University of California, Los Angeles.

A controlled prospective study of 215 African-American, white, and Hispanic pregnant women, both employed and nonemployed, examining the influence of physical exertion and psychosocial demands in daily activities on gestational age and birthweight adjusted for gestational age. Physical exertion late in pregnancy was associated with lower birthweight after controlling for demographics, medical risk, and substance use.

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