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# 2

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**Deborah Holtzman and Lawrence W. Green, *Centers for Disease Control and Prevention***

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medications are delivered are conditional stimuli. Because these conditional stimuli are repeated paired with the active medications that produce the therapeutic benefits, they acquire the capacity to elicit these benefits as conditional responses.

Conditioning theory appears capable of explaining many placebo effects, but there are also some problems with this explanation. For one thing, the conditional response to morphine is an increase in sensitivity to pain (i.e., it is a compensatory response). However, the effect of placebo morphine is a reduction in pain sensitivity. Therefore, it cannot be due to classical conditioning. In fact, it seems to override the conditioning effect. Another problem with the conditioning model of placebo effects is that it does not account well for the existence of placebo effect throughout the history of medicine. Most of the substances that were used as medications before the 20th century (e.g., turpentine, crushed glass, worms, spiders, furs, feathers, crocodile dung, lizard's blood, frog's sperm, pig's teeth, rotten meat, fly specs, powdered stone, iron filings, and human sweat) are now recognized to have been placebos. Because they do not automatically produce therapeutic benefits, they cannot have functioned as unconditional stimuli for placebo effects.

Response expectancy theory rests on the discovery that the belief that an automatic subjective response will occur tends to elicit that response. Thus, the anticipation of anxiety makes people anxious, the belief that one will stay depressed forever is very depressing, and the anticipation of changes in pain alters the perception of pain. More generally, subjective experience appears to be due to a mix of external and internal factors. It is shaped partially by external stimuli and partially by the person's beliefs, expectations, and interpretations of those stimuli. As applied to the placebo effect, expectancy theory asserts that placebos produce their effects by changing people's expectations. A placebo antidepressant, for example, leads people to expect a change in their depression, and that expectation makes them feel less depressed. A shortcoming of expectancy theory is that it does not easily account for the physical effects of placebos.

It is important to note that conditioning theory and expectancy theory are not mutually exclusive. Specifically, classical conditioning may be one of the means by which expectancies are altered. Thus, if an active drug (the unconditional stimulus) repeatedly elicits a particular therapeutic benefit (the unconditional

response), it will also lead people to expect that benefit when they think they are taking the drug, and that expectation might produce the placebo effect (the conditional response).

—Irving Kirsch

### Further Reading

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## PREGNANCY OUTCOMES: PSYCHOSOCIAL ASPECTS

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The outcomes of pregnancy include many different medical and psychosocial effects for mother and infant. Among the most significant are preterm delivery (PTD; birth at less than 37 weeks gestation) and low birth weight (LBW; less than or equal to 2500 grams). Infants born early are more likely to be LBW. The United States has surprisingly high rates of LBW and PTD compared to other nations. In 2001, of births in the United States, 11.9% were PTD and 7.7% were LBW. Both rates show increases in the past decade. LBW and its effects occur disproportionately among African American women. In 2001, of African American births in the United States, 13.1% were LBW compared to 6.7% of non-Hispanic Whites and 6.4% of Hispanics. For PTD, 17.6% of African Americans deliver early, 11.4% of Hispanics, and 10.6% of non-Hispanic Whites. These adverse outcomes occur among African Americans of all socioeconomic levels, not only among those who are poor, although poor women of all ethnicities are at greater risk of poor pregnancy outcomes as well.

The consequences of LBW and PTD include higher rates of infant death and a host of developmental and pediatric health complications. For example, prematurity is the leading cause of death in the first month of life. In addition, prematurity is a major contributor to developmental delays, chronic respiratory problems, and vision and hearing impairment. In addition to these significant developmental and health implications of adverse pregnancy outcomes, medical costs associated with PTD and LBW births are enormous. The average cost of a birth after 37 weeks

gestation in the United States is less than \$5,000 compared to more than \$50,000 on average for infants born preterm, amounting to health care costs of close to \$12 billion per year presently.

Because of the many adverse consequences of LBW and PTD, these outcomes are a high priority in public health and medicine. National health agendas have set goals for reductions in rates of PTD (to 7.6%) and LBW (to 5%) by the year 2010. A greater understanding of the etiology of early birth and of poor fetal growth is sought, as are strategies for prevention. In recent years, we have begun to develop stronger integrative models of the causes of adverse pregnancy outcomes, taking into account psychological, social, cultural, and biological factors, as well as demographic analyses of their etiology.

Medical risk factors such as hypertension, gestational diabetes, a prior PT or LBW delivery, and gynecological infections predict adverse outcomes such as PTD and LBW, but not terribly well. Availability and use of prenatal care throughout pregnancy predict better outcomes; lack of prenatal care contributes to the adverse outcomes of poor women. In addition, behavioral factors such as tobacco use (smoking), alcohol use, and drug use are known risk factors for adverse outcome. However, relatively high rates of LBW and PTD still occur in women who do not use substances. Therefore, attention has turned in recent years to a wide range of further behavioral and psychosocial factors possibly involved. Among these, stress has probably received the greatest attention.

Stress is broadly defined as demands that tax or exceed resources. Stressors are demands such as life events, chronic strain, and trauma. Stress responses include emotional, behavioral, and biological reactions to demands. In pregnancy, the stress variables studied most often are major life events, such as death of a close relative or a family member's job loss, and the emotional state of anxiety. Nearly three dozen studies have been done on stress and PTD alone. The subset of these that are prospective studies with larger samples, standardized measures of stress, and appropriate controls indicate that stress is a significant risk factor for PTD. In a series of studies, Christine Dunkel Schetter and colleagues have found that multidimensional stress measures predict PTD. The component of stress that seems to be most responsible is anxiety. Women who are more anxious *in general* during pregnancy and who are more anxious *about their pregnancies* deliver their babies earlier. These findings

appear to hold true for all ethnic groups, although emerging findings suggest that additional factors such as racism may figure importantly in the etiology of PT birth in African Americans.

Emerging research in several laboratories with human and animal models points to dysregulation of the maternal stress systems in the mediation of the relationship between stressful experience and early onset of labor. Acute stress elicits a cascade of biological responses involving many systems including the cardiovascular system, the endocrine system, the immune system, and the nervous system including the brain. Complex responses to stress that occur in humans in response to stress are well understood and provide a basis for our growing knowledge of stress in pregnancy. One feature that differs is that the fetus and the placenta both release stress hormones such as corticotropin-releasing hormone (CRH) in response to specific maternal stress hormones. High levels of maternal stress hormones such as cortisol and CRH have been implicated in PTD via their effects on the placenta and the fetus. Although the pathways and precise mechanisms are not fully worked out as yet, it appears that psychosocial stress and emotions in the mother can lead to physiological effects that influence the timing of delivery and in some cases, trigger early delivery. In addition, emerging research suggests effects of maternal stress on fetal development and on the offspring's health over the life span.

In addition to the fast-growing body of work on maternal stress and pregnancy outcomes, other findings point to personal resources such as a woman's degree of mastery, optimism, self-esteem, and social support in predicting fetal growth. Women who lack these resources are at higher risk of delivering an LBW infant, independent of the timing of delivery. In addition, recent results suggest that perceived racism and rumination over severely stressful life events among African American pregnant women predict LBW independent of their level of education, income, and medical risk. There is some evidence that these links are mediated by behavioral health factors such as substance use, lack of prenatal care, inactivity, and poor diet. However, this topic requires much further investigation before we will fully understand the risk factors and pathways.

It remains to be known whether there are vulnerable times in pregnancy such as the first trimester when stress may have its most potent effects. Some

evidence points to critical times in early pregnancy. Further evidence points to prepregnancy states of the mother such as emotional stability and her family history of stress and birth as potent risk factors. Both prenatal risk factors and prepregnancy risk factors hold promise for future interventions that reduce rates of LBW and PTD.

There have been very few randomized, controlled trials testing psychosocial interventions in pregnancy in order to prevent LBW or PTD. A number of social support interventions have been tested but only one or two have been found effective. For example, Jane Norbeck and her colleagues in San Francisco targeted a group of low-income African American women who had inadequate social support and intervened to reduce LBW in this group by use of individual counseling sessions in which problems and successes in life were identified and meaning, self-esteem, and social support were bolstered. This intervention successfully reduced LBW by 13% from 22% in the control group to 9% in the intervention group. This study is promising although methodological limitations hinder our ability to draw strong conclusions about most interventions as yet.

Future directions include (1) the further development and refinement of theories of the etiology of PTD and LBW that combine biological, psychological, sociocultural, and medical knowledge, and (2) the development of intervention trials that are based in theory and, importantly, that test process variables allowing researchers to infer what the mechanism of effective interventions are.

—Christine Dunkel Schetter  
and Christine M. Rini

See also PREGNANCY PREVENTION IN ADOLESCENTS

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## PREGNANCY PREVENTION IN ADOLESCENTS

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### CURRENT STATISTICS ON ADOLESCENT PREGNANCY

Adolescent pregnancy includes women between the ages of 10 and 19 who conceive and give birth to children. Statistical data, based on recorded birth certificates from state vital statistics offices, are used to calculate the teen pregnancy rate. Adolescent pregnancy rates are compiled and distributed through the Center for Health Statistics and the Centers for Disease Control and Prevention (CDC, 2003). These data are often looked at by categories of ages: 10-14, 15-19, and 18-19. Age categories have been shown to reflect certain risk factors that can be anticipated due to a young woman's age and point of development, and predict deleterious health, social, and economic effects. Younger adolescents ages 10-14 show the greatest risk factors. Pregnant adolescents, under the age of 15, for example, have higher rates of complications and more premature and low-birth-weight babies than older mothers.

Vital statistics also offer information on adolescents who are married and not married at the time of the birth of their children. Marital status is important in relation to the incidence of adolescent births as well as the sociopolitical and moral debates about adolescent pregnancies.