

# Psychosocial Aspects of Selected Issues in Women's Reproductive Health: Current Status and Future Directions

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Emphasizing research published in the past decade, this article presents a summary and evaluation of psychosocial investigations of women's reproductive health, with a focus on selected aspects of menstruation, pregnancy and birth, infertility, and menopause. In some areas, studies have focused on negative physical and psychological concomitants of these health issues. However, research reveals substantial individual variability, with most women adapting well to reproductive health changes. Although methodological and conceptual shortcomings have limited firm conclusions, research has advanced our understanding of the multivariate biological, psychological, and social influences on women's reproductive health and associated outcomes. Understanding and promoting women's reproductive health across the lifespan requires biopsychosocial approaches to research.

Over the past few decades, psychological conceptualizations of women's reproductive health have undergone transformation from psychoanalytic and psychosomatic models focusing on women's unconscious and defensive processes as determinants of adverse outcomes to models underscoring the multiply determined and individually variable nature of reproductive experiences. Highlighting research appearing in the past decade, this article presents a summary and evaluation of research on psychosocial issues in reproductive health, specifically on menstruation, pregnancy and birth, infertility, and menopause. We focus on these topics because they represent major experiences in the reproductive lives of many women. Within each of these areas, we devote most attention to topics that have dominated the psychological literature, resulting in a concentration on difficulties (e.g., premenstrual syndrome, postpartum depression) rather than on normative or salutary experiences.

Space limitations preclude discussion of many topics of interest, including diseases that affect reproductive function (e.g., pelvic inflammatory disease, endometriosis), psychosocial concomitants of surgical procedures (e.g., cesarean section, hysterectomy), health behaviors associated with reproductive outcomes (e.g., smoking in pregnancy, unsafe sexual behaviors), and other important areas (e.g., adolescent pregnancy, contraception, abortion). We refer the reader to recent reviews of these areas (e.g., see Adler

et al., 1992; Blechman & Brownell, 1998; Coley & Chase-Lindale, 1998; DiMatteo et al., 1996; O'Hara, Reiter, Johnson, Milburn, & Engeldinger, 1995). Further, our charge to review a spectrum of women's reproductive health issues necessitated some sacrifice of depth and detail for breadth. More finely grained reviews exist for some of the topics we address, and we include representative citations to these in each section.

## The Experience of Menstruation and Premenstrual Syndrome

Menarche, the onset of menstruation, occurs on average between the ages of 12 and 13 in American girls. For most girls, both positive and negative feelings and concerns about secrecy mark the menarche (Gallant & Derry, 1995). Early menarche, negative attitudes toward menstruation, greater physical symptomatology at onset, and insufficient preparation with regard to both biological and practical information, predict more negative responses (Anson, 1999; Brooks-Gunn, 1988; Caspi & Moffitt, 1991; Koff & Rierdan, 1996; Rierdan & Koff, 1990).

By far, most research on psychological aspects of menstruation has focused on what is frequently labeled "premenstrual syndrome" (PMS), or an increase in negative psychological and physical symptoms prior to menses. Despite more than 4 decades of research, no strong consensus exists on the definition, etiology, treatment, or even existence of PMS. Because methodological limitations characterize much of the research, reviews indicate that little scientifically sound evidence exists for a link between menstrual cycle phase and symptomatology, particularly psychological symptoms (Klebanov & Ruble, 1994; McFarlane & Williams, 1994). Nor is there confirmation for the role of biological factors, especially hormones, in PMS (e.g., Schmidt et al., 1991; Walker,

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1992), although serotonergic dysregulation now is receiving attention (e.g., Rapkin, 1992).<sup>1</sup> We review major topics in PMS below.

### *Definition of PMS*

As most widely defined, PMS involves negative emotional, behavioral, and physical symptoms present during the luteal phase of the menstrual cycle (from ovulation to menstruation) but not the follicular phase (postmenstruation to ovulation). Some researchers (e.g., Johnson, 1995) include cognitive symptoms, although there is growing consensus that no demonstrable cognitive effects of menstruation exist (e.g., Epting & Overman, 1998; Girdler & Light, 1994; Gordon & Lee, 1993; Man, MacMillan, Scott, & Young, 1999; see Klebanov & Ruble, 1994). Across studies, hallmark symptoms of PMS are diverse, numbering as many as 150 according to some reviews (e.g., Tucker & Whalen, 1991). The most common emotional symptoms include irritability, moodiness, hostility, and depressed mood; physical symptoms include breast pain, bloating, fatigue, abdominal pain or cramping, and headaches. Because researchers have used varying definitional criteria with regard to symptom severity, duration, and number, as well as varying data collection strategies, determining the prevalence of PMS is difficult (Hurt et al., 1992). Greater agreement exists about the prevalence of severe as opposed to milder PMS; estimates of the former typically range from 5 to 10%, whereas estimates of the latter range from 25 to 80% of all women (Johnson, 1995; Klebanov & Ruble, 1994; Robinson & Swindle, 2000; Steiner & Wilkins, 1996).

### *Comorbidity of PMS*

The comorbidity of PMS with psychological disorders has received much attention. Although evidence is inconsistent regarding the co-occurrence of psychopathology with PMS (Gallant & Derry, 1995), a number of studies have revealed that depression (Bancroft & Rennie, 1995; Bancroft, Williamson, Warner, Rennie, & Smith, 1993; De Ronchi, Muro, Marziani, & Rucci, 2000; Kuczmierczyk, Labrum, & Johnson, 1992), or a history of depression (Bancroft, Rennie, & Warner, 1994), is present in at least half of women who report disabling premenstrual symptoms, leading some to question whether depressed women are being misdiagnosed as suffering from PMS (Nye, Hurt, Severino, & Shangold, 1992). Evidence for the comorbidity of PMS with anxiety disorders is much more equivocal (Bailey & Cohen, 1999; Christensen, Board, & Oei, 1992; Facchinetti, Tarabusi, & Nappi, 1998; Kuczmierczyk et al., 1992).

### *Correlates of PMS*

A variety of studies have attempted to identify characteristics of women or their life circumstances that are more commonly seen in those with PMS. These studies have focused on five sets of variables: quality of interpersonal relationships, self-esteem, attitudes or expectations about menstruation, stress, and coping. Except as found in a few notable experimental investigations examining effects of women's expectations concerning menstruation (e.g., Marvan & Escobedo, 1999), the direction of causality between PMS and these variable sets has been unclear.

These studies reveal that women with low self-esteem (Maddocks & Reid, 1992), those who are less satisfied with their romantic relationships (Corney & Stanton, 1991; Futterman, Jones, Miccio-Fonseca, & Quigley, 1992; Ryser & Feinauer, 1992), and those who use less adaptive forms of coping (Gallant & Derry, 1995; Ornitz & Brown, 1993; Warren & Baker, 1992) are more likely to experience PMS. Many studies have found that self-reported stress is higher in women with PMS (Gallant, Popiel, Hoffman, Chakraborty, & Hamilton, 1992b; Girdler et al., 1998; Kuczmierczyk et al., 1992; Maddocks & Reid, 1992; Warner & Bancroft, 1990; Woods et al., 1998; Woods, Mitchell, & Lentz, 1995), although contradictory evidence exists (e.g., L. E. Beck, Gevirtz, & Mortola, 1990). Women with and without PMS also differ in stress reactivity, although findings across studies are mixed with regard to which group is more reactive (Girdler, Pedersen, Stern, & Light, 1993; Girdler et al., 1998; Sabin-Farrell & Slade, 1999). Finally, women's attitudes and expectations about menstruation are related to their likelihood of experiencing PMS (Gallant, Hamilton, Popiel, Morokoff, & Chakraborty, 1991; Klebanov & Jemmott, 1992; Koff & Rierdan, 1996; Marvan & Escobedo, 1999; Woods et al., 1995). The impact of expectations on PMS also is bolstered by studies showing an abatement of symptoms following hysterectomy in women whose ovaries continue to cause hormonal cyclicity (e.g., Metcalf, Braiden, Livesey, & Wells, 1992).

### *Treatments for PMS*

PMS has been treated successfully with dietary change or nutritional supplementation (e.g., Daiss & Krietsch, 1997; De Souza, Walker, Robinson, & Bolland, 2000; Schellenberg, 2001), light therapy (e.g., Parry, Berga, Mostofi, Klauber, & Resnick, 1997), psychotherapy (e.g., Blake, 1995; Blake, Salkovskis, Gath, Day, & Garrod, 1998) and other psychosocial interventions (e.g., D. Taylor, 1999), and by a range of pharmacological and surgical measures to inhibit or end ovulation, with attendant risks (see reviews by Johnson, 1995; Pearlstein & Steiner, 2000; Rivera-Tovar, Rhodes, Pearlstein, & Frank, 1994; Steiner, 1997). Treatment with antidepressants, and particularly selective serotonin reuptake inhibitors such as fluoxetine, has become increasingly common (Freeman, Rickels, Sondheimer, & Polansky, 1999; Simpson & Noble, 2000; Steiner & Born, 2000). However, across studies, placebo treatments for PMS have been shown to be effective for a substantial portion of women (Freeman & Rickels, 1999; Klebanov & Ruble, 1994; McFarlane, 1998). Improvement resulting from placebos may be due to the compassion that study participants receive from health care providers, the opportunity to express and describe symptoms, and the increased optimism that is derived from engaging in an endeavor to alleviate symptoms.

### *Methodological Problems of PMS Research*

More than 65 instruments have been developed to diagnose PMS (Budeiri, LiWanPo, & Dornan, 1994), with wide differences in content, administration, and degree of impairment required to

<sup>1</sup> There is, however, good evidence that dysmenorrhea (painful menstruation) is biologically based (see review by Klebanov & Ruble, 1994).

constitute a diagnosis. Several researchers have reported that such instruments do not reliably discriminate women with and without premenstrual symptoms (Gallant, Popiel, Hoffman, Chakraborty, & Hamilton, 1992a; McFarlane & Williams, 1994). Most instruments depend on retrospective self-reports, which inflate reports of PMS compared with prospective methods (Gallant & Derry, 1995; Klebanov & Ruble, 1994; McFarlane, 1998; McFarlane & Williams, 1994), and most focus only on negative aspects of menstruation, creating likely response biases (Chrisler, Johnston, Champagne, & Preston, 1994; McFarlane, 1998; Metcalf & Livesey, 1995). A number of studies failed to collect data throughout the menstrual cycle or across multiple cycles (McFarlane, 1998); longitudinal studies are rare (Paikoff & Brooks-Gunn, 1991). Similarly rare are studies of women diverse in age, ethnicity, cultural background, and socioeconomic status, although increasing evidence suggests that these factors influence menstrual experience (Anson, 1999; Gallant & Derry, 1995; McFarlane, 1998; Mitchell, Woods, & Lentz, 1994; Paikoff & Brooks-Gunn, 1991). Further complicating interpretation of findings is the presence of potent demand characteristics in many studies, such as occurs when study participants know the purpose of the research (Klebanov & Ruble, 1994; McFarlane, 1998; but see Gallant et al., 1991; and Gallant et al., 1992b, for alternative results). Methodological variation and lack of precision exist in the detection and definition of cycle phase; even hormonal assays are not reliable tools for this purpose (Klebanov & Ruble, 1994).

A serious methodological weakness is the widespread failure to use appropriate control groups. Studies comparing women and men have yielded no significant difference in affective cyclicality (Klebanov & Ruble, 1994; McFarlane, 1998; McFarlane & Williams, 1994). Furthermore, women experience other types of affective cyclicality than those associated with the menstrual cycle. Finally, studies comparing women with PMS with groups of women on oral contraceptives (i.e., without hormonal cyclicality) have found few or no differences between groups (Gallant et al., 1992b; Klebanov & Ruble, 1994; but see Bancroft & Rennie, 1993).

#### *New Approaches to the Study of Menstruation and PMS*

Although many researchers continue to pursue exclusively biological causes of PMS (e.g., see review by Johnson, 1995), an important advance is increased attention to biological, psychological, social, cultural, ethnic, and environmental factors that affect women's experience of menstruation (e.g., P. S. Chandra & Chaturvedi, 1992; Gallant & Derry, 1995; McFarlane, 1998; see also Halbreich, 1993). Also prominent in recent research is a social-psychological perspective on PMS, which describes how the social-psychological context and the ways that women perceive themselves and their bodies contribute to the experience of menstruation. The basic elements of this perspective, culled from the work of Brooks-Gunn, Gallant, Klebanov, McFarlane, and Ruble, are as follows.

First, menstruation occurs in a social-psychological context that includes a woman's attitudes and expectations about menstruation and about women, and others' reactions to her. Women are more likely to attribute symptoms to their menstrual cycle that are consistent with their own and others' expectations (e.g., T. R. Elliott & Harkins, 1992; Rodin, 1992; Sigmon, Rohan, Boulard,

Dorhofer, & Whitcomb, 2000). Therefore, basic issues involving the perception and labeling of affective and physical states are important to the social-psychological perspective on PMS. Furthermore, some evidence exists for self-fulfilling prophecies, by which women's expectations can produce cyclic symptoms. These expectations originate in part from the media, the advertising industry, friends and family members, and PMS research measures (Chrisler & Levy, 1990; Chrisler et al., 1994; Coutts & Berg, 1993; Pugliesi, 1992; D. Taylor, Woods, Lentz, Mitchell, & Lee, 1991; Wilson, Turner, & Keye, 1991; Woods et al., 1995).

A second element of this perspective is that basic social-cognitive processes affect the menstrual experience. For example, humans tend to overestimate the co-occurrence of independent events (called illusory correlation), and this bias may inflate the perceived association between cycle phase and physical sensations. Information encoding, recall, and other memory biases also appear to influence symptom reports (e.g., McFarlane & Williams, 1994). Finally, certain beliefs about menstruation may be self-reinforcing because they have positive consequences, such as legitimizing the expression of negative behaviors and affect (Mello-Goldner & Jackson, 1999).

#### *Conclusions and Directions for Research*

In the psychiatric and other medical literature on PMS, almost no attention is devoted to social-psychological factors contributing to the existence—or appearance—of a premenstrual syndrome. Some professionals now consider PMS a psychiatric disorder, and it appears as “premenstrual dysphoric disorder” in the Research Appendix of the current *Diagnostic and Statistical Manual (DSM-IV*; American Psychiatric Association, 1994). Although political, economic, and other social issues that bear upon PMS are beyond the scope of this article (but are well discussed elsewhere—e.g., see Caplan, McCurdy-Myers, & Gans, 1992; Gurevich, 1996), it is important to recognize that Western ideas about women and medicine may contribute to the pathologizing of women's health and to notions of female maladies such as PMS (Nicolson, 1995; Rodin, 1992).

Sorely needed in research on PMS are studies using a biopsychosocial perspective, examining the independent and interactive effects of biological, psychological, and social factors on the experience of menstruation. Only such multivariate approaches can resolve questions about the existence of PMS and address other aspects of menstruation—such as its positive concomitants—that have been overshadowed by research efforts focused on PMS. If they are to clarify the extant research on menstruation, studies will need to be longitudinal and prospective, incorporate appropriate control groups, use psychometrically sound measures of behavior, affect, and physical symptomatology, use reliable methods to determine cycle phase, and reflect the multiple biological, psychological, and social influences on menstruation.

#### *The Experience of Pregnancy*

The last decade has seen the introduction of scientifically sound research on normative emotional states in pregnancy and on how women respond to the variety of attendant physical, emotional, and social changes (e.g., Cameron et al., 1996; Chapman, Hobfoll, & Ritter, 1997; Da Costa, Larouche, Dritsa, & Brender, 1999; Lobel,

Yali, Zhu, DeVincent, & Meyer, 2002; Park, Moore, Turner, & Adler, 1997; Pond & Kemp, 1992; Yali & Lobel, 1999). A recent review of this literature identified several common themes (Lobel, 1998). First, women vary substantially in their experience of pregnancy, owing to a range of factors including their age, health, socioeconomic resources, work or occupational status, availability of social support, birth history, and whether the pregnancy is planned or desired. Nevertheless, some experiences of pregnancy appear to be common. Most pregnant women experience physical symptoms, alterations in work or other activities, changes in appearance, and changes in their relationships with other people (Lederman, 1996; Seegmiller, 1993; Sorenson, 1990; Tulman & Fawcett, 1990; Yali & Lobel, 1999). A few studies have documented the particular issues that concern pregnant women. Those most prevalent include the management and meaning of physical complaints, changes in appearance, changes in interpersonal relationships, and concerns about labor and delivery and about the baby's health (Affonso, Liu-Chiang, & Mayberry, 1999; Affonso et al., 1993; Yali & Lobel, 1999).

An important theme of this literature is that the vast majority of women adapt well to pregnancy-related changes, and most experience no psychological complications (Lobel, 1998; see also Dunkel-Schetter, Gurung, Lobel, & Wadhwa, 2001). Moreover, despite some popular folklore and media images depicting pregnant women as emotionally unstable, studies have found that most women experience normal levels of affect (the focus has been primarily on anxiety and depression) with great stability across the 9-month period (Lobel, 1998; Tunis & Golbus, 1991). A small portion of women experience marked fluctuations in negative affect, and some experience more gradual changes over pregnancy (Da Costa et al., 1999), but no consistent pattern of variation exists. Control groups are lacking in most research on pregnant women's emotional state (O'Hara, Zekoski, Philipps, & Wright, 1990). As a result, whether emotional lability is different in pregnant women than in other groups is unknown. Furthermore, almost no research is available on positive emotional states in pregnancy (Lobel, 1998).

### *The Role of Prenatal Stress in Adverse Birth Outcomes*

The experience of pregnancy is affected by the range of roles that a woman fulfills in her family and work life. The demands of those roles, as well as pregnancy's physical strains, can make it a stressful event for some. As elaborated below, high levels of stress can have a deleterious effect on pregnancy, increasing the likelihood of adverse birth outcomes such as low birthweight and preterm delivery.<sup>2</sup>

Exceptional growth in this research area has occurred over the past decade, fueled by statistics revealing high rates of preterm delivery and low birthweight in the United States and the enormous toll of these adverse outcomes on women, children, and families; the health care system; and society (e.g., National Center for Health Statistics [NCHS], 2000). Low birthweight survivors are at greater risk of subnormal growth, illness, and neurological problems and are more likely to require special education (Hack, Klein, & Taylor, 1995; Newnham, 1998; Thompson et al., 1997). The consequences of low birthweight create annual financial costs nationally that are estimated to exceed those of AIDS (Lewit, Baker, Corman, & Shiono, 1995).

The toll of low birthweight and preterm delivery on the mothers of these newborns is also substantial and appears to be greater than for the infants' fathers (e.g., Affleck, Tennen, & Rowe, 1990). Women who deliver a vulnerable infant are emotionally distressed, especially if the child is placed in the neonatal intensive care unit (Affleck, Tennen, & Rowe, 1991; Stern, Moritzen, Olexa, & McIntosh, 1999). When vulnerable infants are cared for at home, mothers often encounter additional stressors, including an exhausting caregiving routine, which heightens their distress (DeLuca, Lobel, & Meyer, 1999; Whiffen, 1988).

Several factors have led to interest in the role of prenatal maternal stress (PNMS) in adverse birth outcomes.<sup>3</sup> First, medical conditions that place women at risk (including prenatal complications or a history of obstetric problems) account for only half to two thirds of all cases of adverse birth outcomes (Shiono & Behrman, 1995; Wall, 1988). Second, socioeconomically disadvantaged women and women of color, especially African Americans, disproportionately experience adverse birth outcomes (NCHS, 2000). Insufficient prenatal care, poor nutrition, and cigarette smoking explain only a small portion of the adverse birth outcomes among these groups (Blackmore et al., 1993; Gazmararian, Adams, & Pamuk, 1996; Kramer, 1998; Paneth, 1995). PNMS is a potential mechanism for the impact of socioeconomic conditions and ethnicity on birth outcomes. Similarly, poverty and perceived racism have been shown to impair physical health (Adler et al., 1994; Clark, Anderson, Clark, & Williams, 1999).

A central dilemma facing researchers is how to operationally define PNMS. Historically, PNMS was measured by assessing state anxiety (e.g., Norbeck & Anderson, 1989; Pagel, Smilkstein, Regen, & Montano, 1990) or stressful life events (e.g., Hagoel et al., 1995; Mutale, Creed, Maresh, & Hunt, 1991; Norbeck & Anderson, 1989; Pagel et al., 1990). These measurement approaches have been criticized on conceptual grounds (e.g., Dunkel-Schetter et al., 2001; Lobel & Dunkel-Schetter, 1990; Lobel, 1994) because they focus exclusively on women's emotional responses (anxiety) or on stimuli (life events) that evoke stress. A more reliable and theoretically founded approach to stress measurement is achieved by a multivariate approach incorporating indices of stressful stimuli, individual perception, and response (Lazarus & Folkman, 1984; Lobel & Dunkel-Schetter, 1990). According to a comprehensive review of the literature examining effects of PNMS on birth outcome (Lobel, 1994), studies using multivariate measurement approaches to stress have provided some of the most definitive evidence available that PNMS has deleterious impact, as have studies published since that review (e.g., Hobel, Dunkel-Schetter, Roesch, Castro, & Arora, 1999; Rini, Dunkel-Schetter, Sandman, & Wadhwa, 1999). For example, Lobel, Dunkel-Schetter, and Scrimshaw (1992) constructed a factor consisting of repeated assessments of prenatal state anxiety and perceived

<sup>2</sup> Low birthweight is defined as less than 2,500 g (approximately 5.5 lbs); delivery is defined as preterm if it occurs prior to 37 weeks of gestation.

<sup>3</sup> Related to PNMS is the research on social support and work strain in pregnancy; because these constitute separate, large bodies of literature, consideration of these topics is beyond the scope of the present article. Interested readers are referred to several excellent reviews (e.g., Dunkel-Schetter, Sagrestano, Feldman, & Killingsworth, 1996; Woo, 1997).

chronic stress, as well as distress engendered by life events during pregnancy. When medical risk was controlled, this factor predicted birthweight and gestational age at delivery in a sample of socioeconomically disadvantaged women. Similarly, Hobel and colleagues (1999) found that a composite index of state anxiety and perceived stress at two timepoints was associated with preterm delivery.

Other methodological and conceptual problems plague research on PNMS (Hoffman & Hatch, 1996; Lederman, 1995a; Lobel, 1994; Paarlberg, Vingerhoets, Passchier, Dekker, & Van Geijn, 1995), making the literature difficult to summarize. Despite these weaknesses, an impressive convergence of evidence reveals that stress during pregnancy is deleterious. In studies published from 1970 through the early 1990s, a consistent association has emerged between number of life events experienced in pregnancy and low birthweight, and somewhat less consistent associations with gestational age or preterm delivery (Hoffman & Hatch, 1996; Lederman, 1995a; Lobel, 1994; Paarlberg et al., 1995). State anxiety and subjective appraisals of life event stress are associated with labor and delivery complications (e.g., Georgas, Giakoumaki, Georgoulas, Koumandakis, & Kaskarelis, 1984; see review by Lobel, 1994).

In the past decade, a number of influential PNMS studies have appeared, especially in the medical and epidemiological literature. Several used samples large by comparison with those from the previous decades (Copper et al., 1996; Hedegaard, Henriksen, Secher, Hatch, & Sabroe, 1996; Nordentoft et al., 1996), as well as proper statistical controls for variables such as education, age, and substance use that are often confounded with PNMS effects on birth outcome. Across studies, effects of stress on preterm delivery were statistically significant, although at levels that might be too small to discern in smaller samples. Nevertheless, these studies used limited measures of stress administered at a single time point, raising the same doubts about stress conceptualization that apply to earlier research.

The past decade also has seen growth in research on physiological and behavioral mechanisms that account for PNMS effects on birth outcomes, although this research is in its infancy and few direct investigations of PNMS, mediators, and birth outcomes exist in humans. Neuroendocrine, hormonal, and immunological variables have been implicated as physiological mediators. For example, levels of corticotropin-releasing hormone in the hypothalamus, pituitary gland, and placenta that are elevated under conditions of stress are thought to trigger preterm labor (e.g., Dunkel-Schetter, 1998; Hobel et al., 1998; Wadhwa, Porto, Garite, Chicz-DeMet, & Sandman, 1998). Other putative physiological mechanisms include stress-induced immunosuppression, resulting in infectious processes that induce premature birth (e.g., Garite, 1994), and the impact of stress on the sympathetic nervous system, which can reduce blood flow to the uterus and placenta (e.g., Shepherd, Stanczyk, Bethea, & Novy, 1992).

Impaired nutrition and physical activity, smoking, alcohol, and substance use have received the greatest attention as behavioral mechanisms of stress effects on birth outcome (e.g., Bresnahan, Zuckerman, & Cabral, 1992; Chomitz, Cheung, & Lieberman, 1995; Hutchins & DiPietro, 1997; McCormick et al., 1990; Paarlberg et al., 1999; A. Rodriguez & Bohlin, 2000). In a review, Dunkel-Schetter et al. (2001) concluded that in the majority of studies, PNMS was related to greater likelihood of the types of

health-impairing behaviors that may result in adverse birth outcomes. This evidence was consistent across age, marital status, ethnicity, and socioeconomic status.

A number of important questions remain regarding PNMS. One is whether critical periods exist when the fetus is particularly vulnerable to PNMS and whether the specific effects of prenatal stress are correlated with its time of occurrence (Dunkel-Schetter & Lobel, 1998; Glynn, Wadhwa, Dunkel-Schetter, Chicz-DeMet, & Sandman, 2001; Lobel, 1994). However, evidence is accumulating that chronic stress may be more deleterious than episodic stress in pregnancy (Coe & Crispen, 2000; Dunkel-Schetter et al., 2001; Dunkel-Schetter & Lobel, 1998; Lobel, DeVincent, Kaminer, & Meyer, 2000). An additional area of inquiry involves the possibility that PNMS may have interactive effects with variables such as socioeconomic status, ethnicity, or medical risk (e.g., Orr et al., 1996; see Hoffman & Hatch, 2000, for an example of interactive effects between prenatal depression and socioeconomic status). These factors may establish a level of vulnerability in which women are particularly sensitive to PNMS. There has been notable improvement in the ethnic and socioeconomic diversity of participants in PNMS studies (e.g., Edwards et al., 1994; Lobel et al., 1992; Orr et al., 1996; Rini et al., 1999), facilitating analyses of the impact of these variables as moderators of PNMS effects. Similarly, particular intrapersonal, interpersonal, or structural resources, as yet unidentified, may buffer the impact of PNMS.

A second critical direction for research is to explore the long-term effects of PNMS on cognitive, motor, sensory, and socioemotional development in infancy and childhood. A number of well-controlled experiments in rodents (e.g., Koehl, Barbazanges, Le Moal, & Maccari, 1997; Vallee et al., 1997; Williams, Hennessey, & Davis, 1995) and nonhuman primates (e.g., Coe, Lubach, & Schneider, 1999; Schneider, Roughton, Koehler, & Lubach, 1999; Worlein & Sackett, 1995; see review by Schneider & Moore, 2000) demonstrate the injurious effects of PNMS on behavior and development after birth. Strong evidence also indicates that stress affects development prenatally through its impact on fetal brain morphology, receptor density and sensitivity, central nervous system function, and activity of the fetal autonomic and neuroendocrine systems (e.g., Sandman, Wadhwa, Chicz-DeMet, Porto, & Garite, 1999; Vallee, Mayo, Maccari, Le Moal, & Simon, 1996; Weinstock, 1997; Weinstock, Poltyrev, Schorer-Apelbaum, Men, & McCarty, 1998; Worlein & Sackett, 1995). Results of these studies are especially important when extrapolated to humans because organisms are most vulnerable to environmental insults such as PNMS during periods of fastest growth, and cell division during human gestation is more rapid than in other species (Wadhwa, 1998). A few well-conducted studies of the impact of PNMS on human developmental outcomes have been mounted and promise important results over the next several years (e.g., Huizink, 2000).

Finally, basic research is needed to document the emotional and psychological experience of pregnancy and to determine how women approach the changes that typically occur during this 9-month period. Little is known about positive affect during pregnancy or coping resources and behaviors that enable women to adapt well (Lobel et al., 2002). As psychological research on pregnancy progresses into the next decade, we also can expect to improve understanding of factors that contribute most centrally to PNMS, including situational strains such as partner abuse (e.g., J.

Campbell et al., 1999) or poverty (Stein, Lu, & Gelberg, 2000), maternal perceptions, and dispositions (e.g., Lobel et al., 2000; Rini et al., 1999). Furthermore, it is likely that knowledge will accrue regarding behavioral and physiological mechanisms that account for adverse effects of stress. These advancements in knowledge about the moderators, sources, and mediators of stress effects are necessary to design effective interventions, which may target reduction of stress (e.g., Affonso, De, Korenbrot, & Mayberry, 1999; Lederman, 1995b) or prevention of its behavioral and physiological sequelae (see Alexander & Korenbrot, 1995; Korenbrot & Moss, 2000).

### *Postpartum Depression*

The period following childbirth necessitates a range of psychological, social, and physical adjustments. Among numerous indicators of adjustment that have been examined (e.g., anxiety, Stuart, Couser, Schilder, O'Hara, & Gorman, 1998; and self-esteem, Fontaine & Jones, 1997), depression has received by far the greatest empirical attention (e.g., Nonacs & Cohen, 1998; O'Hara & Swain, 1996; Whiffen & Gotlib, 1993). Nevertheless, although postpartum mood fluctuations are more pronounced than in nonparturient women, positive mood ratings are consistently greater than negative mood ratings during the postpartum period (e.g., O'Hara et al., 1990). The three depressive-spectrum phenomena in the postpartum period include (a) postpartum blues, which involves mild symptoms occurring during the first 10 postpartum days; (b) postpartum psychosis, a psychotic episode—often with depressive features—occurring 3 to 14 days postpartum in 0.1% to 0.2% of parturient women (Kumar, 1994; Rhode & Marneros, 1993); and (c) postpartum depression, with symptoms of a major depressive episode (American Psychiatric Association, 1994). The *DSM-IV* includes a course-specific designation of "postpartum onset," indicating that the episode begins within 30 days after delivery.

There has been some question as to the distinctiveness of postpartum depression from nonpostpartum depression (e.g., Stanton & Danoff-Burg, 1995). One reason is that the prevalence of postpartum depression is similar to that in nonchildbearing women: In a meta-analysis of 59 studies, O'Hara and Swain (1996) found a prevalence of 12% when structured interviews were used to diagnose postpartum depression and 14% when self-report measures of symptom severity were used. A second reason is that risk factors for postpartum and nonpostpartum depression are similar (Stanton & Danoff-Burg, 1995). The strongest predictors of postpartum depression are history of mood disturbance before or during pregnancy, poor marital relationship, low social support, and the occurrence of stressful life events (for reviews, see L. J. Miller, 1999; Nonacs & Cohen, 1998; O'Hara & Swain, 1996). Although a long-held assumption is that hormonal changes following childbirth precipitate postpartum depression, no consistent support exists for this notion (O'Hara, 1994; Steiner, 1998).

A third reason for questioning the distinctiveness of postpartum depression from non-birth-related depression is that the symptoms experienced with each disorder are similar (Stanton & Danoff-Burg, 1995). However, some evidence suggests that postpartum onset leads to a different course of depression compared with nonpostpartum onset (Steiner & Tam, 1999). In a longitudinal study of primiparous women experiencing current postpartum de-

pression, Cooper and Murray (1995) found that those with a previous history of a mood disorder were at a higher risk in subsequent years for nonpostpartum depression but not for postpartum depression. Similarly, postpartum depressed women with no previous mood disorder had an elevated risk for future postpartum depression but not for nonpostpartum depression. These findings are supported by Hunt and Silverstone's (1995) study in which women with bipolar disorder with postpartum onset had a higher rate of postpartum relapse compared with women with bipolar disorder without postpartum onset.

Finally, an alternative perspective is that postpartum depression is a normal, healthy response to a series of losses that many mothers experience, including their previous identity, their social network, and in some cases, their employment (Mauthner, 1993; Nicolson, 1998). This perspective focuses more on women's social situation than on their psychological state. From interviews with women who identify themselves as having suffered from postpartum depression, V. Taylor (1996) theorized that a major source of postpartum depression is the guilt and shame that some women feel when they do not experience idealized emotions about motherhood and feel they do not measure up to the selfless and sacrificing model of motherhood prevalent in our culture. From this perspective, the solution to postpartum depression is not to pathologize women's feelings but to challenge the notion that only women are fit to parent and to encourage other adults such as a woman's partner to share childrearing responsibilities (V. Taylor, 1996).

*Treatment.* In the past decade, a notable increase is apparent in controlled, randomized experiments on treatment of postpartum depression. Several have examined the usefulness of psychotherapy or counseling, with strong evidence of effectiveness. O'Hara and colleagues (O'Hara, Stuart, Gorman, & Wenzel, 2000) randomly assigned 120 parturient women meeting *DSM-IV* criteria for major depression to 12 weeks of interpersonal therapy or a waiting list control group. Women in interpersonal therapy were significantly more likely to recover from depression than those in the control group. In a study of Swedish women, Wickberg and Hwang (1996) similarly found that women randomly assigned to receive six 1-hr counseling sessions from a Child Health Clinic nurse were significantly more likely to recover from depression than those who received routine primary care alone. In a third study (Misri, Kostaras, Fox, & Kostaras, 2000), women who were randomly assigned to seven psychoeducational sessions—of which their marital or cohabiting partner attended two—experienced a more pronounced decrease in depressive symptoms than women assigned to seven individual psychoeducational visits.

Recent research also documents the effectiveness of antidepressant medication in treating postpartum depression. For example, Appleby, Warner, Whitton, and Faragher (1997) examined the effectiveness of fluoxetine and cognitive-behavioral therapy in a well-controlled study of depressed parturient women. Both the pharmacological and cognitive-behavioral interventions significantly improved symptoms, although the combination of these treatments was no better than their individual application.

The demonstrated effectiveness of both psychosocial and pharmacologic interventions provides women with a choice of treatment (Appleby et al., 1997). Using antidepressant medication in parturient women may be problematic, however, because the drugs are secreted into breast milk, exposing infants of mothers who

breastfeed. In a recent review, Llewellyn and Stowe (1998) observed that exposure to antidepressant drugs via breast milk has produced few negative health effects in infants, although they note that existing studies are not definitive owing to methodological weaknesses.

Finally, although only weak evidence supports an association between hormone levels and postpartum depression (see review by Hendrick & Altshuler, 1999), a recent well-controlled study found that depressed parturient women treated with transdermal estrogen for 6 months experienced greater improvement than those receiving placebos (Gregoire, Kumar, Everitt, Henderson, & Studd, 1996). Currently, the use of estrogen to treat postpartum depression is considered experimental, as data supporting its effectiveness are limited (Spinelli, 1999).

*Prevention.* Recent studies also have attempted to identify women at high risk of postpartum depression and to prevent an episode in those who have experienced a previous postpartum depression or other mood disorder. Although primary care physicians have an excellent opportunity to screen for risk of postpartum depression, they often do not do so (C. T. Beck & Gable, 2000; Stuart, O'Hara, & Blehar, 1998). Brief instruments based on known risk factors have been developed in recent years to identify women at highest risk for postpartum depression. However, in one study, scores on a screening instrument administered at 38 weeks of pregnancy did not differentiate between depressed and nondepressed women at 8 weeks postpartum (Appleby, Gregoire, Platz, Prince, & Kumar, 1994). Examination of the predictive validity of a second instrument is underway (C. T. Beck & Gable, 2000).

Prevention studies have focused on the use of estrogen, psychotropic drugs, and psychosocial interventions. Two studies using small samples of women with a previous postpartum depression found that estrogen administration following delivery successfully reduced the incidence of postpartum depression (Hamilton, 1992; Sichel, Cohen, Robertson, Rutenberg, & Rosenbaum, 1995), although these studies lacked a control group and had other methodological weaknesses.

Psychotropic drugs have shown uneven effectiveness in preventing postpartum depression among women with a history of mood disorder. A recent randomized, controlled trial found no effect of nortriptyline compared with placebo (Wisner et al., 2001). However, in a prior study examining antidepressant medication in conjunction with psychiatric monitoring following delivery, treatment with nortriptyline or another drug previously successful in treating depression for the individual woman effectively reduced the incidence of postpartum depression compared with placebo (Wisner & Wheeler, 1994).

Research on psychosocial prevention measures also has produced equivocal results. S. A. Elliott et al. (2000) found that first- and second-time mothers identified as vulnerable to postpartum depression randomly assigned to a "preparation for parenthood" group during the first 3 months postpartum experienced lower levels of depressive symptoms than women who were not assigned to a group. The intervention's impact was strongest for first-time mothers. In contrast, two other studies (Brugha et al., 2000; Small, Lumley, Donohue, Potter, & Waldenstrom, 2000) that also used random assignment and proper control groups did not reveal significant benefit of psychosocial interventions.

*Directions for research.* A major goal of future research on postpartum depression is to examine how mood disorders with

postpartum onset may be different from other mood disorders. To examine the unique characteristics of postpartum depression, studies must differentiate women suffering from a first-time depression versus a recurrent episode, women with early postpartum onset versus late postpartum onset, and women with a history of postpartum only, nonpostpartum only, or both types of episodes (Steiner & Tam, 1999).

Although questions linger about the distinctiveness of postpartum depression as a disorder, the negative consequences of depression for a woman, her child, and family are clear. Depression reduces a woman's ability to function effectively at home or work and can impair relationships with family and friends (O'Hara, 1994). A substantial literature indicates that clinical and subclinical levels of maternal depression are associated with behavioral and emotional problems in children (e.g., Downey & Coyne, 1990; Gelfand & Teti, 1990; Weinberg & Tronick, 1998). Many researchers agree that women suffering depression after childbirth are an underserved population and that prevention efforts have been lacking (e.g., Brugha et al., 2000; Herz, 1992; Spinelli, 1999). It has been suggested that all women should be screened for depression during the postpartum period (Nonacs & Cohen, 1998). An important goal for future research is to develop a standardized screening tool to identify women at risk for developing postpartum depression (O'Hara, 1994). Furthermore, longitudinal studies of women experiencing postpartum depression are needed to provide a better understanding of the long-term effects of postpartum depression for women and their families (O'Hara, 1994).

Finally, an area that has seen little attention is the role that spouses or partners can play in preventing or aiding recovery from depression. Lack of social support is a well-established contributor to postpartum mood disorders (N. L. Collins, Dunkel-Schetter, Lobel, & Scrimshaw, 1993; O'Hara, 1986). Partners are often an excellent source of instrumental social support (e.g., sharing of childcare and domestic responsibilities) and emotional support, and they can communicate with family members who may not understand the nature of the disorder (Hickman, 1992). Further research is needed to identify the type and amount of social support that is most helpful in preventing and alleviating postpartum depression.

### Women's Experience of Infertility

A majority of women seek motherhood, and a significant number have difficulty conceiving or carrying a pregnancy to term (i.e., impaired fecundity). Based on National Survey of Family Growth interviews conducted in 1995 with 10,847 women, 7.1% of married couples (2.1 million) met criteria for infertility (i.e., no contraceptive use and no pregnancy for 12 months or more; Abma, Chandra, Mosher, Peterson, & Piccinino, 1997). Furthermore, an estimated 15% of recognized pregnancies result in spontaneous abortion (i.e., miscarriage) prior to 20 weeks gestation (Hill, 1995), and approximately 1% of pregnant women have experienced two or more miscarriages (Regan, 1991). About 44% of those with impaired fecundity seek medical services, particularly those who are White, older, married, childless, and more affluent (A. Chandra & Stephen, 1998). Although the majority of women with fertility problems can attain a viable pregnancy during medical treatment, distinct diagnoses and treatments carry disparate pregnancy rates (Speroff, Glass, & Kase, 1999). For example, about one third of

women who defer pregnancy until their mid- to late 30s are estimated to have a fertility problem, and several treatments become less successful as women age (Speroff et al., 1999).

### *Psychological Factors as Causal in Infertility*

The contention that psychological factors are causal in infertility has a long history. Derived from psychoanalytic theory, the psychogenic model postulated that women's unconscious conflict caused fertility problems. Although this model still receives attention (e.g., Kipper & Zadik, 1996), biomedical causes have been established for the substantial majority of fertility problems. Researchers now focus on investigating infertility as a stressor and posit a circumscribed role for psychological contributors to infertility. Substantial experimental evidence demonstrates that a variety of stressors can induce reproductive failure in nonhuman animals (e.g., deCatanzaro & Macniven, 1992; Rivier, Rivier, & Vale, 1986). Further, physical stressors, such as intense and prolonged exercise, can produce menstrual disturbances and compromised fertility in humans (Chen & Brzyski, 1999). The biological pathways through which stress might affect reproduction in humans, primarily mediated through the hypothalamic-pituitary-adrenal axis, are increasingly well understood (e.g., Domar & Seibel, 1990; Schenker, Meirow, & Schenker, 1992), although no comprehensive theory has been advanced to specify the relations among specific psychological factors, biological processes, and reproductive outcomes.

Research on the links between a variety of psychological variables (e.g., neuroticism, coping style, depressive symptoms, distress) and reproductive status has yielded equivocal findings. Some evidence supports associations of these factors with ovulatory function, spermatogenesis, and treatment outcomes in presumed fertile and infertile individuals (e.g., Berga, Daniels, & Giles, 1997; Demyttenaere et al., 1998; Hjollund et al., 1999; Morelli et al., 2000; Thiering, Beaupaire, Jones, Saunders, & Tennant, 1993). For example, in Boivin and Takefman's (1995) study, women made daily ratings of negative emotions prior to and during a first in vitro fertilization (IVF) cycle. Although comparable on several variables at study entry, nonpregnant women reported more negative emotions during several IVF phases than did pregnant women, and distressed women had a poorer biological treatment response (e.g., less ovarian stimulation). Although these data may suggest that stress-related emotions impair treatment response, an alternative explanation is that negative emotions were a response to feedback about cycle progress from medical staff, as the authors acknowledged.

This study illustrates the point that even carefully designed prospective research is unable to establish causality regarding psychological factors and reproductive outcomes. In addition, some studies postulating a link between these factors and fertility outcomes yield null findings (e.g., Harlow, Fahy, Talbot, Wardle, & Hull, 1996), and much research is methodologically flawed (e.g., because nonstandardized measures were used). In addition, broad individual differences exist in stress reactivity, and factors that may render some women vulnerable to stressful conditions and the complex mechanisms by which stress and psychological factors contribute to reproductive processes require study. Finally, it is essential to note that if psychological factors are operative,

they may play a decidedly minor role in the etiology of infertility in comparison with biomedical causes.

### *Psychological Concomitants of Infertility*

Rather than being a discrete event, the experience of infertility unfolds gradually, often spanning many years and affecting multiple life domains. Although infertility potentially carries serious psychological impact, reviewers of the empirical literature have suggested a more circumscribed effect (Dunkel-Schetter & Lobel, 1991; Greil, 1997; Stanton & Danoff-Burg, 1995; see Eugster & Vingerhoets, 1999, for a review specific to IVF participants). Those reviewers have concluded that infertile couples generally report sound marital and sexual satisfaction. Measures of psychological symptoms yield more mixed results, with findings both of less positive and of equivalent adjustment in infertile women compared with normative groups (Stanton & Danoff-Burg, 1995). Such findings illustrate the substantial individual variability in response to infertility and the resilience of most women who face infertility.

To note that most infertile women maintain sound functioning does not imply that infertility is not stressful. For example, Freeman, Boxer, Rickels, Tureck, and Mastroianni (1985) found that 49% of women and 15% of men in infertile couples reported it as the most upsetting event of their lives, although Minnesota Multiphasic Personality Inventory (Hathaway & McKinley, 1983) profiles and anxiety were within the normal range. Research also reveals that women are more likely than men to report distress specific to infertility (e.g., Abbey, Andrews, & Halman, 1991; Newton, Sherrard, & Glavac, 1999). One explanation for this difference is that women most often bear infertility's physical burdens, typically engaging in more monitoring and medical procedures than men (Abbey, Andrews, & Halman, 1992). Second, parenthood is emphasized as a more central role for women, and thus infertility represents a more profound potential loss. Women rate becoming a parent as more important than do men in infertile couples (e.g., Abbey et al., 1991), and partners who differ in importance placed on having a child are likely to have poorer marital adjustment (Berg & Wilson, 1995). Third, women's greater distress may reflect a general tendency to appraise negative events as more stressful than do men (e.g., S. M. Miller & Kirsch, 1987). Women also may feel more strain from managing fertility issues in the couple's social circle (e.g., Tennen, Affleck, & Mendola, 1991). Finally, although differing in magnitude of distress, partners' patterns of distress as they undergo IVF are similar (Boivin et al., 1998).

### *Risk and Protective Factors for Adjustment to Infertility*

A stress and coping framework (e.g., Lazarus & Folkman, 1984) can guide the specification of predictors of adjustment to infertility, suggesting the influence of enduring environmental, personal, and social attributes, as well as situation-specific cognitive appraisals and coping processes. The broader cultural context is studied primarily in disciplines other than psychology (e.g., Becker, 2000). In the psychological literature, several demographic attributes (e.g., higher socioeconomic status, Koropatnick, Daniluk, & Pattinson, 1993; having other children, Newton et al., 1999) and personality attributes (e.g., high self-esteem, Koropat-



nick et al., 1993; optimism, Litt, Tennen, Affleck, & Klock, 1992) have been associated with better adjustment to infertility or related medical procedures. Dyadic variables and social support also have received attention, with several studies documenting a relation between social support and positive adjustment (Abbey, Halman, & Andrews, 1992; Hirsch & Hirsch, 1995; Stanton, Tennen, Affleck, & Mendola, 1992; cf. Hynes, Callan, Terry, & Gallois, 1992).

Specific infertility treatments are differentially demanding, and number and cost of such treatments are associated with perceived stress (Abbey, Halman, & Andrews, 1992; Lukse & Vacc, 1999). Research on relations of medical factors (e.g., diagnosed cause, infertility duration) to adjustment has yielded mixed results (e.g., Berg & Wilson, 1991; Boivin, Takefman, Tulandi, & Brender, 1995; Domar, Seibel, Broome, Friedman, & Zuttermeister, 1992; Mikulincer, Horesh, Levy-Shiff, Manovich, & Shalev, 1998). The meanings attributed to these factors may have more impact than the medical factor itself, such that blaming oneself for a fertility problem is related to poorer adjustment (e.g., Morrow, Thoreson, & Penney, 1995).

With regard to cognitive appraisals, couples typically perceive infertility as potentially both harmful (e.g., role loss) and challenging (e.g., marital strengthening). Finding positive meaning in infertility predicts better adjustment (e.g., Abbey & Halman, 1995; Mendola, Tennen, Affleck, McCann, & Fitzgerald, 1990). Greater perceived control also is related to better adjustment when the relevant domain is indeed controllable (e.g., Abbey & Halman, 1995; S. M. Campbell, Dunkel-Schetter, & Peplau, 1991).

A consistent finding regarding coping processes is that avoidance-oriented coping is associated with poorer adjustment (Berghuis & Stanton, 2002; Hynes et al., 1992; Litt et al., 1992; Morrow et al., 1995; Prattke & Gass-Sternas, 1992; Stanton et al., 1992; Terry & Hynes, 1998). Approach-oriented strategies, such as problem-focused coping and emotional approach, predict better adjustment (Berghuis & Stanton, 2002; Hynes et al., 1992; Prattke & Gass-Sternas, 1992). For most, infertility is a dyadic stressor, and partners cope somewhat differently (Jordan & Revenson, 1999). One partner's coping has been shown to affect the other's adjustment (Berghuis & Stanton, 2002).

### *Directions for Research*

We need to move beyond the descriptive, cross-sectional methodologies that characterize much of this literature and that focus on documenting distress in infertile women to investigate predictors of psychological and reproductive outcomes in women and couples within longitudinal and experimental designs. Extant research points to several targets for productive intervention with infertile women and couples, such as bolstering perceived control and approach-oriented coping. Controlled research targeting factors such as these in cognitive-behavioral interventions (e.g., Domar, Clapp, Slawsby, Dusek, et al., 2000; Domar, Clapp, Slawsby, Kessel, et al., 2000; McQueeney, Stanton, & Sigmon, 1997) is promising with regard to psychological outcomes and may affect likelihood of parenthood (although such findings should be viewed with caution).

The burgeoning use of infertility services and specific assisted reproductive technologies (ART; i.e., techniques involving direct retrieval of oocytes from the ovary, Speroff et al., 1999) is evi-

denced by 15% of reproductive-aged women reporting infertility service use (Abma et al., 1997), as well as by 73,069 ART cycles initiated in the United States in 1997 and 17,311 resulting deliveries (25,059 babies) (Society for Assisted Reproductive Technology and American Society for Reproductive Medicine, 2000). This context provides opportunity for theoretically grounded studies of decision making, stress, and coping in infertile women and couples as they elect various medical procedures. For example, research is needed regarding (a) utility of psychological assessment of infertility patients and gamete donors (Covington, 1995; Klock, Stout, & Davidson, 1999); (b) short- and long-term adaptive consequences of engaging in ART for women, such as managing repeated disappointing outcomes or multiple pregnancy, as well as for oocyte donors (4,616 donor oocyte cycles were initiated in 1997; Elster, 2000; Hammarberg, Astbury, & Baker, 2001; Kaloglou & Geller, 2000; Klock & Greenfeld, 2000); and (c) psychosocial implications of ethical issues surrounding ART for women and couples (e.g., Blankenship, Rushing, Onorato, & White, 1993; Ethics Committee of the American Society of Reproductive Medicine, 1999).

Finally, the fact that research primarily involves women who are married, affluent, White, and participating in specialized fertility treatments points to a pressing need for research with those who do not or cannot elect specialized medical procedures and examination of the generalizability of extant findings to other groups, including lesbians (Wendland, Byrn, & Hill, 1996), women of diverse ethnicities, and less affluent women. Studies in countries in which treatment is subsidized and thus available to a more representative population (e.g., Hammarberg et al., 2001) can inform this research.

### *The Experience of Menopause*

Menopause is the cessation of menstruation associated with loss of ovarian activity. Natural menopause occurs over a period of years, with a gradual decrease in ovulatory cycles, characterized by increasing luteinizing and follicle stimulating hormones and declining estrogens. The current standard for menopause is a period of 12 months with no menstruation. The progression to menopause from perimenopause, involving irregular bleeding or menstrual cessation of fewer than 12 months, ranges from 2 to 8 years (Matthews & Cauley, 1999). The median age for natural menopause is 51, typically ranging between 40–55 years. Early age at natural menopause is associated with lean body weight, low socioeconomic status, nulliparity, and smoking (Holte, 1998; Matthews & Cauley, 1999). Given current life expectancies, women will spend nearly a third of their lives postmenopausal. Further, menopause is associated with long-term health consequences such as cardiovascular risk and loss of bone mineral density (see Matthews & Cauley, 1999). To reduce these potential health risks as well as physical and psychological symptoms associated with menopause, many women elect hormone replacement therapy (HRT) in the form of either estrogen alone or in combination with progestin.

### *The Methodological Context of Research on Menopause*

The literature on menopause has several methodological and conceptual limitations. Extant studies may not capture the vari-

ability in women's experience due to its focus on negative outcomes (e.g., sexual dysfunction, depression). Although researchers have not conducted large-scale studies to characterize positive psychological concomitants of menopause, many women likely do not find menopause a negative experience and may focus on its benefits, such as freedom from menstrual cycles and the need to be concerned with birth control, and from other menstruation-related social and religious restrictions, which vary across cultures (Hulka & Meirik, 1996).

A first methodological limitation involves sampling and subsequent generalizability. Many early studies examined women seeking treatment for menopausal symptoms, who likely do not represent the general population (Dennerstein, 1996). Further, some studies have not distinguished women experiencing natural versus surgical (i.e., hysterectomy and oophorectomy) menopause, which may have different predictors and outcomes. For example, women with more severe physical and psychological symptoms may be more likely than asymptomatic women to be referred for surgery, and the rapidly changing hormonal environment after surgery may produce more severe effects than does natural menopause (Derry, Gallant, & Woods, 1997; Holte, 1998). Second, randomized, controlled trials (e.g., of HRT) and prospective, longitudinal, population-based studies of menopause are rare, and many studies have not disentangled effects of aging from effects of menopause-related endocrine changes (Dennerstein, 1996; Matthews & Cauley, 1999; Pearce, Hawton, & Blake, 1995). Third, participants often are aware of the researcher's interest in menopause, which may affect reporting (McCoy, 1998). Fourth, many studies comparing groups of women have not considered preexisting between-group differences. For example, women who elect HRT are more educated, have higher income, and have more contact with physicians than women who do not (e.g., Matthews, Kuller, Wing, Meilahn, & Plantinga, 1996). Finally, some studies use limited indicators of outcome. For example, studies of sexuality and menopause often use only intercourse frequency rather than more comprehensive indicators of sexuality (Myers, 1995), such as the Brief Index of Sexual Functioning for Women (e.g., Mazer, Leiblum, & Rosen, 2000). What follows is a discussion of the current state of knowledge in this area, with the caveat that definitive conclusions await prospective longitudinal and experimental designs.

### *Physical Concomitants of Menopause*

The traditional biomedical view has presumed the existence of a "menopausal syndrome" characterized by hot flashes, profuse sweating, headaches, weight increase, vaginal atrophy, loss of breast firmness, dizziness, sensations of cold in the extremities, irritability, depression, insomnia, and constipation. However, research consistently has failed to demonstrate the existence of a normative menopausal syndrome. Symptoms typically do not co-occur within menopausal women and are not consistently more common in menopausal women than in premenopausal women of similar age. The only symptoms reliably associated with menopause are vasomotor symptoms (hot flashes, night sweats) and vaginal changes (e.g., vaginal dryness) (Coope, 1996; Derry, Gallant, & Woods, 1997; Gallant & Derry, 1995). In addition, vasomotor symptoms appear more commonly in women experiencing surgical than in those experiencing natural menopause (Denner-

stein, 1996), and these and other symptoms may be more prominent in perimenopause than with complete menstrual cessation (Matthews, 1992).

Even in the case of hot flashes, the symptom most reliably associated with menopause, the underlying mechanisms are complex, because endogenous hormones do not consistently predict hot flash frequency or intensity. Furthermore, considerable individual variation exists in hot flash frequency (from less than daily to three per hour) and duration (mean of 3.3 min with a range of 0.08–60 min; Greendale & Judd, 1993). Psychosocial factors such as individual expectations, stressful contexts, and cultural norms appear to moderate hot flash experience and report (Derry et al., 1997). For example, Swartzman, Edelberg, and Kemmann (1990) conducted physiological monitoring during stressful and nonstressful laboratory conditions of postmenopausal women who reported frequent hot flashes. The researchers recorded significantly more objective (defined by specific electrodermal changes) and self-reported hot flashes under stressful than nonstressful conditions, suggesting that stress may precipitate hot flashes. Women were accurate in reporting hot flashes, suggesting that laboratory stress did not merely sensitize women to their physiological states or lead them to mislabel somatic sensations as hot flashes.

### *Sexuality and Menopause*

Two reviews (McCoy, 1998; Pearce et al., 1995) concluded that menopause is associated consistently with vaginal dryness and reduced blood flow, reduced lubrication during sexual stimulation, and dyspareunia. A meta-analysis of 21 studies from 1972 to 1992 (Myers, 1995) concluded that both exogenous and endogenous hormones have some positive effect on sexuality. However, the largest difference in sexuality indicators occurred between surgically menopausal and premenopausal women, limiting conclusions about natural menopause. Important moderators of effects of menopause also may exist. Regular sexual activity appears to protect against vaginal dryness (McCoy, 1998; Pearce et al., 1995), and relationship quality influences sexuality (Matthews & Cauley, 1999). General physical and mental health, marital status, and health behaviors may better predict women's midlife sexual functioning than does menopausal status (Avis, Stellato, Crawford, Johannes, & Longcope, 2000).

### *Psychological Concomitants of Menopause*

Although early research linked menopause with depression, newer cross-sectional, epidemiological, and longitudinal studies have produced little evidence that menopause causes depression (Coope, 1996; Dennerstein, 1996; Derry et al., 1997; Holte, 1998; Matthews & Cauley, 1999; Nicol-Smith, 1996; Pearlstein, Rosen, & Stone, 1997). An exception is the finding that depression may be more likely with surgical than natural menopause, perhaps resulting from a rapidly changing hormonal environment, effects of surgery, or differential referral of depressed women to surgery (Dennerstein, 1996; Derry et al., 1997; Holte, 1998).

Compared with the contribution of menopause, psychosocial factors appear more predictive of depression in midlife women (Dennerstein, 1996; Gallant & Derry, 1995; Matthews & Cauley, 1999; Pearlstein et al., 1997). For example, Bromberger and Mat-

thews (1996) examined predictors of depressive symptoms across 3 years in a sample of 460 initially premenopausal women aged 42 to 50. When initial depressive symptoms and education were controlled, depressive symptoms at follow-up were higher among women who (a) reported stressful events, particularly chronic stress; (b) had high trait anxiety; and (c) were pessimistic and subsequently experienced a stressor. Change in menopausal status was unrelated to depressive symptoms. Woods and Mitchell (1997), in cross-sectional structural equation analyses, tested a multidimensional model of depressed mood in a multiethnic sample of 337 women aged 35 to 55. Of the postulated pathways to depressed mood (i.e., menopausal transition, stressful life context, health status), stressful life context was the strongest predictor. Menopausal changes, even as mediated through vasomotor symptoms, had little explanatory power. These findings argue for looking beyond menopausal status to the broader context of midlife women's lives in understanding depression.

### *Cognition and Menopause*

Researchers often have examined effects of HRT on cognition rather than effects of menopause per se. Recent reviews and meta-analyses (Coope, 1996; Henderson, 1997; LeBlanc, Janowsky, Chan, & Nelson, 2001; Sherwin, 1997; Sherwin, 1998; Yaffe, Sawaya, Lieberburg, & Grady, 1998) have concluded that although there are plausible biological mechanisms for and some specific cognitive effects of menopause and HRT on cognition, research to date is inconclusive.

An example of a methodologically sound study is by Shaywitz et al. (1999), who investigated effects of estrogen on brain activation patterns through functional magnetic resonance imaging in postmenopausal women who performed working memory tasks in a randomized, double-blind, crossover trial of 21 days of estrogen or placebo with a 14-day washout period in between. Estrogen significantly altered brain activation patterns (e.g., increased activation in the superior frontal gyrus during a verbal memory task) but did not affect task performance. Low error rates in both conditions suggested that the memory tasks may have been too easy, or perhaps estrogen, if it affects cognitive abilities at all, is therapeutic only for women with existing memory deficits. A recent review (LeBlanc et al., 2001) suggested that even randomized, controlled trials of HRT do not yield uniform findings, although trials that included women symptomatic from menopause yield more consistent positive effects of HRT on specific cognitive functions than those that include asymptomatic women, for whom no cognitive improvements accrue.

### *Intervention With Menopausal Women*

Most of the literature on intervention with menopausal women has focused on HRT. Recent placebo-controlled trials (e.g., Derman, Dawood, & Stone, 1995; Wiklund, Karlberg, & Mattson, 1993) and reviews have concluded that HRT can provide symptomatic relief of hot flashes and vaginal dryness (Coope, 1996; Greendale & Judd, 1993; Hulka & Meirik, 1996; Pearce et al., 1995; Rostosky & Travis, 1996). A meta-analysis (Zweifel & O'Brien, 1997) of 26 studies concluded that HRT appears effective in reducing depressed mood in menopausal women. However, the studies had heterogeneous methods (e.g., sampling, random as-

signment, type of HRT), and effect sizes varied as a function of these factors.

Although many women use HRT only during the menopausal transition for symptomatic relief, others elect use over several years, necessitating examination of its long-term benefits and risks. Potential health benefits include risk reduction for osteoporosis, cardiovascular disease, colorectal cancer, and Alzheimer's disease (e.g., see Bastian et al., 1999; Writing Group for the PEPI Trial, 1995). Potential increased risks include ovarian, endometrial, and some breast cancers (e.g., Collaborative Group on Hormonal Factors in Breast Cancer, 1997; Gapstur, Morrows, & Sellers, 1999; C. Rodriguez, Patel, Calle, Jacob, & Thun, 2001).

A review (Hulka & Meirik, 1996) of risk-benefit analyses concluded that the benefits of estrogen therapy from reduction of cardiovascular disease outweigh the increased cancer risk. However, risk-benefit analyses provide summary estimates of hormone effects, which may have important population implications but may not be relevant to subgroups or individuals (Hulka & Meirik, 1996). Noting the increase in treatment options, Col et al. (1999) developed a decision-making analytic model to compare the effects of three medications, including HRT, on risks of hip fracture, coronary heart disease, breast cancer, and life expectancy in postmenopausal 50-year-old White women. No single therapeutic choice was consistently better or worse than other choices for all women. Rather, gains in life expectancy depended on the woman's individual risk profile.

Many women do not elect or persist in HRT (D. A. Hill, Weiss, & LaCroix, 2000) but may opt for psychological and behavioral strategies, such as stress management, physical activity, and lowering caffeine and alcohol intake for reducing menopausal symptoms (Derry et al., 1997), as well as smoking cessation, nutritional supplements, low-fat and low-cholesterol diets, and exercise for preventing menopause-associated health risks (Hulka & Meirik, 1996; Rostosky & Travis, 1996). A randomized, controlled trial of a nurse-delivered intervention including symptom assessment, education, and non-HRT pharmacological and behavioral strategies versus a usual-care control (Ganz et al., 2000) in breast cancer survivors produced improvement in menopausal symptoms (i.e., hot flashes, vaginal dryness, urinary incontinence) and sexual functioning (but not self-reported vitality) in the intervention group. Such findings are promising for women who are advised or choose not to elect HRT. Finally, the lack of uniformity in physical and psychological effects of menopause suggests that many women may require no intervention and that investigation of moderators of menopausal effects has immediate clinically relevant implications.

### *Directions for Research*

Empirical attention to menopause has burgeoned in the past decade, and conceptually and methodologically sophisticated studies are emerging. Rather than producing uniform physical and psychological consequences, menopause has variable effects, necessitating continued research on moderators (e.g., expectancies, stress exposure, medical and psychological history) of both its positive and negative effects.

Women, even when well educated, feel they lack information regarding menopause (Derry et al., 1997). Women's adoption of medical and lifestyle interventions during menopause is an area

ripe for study and facilitation by health psychologists. For example, Bastian et al. (1999) are conducting a randomized trial of a tailored decision-aid intervention to improve HRT decision making. We also will learn a great deal from the Women's Health Initiative (see Matthews et al., 1997). Following large samples of women aged 50 to 79 for up to 12 years, the initiative will examine contributors to and treatments for important causes of death and disability, including cardiovascular disease, breast and colorectal cancer, and osteoporosis. It includes an observational component, a randomized trial to test the effectiveness of HRT and nutritional interventions in preventing major diseases, and investigation of psychosocial and behavioral factors. These and other studies will pave the way for understanding and promoting women's health across the lifespan.

### Conclusions

The foregoing review of research on reproductive experiences in women's lives reveals a number of advances. Over the past decade, progress is evident in (a) the growth of empirical attention to previously understudied reproductive health topics such as infertility and menopause; (b) the advent in some areas of theory-driven, biopsychosocial models that take into account relations among contextual, psychological, behavioral, and biological factors influencing women's reproductive health; and (c) inclusion of diverse groups of women in some areas. Progress across research domains is uneven. For example, relatively large scale, longitudinal designs and studies including diverse groups are more evident in the PNMS literature than in infertility research. However, cross-cutting themes point the way for future theory and research in women's reproductive health. First, consistent evidence reveals that women in general maintain positive psychological and physical functioning even in the face of very stressful reproductive experiences. However, a tendency to focus on poor outcomes remains in some areas (e.g., negative psychological concomitants of menstruation and menopause). Although this focus is not necessarily misplaced, in that it is important to identify risk factors for untoward outcomes, theory development and research in women's reproductive health would benefit from inclusion of indicators of health-promoting processes and positive outcomes.

Second, it is clear that reproductive experiences do not carry uniform effects. Rather, women are differentially resilient, and moderators of and mechanisms for the effects of reproductive experiences require intensive study. For example, it is obvious that healthy pregnancy and childbirth, for both woman and baby, can occur even under the most profoundly stressful circumstances. Under what social and environmental conditions and for women with which attributes does stress affect reproductive outcomes? What factors render a minority of women vulnerable to emotional distress during pregnancy? What are the behavioral, biological and other mechanisms through which prenatal maternal stress has its effects? In addressing these questions, researchers can benefit from established psychological theory. For example, our review illustrates that predictors of depression in the postpartum and in menopause correspond closely to contributors specified in general etiological theories of depression. Further, diversity in participant samples is necessary to examine generalizability of findings. Finally, our impression of the relevant literatures is that researchers most often focus either on biological or psychosocial parameters

but rarely attempt integration (for outstanding exceptions, see the work of O'Hara et al. [1990] on postpartum depression or Dunkel-Schetter et al. [2001] on PNMS, for example). Biopsychosocial theories are required to account for diversity in reproductive experience.

Third, conclusions regarding psychological aspects of women's reproductive health are limited by methodological drawbacks that cut across each area we reviewed. Although cross-sectional descriptive studies involving retrospective reporting are useful for generating hypotheses, they have limited utility for addressing the many remaining research questions. Longitudinal and, where possible, experimental designs that include psychometrically adequate indicators of the variables of interest are required. Finally, with notable exceptions, many findings regarding psychological aspects of women's reproductive health have not been translated into effective preventive and intervention strategies. Further, extant interventions tend to focus on individual women rather than on addressing their environmental contexts or on promoting accurate public norms regarding reproductive health issues. Development and testing of such interventions are required to optimize women's reproductive health across the lifespan.

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