To the Graduate Council:

I am submitting herewith a dissertation written by Alicia R. Baird-Fassardi entitled "The role of marital quality and social support in pregnancy adaptation in an internet sample of pregnant women." I have examined the final paper copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Psychology.

Leonard Handler, Major Professor

We have read this dissertation
and recommend its acceptance:

John Lounsbury, Ph.D.

Debora R. Baldwin, Ph.D.

Maricarmen Malagon-Rogers, MD.

Accepted for the Council:

Vice Provost and Dean of Graduate Studies

THE ROLE OF MARITAL QUALITY AND SOCIAL SUPPORT IN PREGNANCY ADAPTATION IN AN INTERNET SAMPLE OF PREGNANT WOMEN

A Dissertation

Presented for the

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Degree

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Alicia R. Baird-Fassardi

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Alicia R. Baird-Fassardi ~ August 2003

ABSTRACT

There is growing evidence that women who experience depression, anxiety, and obstetric complications during pregnancy have significantly higher rates of adverse birth outcomes and postpartum depression. The present study examined hypotheses about the possible roles of marital quality and social support in measures of pregnancy adaptation. Marital quality was measured using the Dyadic Adjustment Scale (Spanier, 1976), and social support using the Social Provisions Scale (Cutrona & Russell, 1987). Pregnancy adaptation was measured in terms of self-reported levels of depressive symptomatolgy, state anxiety, pregnancy-specific anxiety and number of pregnancy complications.

The participants were 808 pregnant women in the third trimester of pregnancy (ages 18-50). The data were collected over the Internet. Hypotheses specifying that marital quality and social support would have different effects on measures on pregnancy adaptation were tested in a general linear model. It was expected that social support would modify the relationship between marital quality and measures of pregnancy adaptation therefore providing evidence for the buffering effects of social support during pregnancy. Results confirmed that women who reported higher marital quality showed signs of more positive pregnancy adaptation, whereas those reporting lower marital quality showed indications of poorer pregnancy adaptation, even when controlling for medical risk factors. There was evidence that social support buffered the effects of lower marital quality. The importance of marital quality and social support during pregnancy is highlighted and the implications of the findings are discussed.

TABLE OF CONTENTS

Chapter **Page**

I. INTRODUCTION 1

Overview 1

The transition to motherhood: a biopsychosocial event 1

The role of social support in adaptation to pregnancy 6

Background 10

Research in pregnancy health: the social consequences of birth outcome 10

The link between pregnancy adaptation and birth outcome 14

The association between marriage and physical health 21

The association between the marital relationship and pregnancy health 28

Theoretical Considerations 34

The biopsychosocial model of health 34

The stress buffering effects of social support 42

Statement of the Problem 43

Synopsis of the study 43

Hypotheses 44

II. METHODS 46

Participants 46

Procedures 47

Measures 48

Medical risk factors 49

Pregnancy complications 50

Marital quality 51

Social support 53
Depressive symptomatology 54
State anxiety 56
Pregnancy-specific anxiety 57
III. RESULTS 59
Correlational analyses 59
Marital quality and pregnancy adaptation measures 61
The buffering effects of social support 62
IV. DISCUSSION 65
Implications of findings 65
The stress buffering effects of social support 68
Limitations of the study 69
Recommendations for future research 71
Conclusion 72
LIST OF REFERENCES 73
APPENDICES 114
APPENDIX 1 – Tables 115
APPENDIX 2 – Figures 124
VITA 140

LIST OF TABLES

Table **Page**

1. Summary of Descriptive Statistics for the Study Variables (N = 808) 116

2. Correlations Among Study Variables (N = 808) 117

3. Descriptive Statistics, Zero-Order and Partial Correlations for Age, Ethnicity, and Main Study Variables 118

4. Zero-Order and Partial Correlations for Marital Quality, Social Support and Outcome Measures (N=688) 119

5. Comparison of the Means of the Outcome Measures for High and Low Marital Quality 120

6. Summary of Linear Regression Analysis for Outcome Measures Predicting Marital Quality. 121

7. Selected Demographic Characteristics of the Groups by Levels of Marital Quality and Social Support (N = 622) 122

8. Means for the Total Sample and by Subgroups According to Levels of Marital Quality and Social Support 123

LIST OF FIGURES

Figure **Page**

1. Invitation to Participate in a Pregnancy Health Research Project 125
2. Welcome Page 126
3. Informed Consent Form 127
4. Demographic Information 128
5. Medical Risk Factors Questionnaire 129
6. Pregnancy Health Questionnaire 130
7. Pregnancy-related Anxiety Scale 131
8. State Anxiety Scale (from State-Trait Anxiety Scale) 132
9. Beck Depression Inventory (14 non-somatic items only) 133
10. Dyadic Adjustment Assessment (Adapted) 135
11. Social Support Provisions 137
12. Closing Page: Thank You! 139

I. INTRODUCTION

Overview

The transition to motherhood: a biopsychosocial event

Pregnancy is considered a significant life transition, requiring adaptation of many kinds, including substantial psychological and physical change. The social milieu of the pregnant woman is recognized as having a significant influence on her adaptation to pregnancy (Antonucci & Mikus, 1988; Belsky, Rovine, & Fish, 1989; Grossman, Eichler, & Winickoff, 1980; Lederman, 1984; Lobel, 1998; Rini, Dunkel-Schetter, Wadhwa, & Sandman, 1999; Ruble, D. N., Brooks-Gunn, J., Fleming, A. S., Fitzmaurice, G., Stangor, C. & Deutsch, F., 1990). This biopsychosocial perspective on pregnancy however is a fairly new phenomenon in medical science.

A review of the literature suggests that until the 1920's childbirth was considered a biological phenomenon governed by physiological laws, guided by obstetric techniques, and virtually unaffected by psychosocial processes and cultural events. During the 1920's when the impact of psychoanalysis began to be felt, there was an emergence of general clinical impressions regarding adaptation to pregnancy. This was followed, many years later, by systematic research on psychological variables.

Research by Klein, Potter, and Dyk in 1950 is considered the earliest systematic study of anxiety in pregnancy and childbirth (Grimm, 1969). This study examined the influence of attitude toward conception and pregnancy on the overall well-being of the pregnant woman (Klein et al., 1950).

The arrival of a first child is now recognized as a major life transition. Indeed, the changes that accompany new parenthood are so profound that early investigators referred to this period as a *crisis* (Dyer, 1963; Le Masters, 1957*)*. Bibring, Dwyer, Huntington, & Valenstein, (1961) concluded from their longitudinal study that a "maturational crisis" (p. 45) is a major part of the normal character of pregnancy and that the outcome of this crisis has profound effects on the early mother-child relationship. More recent investigators, however, have conceptualized the transition to parenthood as a "developmental phase" or "process" that is accompanied by considerable changes in the personal, familial, social, and sometimes in the work spheres (Cowan & Cowan, 1992; Michaels & Goldberg, 1988). This contemporary notion paints a more dynamic portrait of new motherhood as a variable and diverse phenomenon (Levy-Shiff, Dimitrovsky, Shulman, & Har-Even, 1998).

First-time motherhood is often associated with changes in intrapsychic and interpersonal adjustment (Fleming & Corter, 1988; Grimm, 1969; Kumar, Robson, & Smith, 1984; Parker, Moore, Turner, & Adler, 1997). Society's attitudes and the attitudes and behaviors of significant people in the pregnant woman's life appear to be very important in determining her reactions (Mercer, 1995; Nuckolls, Cassel & Kaplan, 1972, 1994; Zachariah, 1994b). It has been concluded that being pregnant and having a baby represent clearly defined goals for many women (Lalos, Jacobsson, Lalos, & von Schoultz, 1985) and that choosing to have a baby can be a source of significant psychosocial stress (Lobel, 1994). The most studied psychological variables during pregnancy appear to be anxiety, depression, and stress. It is noteworthy that not all women suffer emotional burdens during pregnancy; some report an increase in self-esteem (Cowan & Cowan, 1988; Leifer, 1980), and some report an increase in satisfaction in several aspects of life (Russell,

1974). Even those women who report experiencing stress during pregnancy may go on to have healthy pregnancy outcomes. There is evidence that only the women with especially high and chronic prenatal stress are at greater risk for poor outcomes (Lobel, Dunkel-Schetter, & Scrimshaw, 1992).

Pregnancy can be a significant health challenge that requires specific health-care behaviors, including the avoidance of smoking and alcohol and other toxic substances known to have a deleterious effect on the growing fetus. It appears that information regarding pregnancy actually aids pregnant women in adjusting to these new health-care regimens. There is evidence also that receiving "informational support" provides guidance with respect to adequate prenatal care, proper nutritional and health-care practices, and preparation for labor and delivery (Aaronson, 1989; Burnes-Boltonn, 1988; Zweig, LeFevre, & Kruse, 1988).

Dion (1995) asserts that becoming a parent is one of the most significant developmental tasks of adulthood and perhaps the most studied in terms of fundamental changes in role and lifestyle (see also Hock, Schirtzinger, Lutz, & Widaman, 1995; Teachman, Polonko, & Scanzoni, 1987). Lobel (1998) states that pregnancy is a distinct life experience distinguished by four unique characteristics: (1) it is a fairly lengthy process of approximately 40 weeks long, (2) birth is its predictable end point, (3) no pregnancy is the same, biologically or psychologically, and (4) pregnancy may be associated with happiness and joy but it may also entail substantial physical, emotional, financial, and interpersonal strain. For all these reasons, Lobel (1998) states "...no other major life event is quite like the experience of pregnancy" (p. 43).

The psychological aspects of pregnancy that become the focus of research appear to evolve over

time. In the 1960's and 1970's, there were substantial investigations on the development of maternal identity and its association with the attainment of the maternal role over the first year of life (Colman & Colman, 1973). Additionally, maternal identity as a correlate of parenting competence was also widely studied during that period of time (Gordeux, 1976). In the 1980's and 1990's, with the widespread acceptance of the biopsychological model of health, the social milieu and its influence on pregnancy health gained considerable attention from researchers, especially the roles of social support, the mother, the spouse, and the work environment in the pregnant woman's adaptation to pregnancy (Pattison, Gross, & Cast, 1997; Walker, Crain, & Thompson, 1986; Zachariah, 1994/a). In recent years however, most research on the transition to motherhood seems to be motivated by the health and social consequences of adverse birth outcomes. Investigators have been examining psychosocial stress as a predictor of birth outcome (Collins, Dunkel-Schetter, Lobel, & Scrimshaw, 1993; Dunkel-Schetter & Lobel, 1998; Rini, Dunkel-Schetter, Wadhwa, & Sandman, (1999); Wadhwa, Sandman, Porto, Dunkel-Schetter & Garite, 1993).

With regard to the development of maternal identity, several studies of women during pregnancy and after a first birth suggest that the sense of self as a mother is established in pregnancy (Ballou, 1978; Jessner, Weigert, & Fay, 1970; Leifer, 1980). Recent evidence for the psychodynamic basis of maternal identity comes from a study in Israel. The participants were 120 women in their third trimester of their first pregnancy. Participants' representations of their own mothers were found to fully mediate the association between internal working models and prenatal ties to their babies (Priel & Besser, 2001).

Moreover, it appears that it is during this period women have reported that the development of a

motherhood identity includes an increasingly concrete ability to visualize themselves as mothers (Leifer, 1980) and the development of feelings of competence in the impending new role. The author states that, "such self-definitional changes appear to have positive consequences for the experience of motherhood" (p. 43). Specifically, women who easily visualized themselves as mothers during pregnancy made better postpartum adjustments and reported greater satisfaction than those women who had difficulty visualizing themselves in that role (Oakley, 1980; Shereshefsky & Yarrow, 1973).

Furthermore, a Finnish study investigated how women's (and men's) personal goals change during the transition to parenthood. Participants were 348 women (152 primiparous and 196 multiparous) and 277 of their partners at 3 times: early in the pregnancy, late in the pregnancy, and 3 months afterward. Findings showed that during pregnancy women became more interested in goals related to childbirth, the child's health, and motherhood and less interested in achievement-related goals. After the birth, women were more interested in family issues. These changes were more sizeable among the first-time mothers than among the multiparous mothers (Salmela-Aro, Nurmi, Saisto, & Halmesmaeki, 2000).

Much research has focused on the transition to motherhood and the aspects in a pregnant woman's life that are associated with competent parenting. Pancer, Pratt, Hunsberger, and Gallant (2000) found that women with more complex, differentiated prenatal expectations about parenthood demonstrated higher levels of self-esteem, lower levels of depression, and better marital adjustment 6 months after their babies were born. Moreover, Sommer, Whitman, Borkowski, Schellenbach, Maxwell, & Keogh (1993) found that young women who were more "cognitively ready" (p. 389) for parenthood had lower levels of parenting stress and were more adaptive in

their parenting style. Similarly, the results of a longitudinal study indicated that at 3 months postpartum self-confidence as a mother and the perception of oneself as possessing mothering characteristics were strongly and significantly related to anticipatory self-definitions late in pregnancy (Deutsch, Ruble, Fleming, Brooks-Gunn, & Stangor, 1986).

Pregnancy is clearly a very complex and unique life experience that appears to be influenced by numerous variables of psychosocial origin. Lobel (1998) asserts that although pregnancy is in essence a biological process, it also poses substantial life changes that can affect women's emotions, behaviors, and thoughts thus making pregnancy a psychobiological process. Thus, pregnancy offers a rich set of issues for study and is of great interest to psychologists and others concerned about health.

The role of social support in adaptation to pregnancy

A search under the criteria of "*social support*" in *PsycINFO* --the database of the American Psychological Association (APA) containing more than 1,900,000 records-- returned 47,718 references. A closer look at this number of abstracts indicates that 4,917 were published in the period from 1872 to 1973. The next period, from 1974 to 1984, generated 8,832 references, followed by 25,817 references for the years from 1985 to 1999. Since year 2000 to date, there have been 8,152 published articles where the role of social support is addressed in the psychological literature. Thus, it is evident that the interest in social support as a psychological construct of significance has grown substantially in the academic community in the last three decades.

When "*social support*" and "*health*" are entered as search criteria, 13,282 references are

retrieved. Most of these abstracts pertain to the role of social support in the lives of patients diagnosed with cancer, heart disease, and AIDS (Grassi, Righi, Makoui, Sighinolfi, Ferri, & Ghinelli, F. 1999; Parker, Baile, De Moor, & Cohen, L., 2003; Penninx, van Tilburg, Boeke, Deeg, Kriegsman, & van Eijk, 1998). As predicted by Cassel (1976), links between social support and physical health have been found on diverse heath outcomes including coronary heart disease, cancer, endocrine dysfunction, and infectious illnesses. Significant relationships between social support and health outcomes have also been found in a number of less life-threatening medical contexts, including psoriasis, rheumatoid arthritis, asthma, diabetes, and acute pain (Cohen & McKay, 1984; Cohen & Wills, 1985; Cutrona, 1984; Kiecolt-Glaser & Newton, 2001).

Family relationship factors in general have also been associated with a number of health-related variables (Campbell, 1986; and Turk & Kerns, 1985) and the quantity and quality of social relationships have been reliably related to morbidity and mortality (Berkman & Syme, 1979; Cassel, 1976; Cobb, 1976; Cohen & Syme, 1985; House, Landis, & Umberson, 1988; Nuckolls, Casel, & Kaplan, 1972). Additionally, the quantity and quality of social relationships have been significantly associated with aspects of the cardiovascular, endocrine, and immune systems functioning (Kiecolt-Glaser, Fisher, Ogrocki, Stout, Speicher, & Glaser, 1987; Uchino, Cacioppo, & Kiecolt-Glaser, 1996). However, most studies have concluded that there are probably multiple physiological pathways by which social support may influence disease states.

When the search criteria included the key words "*social support*" and "*pregnancy*", however, a total number of 666 references were retrieved for abstracts published in the 13 decades since 1872 to date, with most of them (84%) published since 1985. While it is important to recognize that the number of retrieved references by these searches on *PsycINFO* are not mutually

exclusive, the number of references for the search *"social support"* and *"pregnancy"* (*N* = 666) represents five percent of the total number of references retrieved when the key words are *"social support"* and *"health"* (N = 13,282). This finding seems to indicate that the role of social support in pregnancy may be an under-represented topic in the psychological literature.

Social support in pregnancy has been identified as one of the most influential variables on pregnancy adaptation (Collins et al., 1993; Cutrona, 1984; Goldstein, Diener, & Mangelsdorf, 1996). Women consistently report either their mothers or their husbands as their primary prepartum and postpartum support givers (Crnic, Greenberg, Ragozin, Robinson, & Basham, 1983; Levit, Weber, & Clark, 1986). Furthermore, social support in pregnancy is associated with adaptation to parenthood and positive mother-infant interactions (Cutrona, 1984; Crockenberg, 1981). An investigation by Cox, Owen, Lewis, and Henderson (1989) found that first-time mothers were warmer and more sensitive with their infants when they were in close, confiding marriages during pregnancy. Support from spouse seems to have the most profound impact on outcome variables, such as maternal well-being and adaptation to motherhood (Cox, Owen, Lewis, & Henderson, 1989; Crnic et al., 1983; Isabella & Gable, 1992; Levit, Weber, & Clark, 1986) but there is also evidence of a general decline in marital satisfaction during the transition to motherhood (Belsky, Spanier, & Rovine, 1983; Levy-Shiff, 1994).

Support from one's own mother also plays an important role during the transition to motherhood (Fischer, 1981; Martell, 1990; Tinsley & Parke, 1987; Uddenberg, 1974). Fischer (1981) states, "When daughters become mothers, mothers and daughters tend to re-evaluate each other and become more involved in each others' lives" (p. 1). The author reported that daughters with children are more involved with their own mothers than daughters without children.

Supportive relationships may boost a sense of well-being, personal control, and positive mood, thereby helping women to perceive pregnancy-related changes as less stressful . This may result in lowered rates of stress-induced biochemical responses and fewer stress-related health behaviors, such as smoking and alcohol use (Pagel, Smilkstein, Regen, & Montano, 1990). Pregnancy however is not uniformly stressful for all women, and there is growing evidence that women with especially high prenatal stress are at greater risk for poor outcomes (Lobel, Dunkel-Schetter, & Scrimshaw, 1992). Consequently, the effects of social support on pregnancy adaptation and birth outcome may be more pronounced among women who experience high levels of psychosocial stress.

The predictive value of social support during normal pregnancy for pregnancy outcome was investigated by Collins, Dunkel-Schetter, Lobel, and Scrimshaw (1993) who reported that social support during pregnancy correlated with birth outcome as measured by labor progress, higher Apgar scores, and higher birth weight. They found that women who received more support during pregnancy had better labor progress and babies with higher Apgar scores. Also, women with higher quality support had babies with higher Apgar scores and experienced less postpartum depression. Lastly, those women with larger support networks also had babies of higher birth weight. These researchers suggested two general pathways: (a) emotion- or stress-induced physiological and biochemical processes and (b) health-related behavioral patterns. These findings suggest that, from a clinical viewpoint, contextual support --familial and medical-- are important during pregnancy. And from a theoretical standpoint, these findings draw attention to the complex relations between biomedical risk factors and environmental factors in predicting pregnancy adaptation, birth outcome, and infant development.

The receipt of social support has been associated with a number of protective benefits for the pregnant woman and her infant (Condon & Corkindale, 1997; Cutrona, 1984; Goldstein, Diener, & Mangelsdorf, 1996; Gottlieb & Pancer, 1988). A consistent finding is that women who receive social support during pregnancy experience more positive mental and physical health outcomes during the labor, delivery, and postpartum periods than women who do not receive support (Cutrona, 1984; Wadhwa, Dunkel-Schetter, Chicz-DeMet, & Porto, 1996). Also, research has shown that if a woman lacks adequate social support during pregnancy, negative outcomes, such as postpartum depression and insensitive parenting behavior, may follow (Cutrona, 1984; Crockenberg, 1981).

Clearly, several dimensions of social support are relevant to the transition to motherhood and mother-infant interactions. Thus, given the associations found among measures of pregnancy adaptation, birth outcomes and infant health and development, it is critical that more studies in pregnancy adaptation be conducted aiming to further illuminate the first component of a critical equation (pregnancy adaptation => birth outcome => infant health) which is not only of great value to individuals and families but to society as a whole.

Background

Research in pregnancy health: the social consequences of birth outcome

Much of the health research on pregnancy appears to be motivated by the serious social and medical ramifications of adverse birth outcomes. Preterm delivery (birth before 37-weeks gestation) and low birth weight (birth weight less than or equal to 2,500 g) are the major causes of perinatal, neonatal, and infant mortality and morbidity in the United States and low birth weight

is often a by-product of preterm delivery which accounts for 10% of all health care costs for children (Berkowitz & Papiernik, 1993; Paneth, 1995).

Apart from the human costs, the economic costs of low birth weight and early delivery are high, as neonatal intensive care has been estimated at 5 million unit days per year and an annual cost of $5 billion (National Center for Health Statistics, 1992). In 1988 alone, the cost of the care for the 3.5 to 4 million children ages 0 to 15 who had been born with low birth weight was approximately $6 billion more than it would have been if those children had been born of normal birth weight (Lewit, Baker, Corman, & Shiono, 1995). Early delivery and low birth weight are therefore important both as a clinical problem and a public health issue.

Despite the affluence of the United States and the availability of medical technology, there has been has an alarmingly high infant mortality rate, and biomedical risk factors alone are poor predictors of adverse birth outcomes (Institute of Medicine, 1985). Infant mortality is the incidence of death that occurs in the first year after birth, expressed in relation to every 1,000 live births. Infant mortality is commonly divided into two categories: neonatal deaths (occurring during the first 27 days after birth) and post-neonatal deaths (occurring from the age of 28 days to one year). Infant mortality is considered an important indicator of the general level of health for a given population (Gale Research, 1998). In 1995, the United States ranked 22nd in infant mortality out of the 29 leading industrialized nations, well behind Japan, Singapore, Germany, and most Scandinavian countries. It is often suggested that this high rate is determined by the high mortality rates among blacks in the United States. Overall, the rate of infant mortality for African-Americans is more than twice than that for whites (16.5 per 1,000 as opposed to 6.8 per 1,000 in 1993). Paneth (1995) states, "Equal opportunity for life is an American ideal that is

unfulfilled even at birth" (p. 21), when recounting that African-American infants are twice more likely to be born of low birth weight and preterm than white or Asian-American infants. However, if the white population were considered separately, the United States would still rank no better than 13th in the international comparisons (Kleinman, 1990).

Despite this gloomy ranking, infant mortality rates have been declining as a result of the technological advances that allow for saving the lives of the tiniest of infants. In 1997, 65% of all infant deaths occurred to the 7.5% of infants born at low birthweight. The three leading causes of infant death include congenital anomalies, disorders related to short gestation and low birth-weight, and Sudden Infant Death Syndrome (National Vital Statistics Reports, 1999). Furthermore, while medical innovation has played a significant role in lowering infant mortality, it has not changed the prevalence of low birth weight (Paneth, 1995). The fact that no parallel decline in low birth weight or preterm birth rates have occurred suggests that prevention efforts have been mostly unsuccessful.

The new life-saving technological advances have a human price as well. A very tiny baby often must stay in the hospital intensive care unit for months and requires constant care and attention. Hospital bills for rescuing only one of these babies can reach more than a million. Lewit, Baker, Corman, and Shiono (1995) estimated that of the $11 billion spent on health care for infants, approximately 35% of this sum is spent on saving the lives of the tiniest infants ($4 billion).

About 40,000 babies die each year in the United States, more than three-quarters of which were born too small or too early, and the proportion of deaths increases with decreasing birth weight and gestation (Shiono & Behrman, 1995). About 20% of all low weight births could be prevented

if pregnant women did not smoke cigarettes (Chomitz, Cheung & Leberman, 1995). An estimated 19% to 27 % of women smoke during pregnancy. Smoking in pregnancy is causally associated with an annual estimated 32,000-62,000 low-birthweight infants and 14,000-26,000 admissions to neonatal intensive care units (National Center for Health Statistics, 1993).

While low birth weight is often associated with preterm shortened gestation, little is known about the causes of low birth weight in the full term infant. In addition to smoking during pregnancy, other known risks factors are low maternal weight gain and low pre-pregnancy weight. These three factors are considered to account for two-thirds of growth-retarded infants. In addition to those risk factors mentioned, other factors associated with low birth weight in full term infants include African American race, first births, female sex, maternal illness, prior birth of low weight infant, and a number of genetic and metabolic disorders. Clearly, these risk factors are not easily modifiable and thus the current sense of failure in preventive efforts (Alexander & Korenbrot, 1995).

Prenatal care programs have been the strategy of choice in order to prevent low birth weight and preterm birth. Such programs have been long endorsed as a means by which to identify mothers at risk of delivering a preterm or growth-retarded infant. Providing an array of medical, nutritional, and education interventions is the main goal of preventive prenatal care. The target areas of prenatal programs generally include (1) psychosocial (aimed at smoking and other substance abuse); (2) nutritional (aimed and pre-pregnancy weight and inadequate weight gain; and (3) medical (aimed at general morbidity). However, the empirical evidence supporting the link between prenatal care and reduced rates of low birth weight has been equivocal (Alexander & Korenbrot, 1995).

Social class is clearly related to several measures of early child morbidity and mortality and many studies have shown an association between maternal social class and preterm birth. In spite of the introduction of a number of programs that give access to prenatal care to impoverished populations, the proportion of low birth weight in the United States has remained about the same over the past 30 years (Berkowitz, 1981; Pickering, & Deeks, 1991).

Preterm birth is currently the most important problem in maternal-child health in the United States and the search for possible mechanisms to prevent it is a major public health goal (Wadhwa, 2001). Given the personal and social consequences of preterm and low birth weight, investigators have become increasingly interested in the psychosocial factors that may contribute to maternal and infant health (Bragonier, Cushner, & Hobel, 1984; Istvan, 1986; Lobel, Dunkel-Schetter, & Scrimshaw, 1992).

The link between pregnancy adaptation and birth outcome

Understanding psychological adaptation during pregnancy and its impact on birth outcome involves examining the many components that influence prenatal adaptation (Rini, Dunkel-Schetter, Wadhwa, & Sandman, 1999). These factors include numerous variables of psychosocial origin, including the personal resources and the social environment of the pregnant woman (Aneshensel, 1992; Rini et al, 1999; Taylor & Aspinwall, 1996; Taylor, Repetti & Seeman, 1997). A sizable body of evidence indicates that prenatal maternal stress has an adverse impact on birth outcomes, including birth weight and gestational age at delivery. (Copper et al., 1996; Hedegaar, Henriksen, Secher, Hatch, & Sabroe, 1996; Lobel, DeVincent, Kaminer, & Meyer, 2000; Rini et al., 1999).

There is substantial evidence that women who experience more prenatal stress, depression, and anxiety have significantly higher rates of adverse birth outcomes (Dunkel-Schetter & Lobel, 1998; Lobel, 1994; Rini, Dunkel-Schetter, Wadhwa, & Sandman, 1999). These psychological variables have been found to predict infant complications even after controlling for medical risk and demographic variables (Norbeck & Tilden, 1983). However, potential mediators of these relationships continue to remain mostly unexplained.

In an attempt to elucidate possible interactions between prenatal adaptation and birth outcome, maternal variables such as personality characteristics, attitude, preparation for pregnancy, age, smoking, substance use, anxiety, mood, self-assertion, role conceptualization, childhood and medical history, and psycho-social milieu have been widely investigated (Berkowitz & Kasl, 1983; Chambers, Johnson, Dick, & Felix, 1996; Collins et al., 1993; Frisbie, Forbes, Hummer, & Pullum 1998; Gonzalez-Calvo, Jackson, Hansford, & Woodman, 1998; Norbeck & Tilden, 1983; Rini et al., 1999; Tinsley, Trupin, Owens, & Boyum, 1993).

Health-related behaviors such as smoking, and alcohol, and illicit substance use have been identified as having a direct impact on birth outcome. It is estimated that smoking during pregnancy is responsible for 20 to 30 % of low weight births and 10 % of fetal and infant deaths (Chomitz, Cheung, & Leberman, 1995). Furthermore, smoking in pregnancy has been associated with psychosocial and demographic variables such as low socioeconomic status, young age, single parent status, anxiety and depression, substance abuse, and lower educational achievement (Brooke, Anderson, Bland, Peacock, & Stewart, 1989; Pagel, Smilkstein, Regen, & Montano, 1990). This finding reinforces the notion that maternal lifestyle risk factors for adverse birth

outcome are not isolated events and need to be addressed from a biopsychosocial model of preventive care (Chomitz, Cheung, & Leberman, 1995).

The earliest comprehensive review of the psychological literature of birth outcome concluded that anxiety was the most researched variable in the studies published in the 1950's and 1960's and that these studies were plagued by methodological shortcomings (McDonald, 1968). A review by Carlson and LaBarba (1979) also concluded that anxiety was the emotional condition implicated most often in research of reproductive complications. The authors noted methodological difficulties found in most studies reviewed.

Istvan (1986), in a review of evidence for a relationship between exposure to social stressors, anxiety and birth outcomes, noted that earlier studies offered only marginal evidence for a relationship between self-reports of anxiety, life change stress, and global ratings of obstetric outcome. Furthermore, the author argued that, with a few exceptions, the weak findings in this body of research of human subjects contradict evidence from animal research which shows that exposure to chronic stress during gestation can result in unfavorable reproductive outcomes. Moreover, the author proposed that weak results are in part a consequence of a disregard, on the part of investigators, for the impact of important sociodemographic and biochemical factors on obstetric risk. Another criticism offered in this review is the tendency of many authors to use conventional correlational approaches to this type of research. It thus recommends the incorporation of some of the controls and measurement techniques used in epidemiological analyses that may lead to more definitive findings.

In fact, contemporary research has adopted the thinking advanced by Istvan (1986) and has

proposed models based on large, prospective studies using sophisticated techniques such as path-analyses and structural equation modeling (Lobel, 1998; Park, Moore, Turner, & Adler, 1997; Rini et al., 1999). This new approach has resulted in substantial new evidence indicating that women who experience more prenatal stress and anxiety have higher rates of adverse birth outcomes (see Dunkel-Schetter, 1998; Lobel, 1994; Paarlberg,, Vingerhoets, Passchier, Dekker, 1995). More recently, authors have been studying "maternal stress", a multidimensional concept that often includes measures of anxiety and depression, as part of a multivariate model of research. For example, one prospective study (Lobel, Dunkel-Schetter, & Scrimshaw, 1992) showed that high scores on state anxiety, perceived chronic stress, and life event distress predicted lower infant birth weight and shortened gestation after controlling for medical risk, parity (number of children), and maternal substance abuse.

An increase in anxiety level has been long recognized as a common feature of pregnancy (Hirst & Strousse, 1938). Consequently, a new psychological construct called "pregnancy-related anxiety" has been defined which refers to fears a pregnant woman has about her baby's health, her own health, and labor and delivery. Studies investigating this construct have shown that it has effectively predicted shortened gestation (Rini et al., 1999; Wadhwa et al., 1993). It may be noted that the relationship between such stress measures and adverse birth outcomes is apparently stronger for shortened gestation than for low birth weight or retarded fetal growth (Lobel, 1994).

The relationship between perception of stress and birth outcome has been more strongly established for lower socioeconomic status women than for women in general. Evidence for this disparity is found in a prospective sample of 1515 white middle class women living in London who were interviewed at four different times during pregnancy. Biomedical data were also

collected from the obstetric and prenatal records. The predictor variables were anxiety and depression scores and the outcome variables were five obstetric complications: pre-term delivery, nonspontaneous onset of labor, major analgesia in the first and second stages of labor, and nonspontaneous vaginal deliveries. Depression during pregnancy was unrelated to the obstetric complications and the authors concluded that while undesirable in themselves, depression and anxiety are of little importance in the evolution of obstetric complications (Perkin, Bland, Peacock, & Anderson, 1993).

Maternal psychological resources such as self-esteem, dispositional optimism, fatalism, mastery, commitment to pregnancy, trait anxiety, depression, and others have received considerable attention in recent research on pregnancy health (Norbeck & Tilden, 1983, Park, Moore, Turner, & Adler, 1997; Rini et al., 1999). For example, Lobel (2000) hypothesized that effects of observable prenatal maternal stress could be in part linked to psychological characteristics such as pessimism, which may lead women to view their lives as stressful, thus resulting in unhealthy prenatal behaviors. In a prospective study of 129 pregnant women, the authors examined the impact of prenatal maternal stress and dispositional optimism on birth weight and gestational age in a medically high-risk sample. After controlling for medical risk and ethnicity, it was found that women who were least optimistic delivered infants who weighted significantly less. Optimists were more likely to exercise, and exercise was associated with lower risk of preterm delivery. The authors concluded that chronic stress in pregnancy might be a reflection of underlying personality dispositions, which in turn contribute to adverse birth outcomes. Along a similar line of research, Rini et al. (1999) found in a prospective study of 120 Hispanic and 110 White pregnant women that those with stronger personal resources (mastery, self-esteem, and optimism) had higher weight babies whereas those who reported more stress had shorter

gestations. However, ethnic group differences were not found.

While previous studies have reported an association between maternal inner resources and pregnancy outcomes, a recent study examined the personality profiles of 938 pregnant women as tested by the Minnesota Multiphasic Personality Inventory (MMPI). The clinical and research scales as well as the validity scales were investigated in relationship to infant birth outcomes (preterm birth and low birth-weight) and 15-month-old development as assessed by the Bayley Scales of Infant Development. Results showed that mothers of low birth-weight infants scored significantly lower on the hypochondriasis scale, a relationship that was no longer significant after controlling for ethnicity. No other relationships were observed between infant birth outcomes and maternal MMPI scale scores (Schatz, Harder, Schatz, Harden, Chilingar, Fox, & Hoffman, 2000).

Some early studies on adaptation to pregnancy in human subjects showed relationships consistent with animal study findings, suggesting that high levels of anxiety during pregnancy plays a significant role in the genesis of pregnancy complications and adverse birth outcome (Brown, 1964; Davids & Devault, 1962; McDonald, Gynther, & Christakor, 1963). Furthermore, these early studies pointed to possible physiological mechanisms by which exposure to chronic stress results in adverse birth outcomes. A study involving neonatal squirrel monkeys shows that maternal exposure to chronic stress altered antibody levels in the mothers and resulted in a deficient transfer of the maternal antibody (IgG) to the baby monkey before birth. Similar findings are reported in studies of rodent pups, monkeys, and farm animals born after exposure to maternal stress (see Coe & Crispen, 2000).

There has been a recent emphasis in the search for psychobiological pathways by which poor pregnancy adaptation might result in obstetric complications and adverse birth outcome in human subjects and findings appear promising. Physiological processes, including neuroendocrine function, have been proposed as mediators of the relationship between the mother's prenatal psychological state and pregnancy outcome.

Wadhwa et al. (1996) examined a cross-sectional association between prenatal psychosocial factors and stress-related neuroendocrine parameters during pregnancy in a sample of 54 adult women with a singleton pregnancy recruited before 28 weeks of gestation. Maternal blood samples were drawn at 28 weeks of gestation for bioassays of stress-related hormones such as adrenocorticotropin hormone (ACTH), betaendorphin (betaE), and cortisol. After controlling for factors known to influence neuropeptide and hormone levels, including gestational age, circadian variation, and obstetric risk, the authors found that measures of prenatal stress, social support, and personality variables were significantly associated with plasma levels of ACTH, beta-endorphin (betaE), and cortisol. Moreover, an index of certain maternal psychosocial and demographic factors during pregnancy accounted for 36% of the variance in ACTH, 22% of the variance in the ACTH-betaE disregulation index, 13% of the variance in cortisol, and 3% of the variance in betaE. These findings provide additional evidence of the role of the neuroendocrine system as a presumed mediating pathway between prenatal psychosocial factors and biological markers of stress.

It has been hypothesized that psychological stress –roughly defined as high levels of anxiety-- might promote poor pregnancy outcome through the effects of catecholamines on placental perfusion or immune status, or through effects of hypothalamic-pituitary-adrenal (HPA) axis

hormones on fetal growth by way of hormones triggering parturition, or even altering maternal appetite or caloric utilization through the release of glucocorticoids or some other pathway (Hoffman & Hatch, 2000).

Similarly, in a review of research concerning the relation between psychosocial factors and pregnancy outcome, the most consistent finding concerns the association between maternal exposure to taxing situations and preterm delivery (Paarlberg et al. 1995). In this study, the authors hypothesized three possible pathways by which stress may influence birth outcome: (1) an indirect influence via unhealthy life style behaviors, (2) a direct influence via stress-regulating hormones, and (3) a direct influence via psycho-immunological factors.

The link between psychological adaptation in pregnancy and birth outcome has been widely examined and yet more facts are needed to determine the exact nature of this complex relationship. The recently developed biopsychosocial approaches lead the way toward illuminating such facts, and the importance of these new approaches in future research cannot be overemphasized.

The association between marriage and physical health

As part of the growing biopsychological perspective of health advanced by Engel (1977), researchers have been continuing to investigate the link between social relationships and health. The seminal reviews by Cassel (1976) and Cobb (1976) emphasizing the importance of social relationships for health have inspired an abundance of investigations focusing on the association between social ties and physical and mental well-being. Cobb (1976) drew attention to the stress-buffering effects of social support and highlighted the value of the idea that one is cared for in

fostering coping and adaptation during illness. Likewise, Cassel (1976) viewed social relationships as potentially buffering the individual from life stressors but further emphasized the importance of physiological processes in mediating the effects of social relationships on health. He wrote: " The psychosocial processes thus can be envisaged as enhancing susceptibility to disease. The clinical manifestations of this enhanced susceptibility will not be a function of the particular psychosocial stressor, but of the physicochemical or microbiologic disease agents harbored by the organism or to which the organism is exposed" (p 109).

In the prominent epidemiological work known as the Alameda County Study, Berkman and Syme (1979) assessed the relationship between social and community ties and mortality in a random sample of 6,928 adults living in Alameda County, California in 1965 and a subsequent nine-year mortality follow-up. The findings showed that people who lacked social and community ties were more likely to die in the follow-up period than those with more extensive social contacts. The association between social ties and mortality was found to be independent of self-reported physical health status at the time of the survey, year of death, socioeconomic status, and health practices such as smoking, alcoholic beverage consumption, obesity, physical activity, and utilization of preventive health services, as well as a cumulative index of health practices. The four sources of social relationships examined were (1) marriage; (2) contact with close friends and relatives; (3) church membership; and (4) informal and formal group membership.

Berkman and Syme (1979) reported that, with few exceptions, subjects who reported having each type of social interaction had lower mortality rates than respondents lacking such connections. In other words, each of the four sources was found to predict mortality independently of the other three, and the more intimate ties, such a marriage and contact with friends and relatives were

stronger predictors than the ties of church and group membership. This study also showed that in each age and sex group, people who were married had lower mortality rates than the non-married, i.e., separated, widowed, single, and divorced. One relevant question that arose from these findings was whether healthier individuals are more likely to marry and stay married, and/or whether they have more financial resources, less stress, more social support, and less risky health habits than their unmarried counterparts. The authors concluded that this question was not supported by the data.

While there are studies that showed weak or lack of relationship between social ties and morbidity or mortality (Olsen, Olsen, Gunner-Svensson, & Waldstrom, 1991), there is an abundance of evidence supporting the general findings of the Alameda County Study with regard to the link between social ties and morbidity and mortality. For example, it has been shown that married people, especially men, have better overall well-being --including lower levels of depression, anxiety, and other forms of psychological distress-- than those who are divorced, separated, single, or widowed. Most evidence indicates that the aspect of marriage most critical for psychological well-being is not the spouse's mere presence but the emotional support that the spouse provides. This support creates the sense of being cared about, loved, esteemed, and valued as a person and of having someone who cares about his or her problems (National Institute of Mental Health, 1996).

Most findings provide evidence indicating that married men and women are healthier than separated, divorced and widowed people. The loss of a spouse through divorce or death contributes to poorer health and increased mortality. Furthermore, marital disruption appears to be more detrimental for men than for women (House, Landis, & Umberson, 1988).

Marital distress has also been investigated and has been shown to negatively impact physical health in a number of ways. Lower marital dissatisfaction was associated with poorer immune function as well as greater depression and loneliness (Kiecolt-Glaser, Fisher, Ogrocki, Stout, Speicher, & Glaser, 1987). Marital dissolution has also well-documented health consequences. Divorced and separated individuals have poorer mental and physical health than comparable widowed, married, or single adults. Divorced and separated individuals have the highest rates of acute medical problems, chronic medical conditions that limit social activity, and disability, even when age, race, and income are controlled (Verbrugge, 1979).

Substantial evidence on the impact of marriage on the health of both spouses has resulted in an emerging line of research focusing on the relationship between marriage variables and physical health. Kiecolt-Glaser & Newton (2001) summarized studies including objective physical or physiological data, self-reported physical health, pain outcomes, and physiological assessments collected during husband-wife interactions. The authors state that the amplitude of the statistical effect of marriage in the available epidemiological data is comparable to that of well-established health risk factors such as smoking, blood pressure, blood lipids, obesity and physical activity.

There is also evidence that the protective health benefits of marriage are stronger for men than for women (Berkman & Breslow, 1983; Litwak & Messeri, 1989). This effect, in part, is likely to be related to women's involvement in the care of others. In light of these findings, Umberson (1992) proposed a theoretical model of social integration and social control to study the hypothesis that marriage may be beneficial to health because many spouses monitor and attempt to control their partner's health behaviors. The impact of marital distress on cardiovascular

function has also been shown in women. Data from an innovative study of married women suggest that recollection of conflict is sufficient to alter blood pressure (Carels, Szczepanski, Blumenthal, & Sherwood, 1998).

The Cardiovascular Health Study (Bookwala & Schulz, 1996) examined the extent to which spouses' subjective well-being predicted that of the partner in 1,040 spousal pairs of older adults. The subjective well-being indicators were perceived health, depressive symptoms, feelings about life as a whole, and satisfaction with the meaning and purpose of life. The non-affective variables were physical activity, physical functioning, and medical history. These findings extended prior research, which indicated that one spouse'assessments of well-being and depression predicted the other spouse's well-being even after controlling for known predictors of these outcomes. Moreover, Manne and Zautra (1989) investigated whether the psychological adjustment of women with rheumatoid arthritis would be related to the support and criticism the patient received from the husband. Interviews were conducted with the husbands of 103 women with rheumatoid arthritis and content was coded for critical remarks. Path analyses revealed that patient adjustment was significantly related to the attitude of the spouse. Patients with a highly critical spouse reported poorer psychological adjustment. Independent of spousal criticism, patients who perceived their spouse as being supportive engaged in more adaptive coping. It was concluded that the spouse might affect adjustment indirectly through influencing the patient's selection of adaptive or maladaptive coping responses.

The spouses' behavior also appears to have an influence on behavioral symtomatology in patients with neurological disorders. In a study of 79 Alzheimer's disease patients and their spouses, the authors concluded that caregiver expressed emotion, defined as expressions of criticism and/or

over-involvement toward the patient, was predictive of increased negative behavior in the ill spouse (Vitalino, Young, Russo, Romano, & Magana-Amato, 1993). Similarly, in a study of videotaped interactions of 17 Parkinson's patients and their spouses, it was found that patients in distressed marriages blinked less frequently and had longer blink durations than their non-distressed counterparts. Spontaneous eye-blink rate and duration, which can be affected by dopamine availability, are considered the two strongest neurophysiological measures of orofacial hypokinesia (the inability to initiate or maintain movement of the lips during speech which is typical of Parkinson's disease). The results were interpreted as evidence for the exacerbation of neurophysiological symptoms among patients with Parkinson's disease in distressed marriages (Greene & Griffin, 1998).

There are data from two large longitudinal studies examining the link between the marital relationship and health that offer stronger statistical effects for women than for men. The first study, conducted by Hibbard & Pope (1993), examined marital processes and the development of health outcomes such as heart disease or cancer. The findings show that for women, particular qualities of the marital and work roles were predictive of subsequent morbidity and mortality. For women, companionship in marriage and equality in decision-making were related to lower risk of death while for men none of the marriage characteristics were predictive of health outcome.

The second study, conducted by Appelberg, Romanov, Heikkila, Honkasaol, and Koskenvuo (1996) examined the impact of interpersonal conflict at work on work disability and whether this association was influenced by martial conflict or other work-related or psychosocial factors. The sample consisted of 15,348 Finnish workers (aged 24-64 yrs) who were followed for up to six

years. Interpersonal conflict was predictive of work disability only among women, especially those with simultaneous marital distress. The stronger effects found for women in both of these studies may be related to the gender relevance of the stressors. As shown in previous studies, gender relevance of the stressor may modulate responsivity and thus may explain the gender differences found in some studies (Ewart, Taylor, Kraemer, & Agras, 1991; Malarkey, Kiecolt-Glaser, Pearl, & Glaser, 1994; Stoney, Davis, & Matthews, 1987).

A British study examined the role of informal helping from the partner in women's psychological response to breast cancer. Findings indicated that satisfaction with partner's helping/supportive relationship was associated with psychological well-being in the female patients. Even though most women had a good helping relationship with another person, this did not compensate for a problematic relationship with the partner. Good communication with the partner was characterized by high empathy and low withdrawal. Findings suggest that the relationship with a partner plays an important role in breast cancer patients' adaptation, and that interventions aimed at couples may be an effective way of reducing psychological distress in the patients themselves (Pistrang & Barker, 1995).

The evidence for the link between social relationships and health continues to accumulate, and marriage has gained special consideration as a particularly important factor that influences health status. These findings have resulted in the biopsychosocial approach continuing to gain supporters with the ensuing search for further evidence on the mechanism by which social factors impact health

The association between the marital relationship and pregnancy health

As noted in the preceding chapters, the association between the marital relationship and physical well-being has been established in a number of studies across a variety of acute and chronic conditions, including cancer, heart attacks and surgery (Chandra, Szklo, Goldberg, & Tonascia, 1983; Goodwin, Hunt, Key, & Samet, 1987; Gordon & Rosenthal, 1995; House, Landis, & Umberson, 1988).

Kiecolt-Glaser and Newton (2001) outlined recent research indicating that marital relationship factors have significant health implications for diverse medical conditions, including cardiovascular problems, oral health, cancer, and neurological disorders such as Parkinson's and Alzheimer's disease. They summarized studies including objective physical or physiological data, self-reported physical health, pain outcomes, and physiological assessments. Thus, the research available consistently shows that the emotional support of a marriage partner can have many health-related benefits for a patient (Berman & Breslow, 1983; Carels, Szczepanski, Blumenthal, & Sherwood, 1998; Kiecolt-Glaser & Newton, 2001; Zautra, Hoffman, Matt, Yocum, Potter, Castro, & Roth, 1998).

Given the centrality of marriage in the lives of most adults and the growing evidence of its relationship to physical health, it would seem reasonable to assume that marital functioning would also have an influence on physical health during pregnancy. In fact, the association between the marital relationship and physical-well being during pregnancy has been shown in numerous studies (Berkman, 1984; Campbell, 1986; Malarkey et al., 1994; Manne & Zautra, 1989; Pilisuk & Parks, 1983). However, most recent research on pregnancy health seems to focus primarily on the relationship between social stress (often defined as a socioeconomic and

cultural index), personal characteristics of the pregnant woman, and birth outcome (Collins & Shay, 1994; Dunkel-Schetter, 1998; Lobel, Dunkell-Schetter, & Scrimshaw, 1992; Rini et al., 1999; Wadhwa et al., 1993). In a parallel body of recently published literature however, the marital relationship has been gaining great attention from researchers in the areas of cardiovascular and immune disorders, and especially from psychoneuroimmunology, which has consistently shown a strong relationship between marriage and illness outcome (Kiecolt-Glaser & Newton, 2001; Malarkey et al., 1994; Smith & Christensen, 1992). Given the present knowledge of the link between marriage and physical well-being, it appears that family dynamics and particularly husband-specific variables could be further researched in the area of pregnancy health.

It has been pointed out that the link between interpersonal variables and physical health is bi-directional, with interpersonal variables affecting health and, conversely, with poor health affecting interpersonal relationships (Margolin & McIntyre-Kingsolver, 1988). From a systems perspective it would seem pointless to separate the effect of marriage on pregnancy health from the effect of pregnancy health on marriage. However, one of the benefits of evaluating these two directions independently would be the identification of factors that may be useful in developing specific interventions and further hypotheses. Burman and Margolin (1992) have argued in favor of this method indicating that both the quantity and quality of the data can be better assessed with this approach.

Previous research has shown that expectant mothers with marital problems report greater life stress, poorer overall health, lower well-being, and more somatic and psychological symptoms during pregnancy (Brown, 1994). Another important finding comes from a study (Colpin, De

Munter, Nys, & Vandemeulebroecke, 1998) where a strong positive relationship was found between the quality of maternal emotional attachment to the unborn baby and the quality of the marital relationship as well as overall psychosocial well-being during pregnancy.

In the general population, a couple's perception of inadequate intimacy and support during stressful times has been associated with a higher likelihood of mood disturbance (Burg & Seeman, 1994; Carter & Carter, 1994; Koerner, Prince & Jacobson, 1994; Prince & Jacobson, 1995) and illness. Prince and Jacobson (1995) reported, for both husbands and wives, that a spouse in a distressed marriage was 25 times more likely to be depressed than a spouse in a nondistressed marriage.

A number of husband-specific variables have been researched and found relevant to the psychological well-being of women during pregnancy. For example, one study of 190 couples (ages 18-59) examined the factors that influenced concerns and needs of married couples during pregnancy depending on the type of marriage they had-- based on a typology developed by the authors-- and found that husbands' nurturing behaviors were associated with healthier pregnancies (Fitzpatrick, Vangelisti, & Firman, 1994). Another study of a heterogeneous group of 433 pregnant women who completed a set of medical and psychosocial measures found that participants with an emotionally supportive husband had lower state and trait anxiety and overall better physical health (Kalil, Gruber, Conley & Sytniac, 1993). Moreover, Zimmermann-Tansella et al. (1994) conducted a study where both wives and husbands participated and found that a high level of exchanged affection reported by wives was associated with lower levels of symptoms of anxiety and insomnia during the third trimester of pregnancy.

Along the same line of investigation but using different instruments, Zachariah (1994/b) explored the influence of mother-daughter and husband-wife attachment, as well as more general social support, on the psychological well-being of women during pregnancy in a convenience sample of 115 middle-class women (aged 19-33 yrs) who attended prenatal classes at an urban health department in Canada. Results supported the hypothesis that both mother-daughter and husband-wife attachment relationships were significant predictors of psychological well-being of women during pregnancy. These findings provided new insights into the role of unique attachment relationships in promoting psychological well-being for pregnant women.

These findings were replicated in a study conducted by the same author two years later (Zachariah, 1996). In addition to the original variables (attachment relationships, social support, and psychological well-being), life stress was also examined independently and in interaction with social support for its effects on psychological well-being. Subjects were 118 women (aged 18-42 yrs), married, living with their husbands, medically healthy, and expecting their first infant. The significant predictors of psychological well-being were the quality of husband-wife attachment, life stress, and social support. The author emphasized the importance of replication of research using different samples before generalization and utilization of research findings.

The connection between depression during pregnancy and postpartum depression and the woman's perception of her relationship with her husband and her mother was examined in a group of 54 primiparous Israeli women (aged 19-43 yrs). Findings indicated that a poor relationship with the husband was significantly associated with depression during pregnancy and was also predictive of depression after childbirth. No parallel association between depression and the participants' relationship with the mother was noted (Dimitrovsky, Perez-Hirshberg, & Itzkowitz,

1987).

Additional evidence for the association between marriage and pregnancy adaptation comes from a study where the importance of the marital context in predicting maternal depressive symptomatology was examined in 142 first-time mothers and their husbands or partners (Hock, Schirtzinger, Lutz, & Widaman, 1995). The authors assessed marital satisfaction and the endorsement of traditional sex role beliefs about marriage in this sample, data were collected during pregnancy and again at six weeks and nine months postpartum. In this study, both maternal and paternal reports about the marriage were assessed, and analyses were done on the way in which marital context scores interacted with earlier and current levels of maternal depressive symptomatology. The final model explained 57% of the variance and marital context contributed 18% of the variance beyond that of earlier symptom levels in predicting mothers' depressive symptoms nine months after the birth of the first child.

Furthermore, a sample of 99 women was studied prospectively from the second trimester of pregnancy until nine weeks postpartum (O'Hara, 1986). Depressed and nondepressed women identified at the second-trimester assessment and the postpartum assessment were compared on measures of stressful life events and social support provided by their spouses and close confidants. Nine percent of women during pregnancy and 12 percent of women after delivery were depressed. Women experiencing depression during pregnancy reported somewhat less support from their spouses and more support from their confidants compared with nondepressed women.

Elevated levels of depressive symptoms during pregnancy consistently show a strong relation to

elevated levels following the birth of a child. For example, O'Hara, Neunaber, and Zekoski (1984) assessed 142 first-time adult mothers and their husbands or partners. The participants were recruited from childbirth education classes, private physicians, obstetrical clinics, and other community resources. Prenatal depressive symptomatology was related to both depressive symptoms and clinical depression at nine weeks after childbirth. Prenatal levels of depressed mood were also found to predict levels of depressive symptoms at four weeks (Gotlib, Whiffen, Mount, Milne, & Cordy, 1989), eight weeks (Whiffen, 1988), nine weeks (O'Hara, Schlechte, Lewis, & Varner, 1991), and three months after the birth of the child (O'Hara, Rehm, & Campbell, 1982). Furthermore, Field (1985) found that a single set of questions regarding the mother's feelings about her marriage and her expectant child during the prenatal period could predict postpartum depression.

Brown (1994) explored the prevalence of marital discord and its relationship to partner support, life stress, and physical health in 431 couples, using a family systems approach. Expectant mothers were aged 14-42 yrs and were from 15 to 42 weeks pregnant. The expectant fathers were aged 17-46 yrs. In 37% of the expectant families, one or both partners reported marital discord. Expectant mothers and fathers with marital problems experienced less satisfaction with their partners' support, greater life stress, poorer overall health, lower well-being, and more somatic and psychological symptoms. Expectant mothers' adaptation was poorest in situations where both partners felt maritally stressed, followed by situations where only the pregnant woman experienced distress.

A recent study offers important evidence for the link between husband specific variables and pregnancy health. Teitler (2001) examined the level and effects of husband or partner

involvement on mothers' health behavior during pregnancy (prenatal care, drinking, drug use, and smoking). Data were obtained from interviews of 2,425 mothers and 1,859 fathers. The author concluded that the most important finding was that fathers could influence mothers to maintain or adopt healthy pregnancy behaviors. The large sample size and the findings in this study stress the important influence that fathers can have on their pregnant wives, thus becoming themselves part of the mechanism by which health behaviors might impact pregnancy health and birth outcome.

Research in the area of pregnancy health has been mostly motivated for its association with adverse birth outcome. Considering the evidence that marital distress has the potential to generate substantial health challenges, modifying this health risk factor should be of clinical interest to researchers and practitioners in the area of pregnancy health and birth outcome. Thus, continued efforts at developing efficacious interventions designed to prevent, manage, or resolve martial dysfunction during pregnancy have the potential for sizeable yields in the area of pregnancy health.

Theoretical Considerations

The biopsychosocial model of health

Since ancient times people have believed that psychological factors can affect disease susceptibility and the course of illness (Dubos, 1965). However, the development of life-saving techniques, including antibiotics and vaccines, have led to an almost strictly biomedical approach to illness throughout the past century. McDaniel (1995) argues that despite gradual changes seen in recent decades, it is still true today that both medicine and psychology have long traditions rooted in the Cartesian view that mind and body are separate entities that should be studied

separately. For the most part, the author says, physicians are trained to treat the body and psychologists are trained to treat the mind, and the health care system is organized around the treatment of different body parts, with a entirely different system, that of mental health care, looking after the mind.

In contrast with the Cartesian view of health, most people do not experience physical and psychological experiences in a dichotomous fashion. For most people, biological, social and psychological experiences interact and shape each other in many complex ways. George Engel (1977) proposed a model of health care that builds upon the traditional biomedical model of the time. He called this new method the "biopsychosocial model" to describe an integrative approach to medical problems with the ability of moving from the biological to the societal level of analysis and intervention, depending on the type of the problem. This approach presupposes that all health problems are biopsychosocial in nature. It also underscores the view that each biological problem has psychosocial and sociocultural consequences, and that each psychosocial problem has biological correlates.

Congruent with Engel's (1977) position, Krantz, Grumber & Baum (1985) note that the biomedical model of illness is an insufficient model in explaining disease. They emphasize the role of behavior in major health problems and describe mechanisms linking unhealthy behaviors and habits to physical illness. Similarly, the strong emphasis on the biological and pharmacological aspects of health care have led some health professionals within the medical profession to call for the adoption of a more humanistic, biopsychosocial approach to medicine (Eisenberg, 1988; Lipkin, 1989).

Thus, recent trends towards a more holistic view of health have resulted in a substantial number of authors investigating health behaviors and health problems from a biopsychosocial perspective of health (Campbell, 1986; Doherty & Campbell, 1986; Rodin & Salovey, 1989; Turk & Kerns, 1985). Stressful life events have been associated with the development of a variety of health problems (Dohrenwend & Dohrenwend, 1974; Rabkin & Struening, 1976).

The available data provide a wealth of information on the link among psychosocial factors and physical illness. It is estimated that as many as 75% of all patient visits in primary care practice can be attributed to psychosocial problems that present themselves through physical complaints (Roberts, 1994). Family physician researchers have identified somatization disorder as the fourth most common diagnosis seen in primary care, positioning it ahead of ischemic heart disease, diabetes, obesity, urinary tract infections, and otitis media (De Gruy, Columbia, & Dickenson, 1987). Moreover, forty percent of all patients in a typical family practice have somatoform disorder (Smith, Miller, & Monson, 1986). Similarly, 50% of all morbidity and mortality that physicians encounter can be traced to behavioral origins (McGinnis & Foege, 1993). Wickramasekera (1996) argues that measures to prevent this "burden of illness would be maximized by a collaboration between psychology and medicine to manage the behavioral origins of disease" (p. 221). Consequently, chronic illness is a public health issue that deserves much attention.

Stressful life events, inadequate social support, perceived psychological stress, negative affect, interpersonal conflict, and work-related stress are among the most studied psychosocial variables that have been associated with the onset and progression of physical disease. These factors have been found to have an effect in various populations, including women, men, children and the

elderly, and across ethnic and racial groups.

For example, in the area of women's health, research has shown a positive relationship between stressful life events and spontaneous abortion. In one study, Neugebauer, Kline, Shrout, & Skodol, (1997) interviewed women after spontaneous abortion to assess the possible impact of life events. One hundred eleven women who spontaneously aborted chromosomally normal fetuses served as cases, and 81 women with chromosomally abnormal fetuses were controls. The investigators found that the cases were more likely to be exposed to one or more negative life events, even after controlling for education, maternal age, and ethnicity. Similarly, O'Hare and Creed (1995) examined 48 case-control pairs who were matched on maternal age and pregnancy history. Women who had experienced a spontaneous abortion served as cases, and women giving birth were controls. The investigators found that the cases were more likely to have been exposed to severe life events in the 3 months before conception.

Deficiencies in social support have been linked to poor physical and psychological health and increased mortality risk for the population at large (Berkman & Syme, 1979) as well as for the elderly (Blazer, 1982; Seeman, Kaplan, Knudson, Cohen & Guralnik, 1987). In a study by Thompson and Heller (1990), quantitative social isolation was measured as the co-occurrence of infrequent contact with family and with friends. Findings indicated that isolated participants had poorer functional health than did nonisolated participants and this effect was independent of perceived support levels.

Psychological stress is often defined as an unpleasant emotional experience associated with feelings of tension, annoyance, and anxiety. This response is said to occur when a person

perceives the stressor as taxing his or her adaptative resources. In the words of Lazarus & Folkman (1984), a psychological stress response occurs only when demands imposed by events exceed the individual's ability to cope.

Psychological stress has been associated with disease etiology and/or disease course in a number of medical conditions including coronary heart disease (see Krantz, Contrada, Hill, & Friedler, 1988; Vitaliano, Young, Russo, Romano, & Magana-Amato, 1993), gastrointestinal disorders (Whitehead, 1992), diabetes mellitus type II (Evans, 1985), sickle cell disease (Thompson, Gil, Abrams, & Phillips, 1992), pregnancy complications and adverse birth outcome (see Dunkel-Schetter, Wadhwa & Stanton, 2000), breast cancer (Cordova et al., 1995), Raynaud's disease (Sedlacek & Taub, 1996), asthma (Lehrer, Sargunaraj & Hochron, 1992), and sudden cardiac death (Kamarck & Jennings, 1991).

Similarly, it has become widely recognized that children also suffer from stress and its consequences (Rutter, 1983). Children under high stress have been shown to have more frequent accidents (Beautrais, Fergusson, & Shannon, 1982; Padilla, Rohsenow, & Bergman, 1976), more upper respiratory tract illness (Meyer & Haggerty, 1962) and more recurrent abdominal pain (Hodges, Kline, Barbero, & Flanery, 1984) than other nonstressed children.

Negative affect, widely defined as a general dimension of subjective distress, includes a range of unpleasant mood states including anxiety, hostility and depression (Cohen, Tyrrell, & Smith, 1993). Negative affect has been measured as either a state (i.e., transient fluctuations in mood) or as a trait (i.e., stable individual differences in general affective level) and has been found to be associated with physical illness (Watson & Pennebaker, 1989). In two different well-controlled

laboratory studies, the manipulation of negative mood increased the number and severity of self-reported symptoms of illness (Croyle & Uretsky, 1987; Salovey & Birnbaum, 1989). A study by Leventhal, Hansell, Diefenbach, Leventhal, & Glass (1996) showed that negative affect predicted somatic complaints associated with acute illness (e.g., colds) 6 months later in a sample of 366 older adults. Another study showed a 4-month lagged association between depression (a component of negative affectivity) and increasing levels of acute physical illness (Aneshensel, Frerichs, & Huba, 1984).

Still further support comes from a study of healthy participants in whom illness was induced through exposure to a respiratory virus. Findings showed that baseline negative affect was associated with increased numbers of health complaints (e.g., sneezing and nasal congestion) over a subsequent 7-day period (Cohen et al., 1995). Negative affect has also been associated with behaviors that may affect physical health including sexual risk (Kalichman & Weinhardt, 2001), smoking (Hall, Munoz, Reus, & Sees, 1993), and substance use (Tschann, Adler, Irwin, & Millstein, 1994).

In a representative sample of 2,000 Americans, Veroff, Depner, Kulka and Douvan, (1981) found that interpersonal problems rank among the most common sources of unhappiness in people's lives. Research suggests that bad relationships may have a stronger impact on individuals' lives than positive relationships (Berscheid & Reis, 1998). The ill effect of interpersonal conflict on physical health has received attention from social science researchers. Zautra, Hoffman, Matt, Yocum, Potter, Castro, & Roth (1998) found that interpersonal stress was positively associated with disease activity in rheumatoid arthritis patients. Furthermore, findings in the field of chronic pain provide experimental support for the notion that uncomfortable interpersonal interactions

may increase the likelihood of subsequent pain behavior in patients with chronic pack pain (Schwartz, Slater, & Birchler, 1994).

Similarly, Leary, Rapp, Herbst, Exum, & Feldman (1998) showed that interpersonal stress, as it relates to fear of negative evaluation, influenced the quality of life in some psoriasis patients. Most recently, Kiecolt-Glaser and Newton (2001) reviewed the literature on the relationship between marriage and physical health, and concluded that interpersonal stress factors within the marital relationship have health implications for diverse medical conditions, including cardiovascular function, periodontal health, and neurological disorders.

The extensive literature on work-related stress has emphasized its effects on health (Greenberg, 1997; Quick, Horn, & Quick, 1986), health-related physiological variables such as cholesterol levels, blood pressure, and psychological states (Ivancevich, Matteson, & Preston, 1982), and absenteeism, sick days, and turnover (Manning & Osland, 1989). Perceived stress is an important factor in the development of many work-related health problems such as musculoskeletal and cardiovascular disorders, symptoms of depression, and anxiety (Steptoe, 1991).

Despite the wealth of evidence linking stress and the onset of illness, the most convincing findings in support of the biopsychological model of health come from studies involving stress and infectious disease in humans and which provide biological verification of illness (see Cohen & Williamson, 1991; Clover, Abell, Becker, Crawford, & Ramsey, 1989; Graham, Douglas, & Ryan, 1986). It is commonly believed that psychological stress increases susceptibility to infectious disease. The negative cognitive and emotional states involved in the stress response are thought to alter immune function through autonomic nerves that connect the central nervous

system to immune tissue (D. L. Felten, Felten, Carlson, Olschowka, & Livnat, 1985; S. Y. Felten & Olschowka, 1987), through the action of hormones whose release is associated with negative affectivity or through stress-elicited changes in health practices such as smoking and alcohol consumption (Cohen & Williamson, 1991; Kiecot-Glaser & Glaser, 1988).

In a provocative virus-challenge paradigm study, where healthy volunteers were intentionally exposed to a cold or influenza virus, Cohen, Doyle, Skoner, Rabin, & Gwaltney (1998) provided important findings for a relationship between psychosocial stress and physical health. Two hundred seventy-six volunteers (125 men and 151 men) completed a life stressor interview and psychological questionnaires and provided blood and urine samples. Participants were then inoculated with common cold viruses and monitored for the onset of disease. Although severe acute stressful life events (less than 1 month long) were not associated with developing colds, severe chronic stressors (1 month or longer) were associated with a substantial increase in risk of disease. This relationship was explained as a consequence of under- or unemployment and to ongoing interpersonal problems with family or friends. However, the authors stated that the association between chronic stressors and susceptibility to colds could not be fully explained by differences among stressed and non-stressed subjects in terms of social network characteristics, personality, health practices, or on endocrine or immune data collected pre- inoculation.

In conclusion, the evidence amassed in the last 30 years in support of the biopsychosocial model of health is indisputable. However, the mechanisms by which these associations take place continue to be elusive and deserve further scrutiny. As Greenberg put it in 1977, "The stress-illness link: Not 'if' but 'how'." The complexity of the matter is such that, almost 25 years and hundreds of important findings later, the precise mechanisms by which stress adversely affects

physical health remain unexplained.

The stress buffering effects of social support

Currently, there are two basic models of social support: the main-effect model and the stress-buffering model (Cohen & Wills, 1985). In the main-effect model, high levels of social support foster well-being regardless of stress (House, 1981). Thus, according to this model, simply being married is considered evidence of social support and being unmarried impedes the person's access to this type of support (Berkman & Syme, 1979) and in general having social resources may reduce the probability of symptom development.

In contrast, the stress-buffering model argues that social support is beneficial only in the presence of stress (Landermann, George, Campbell, & Blazer, 1989; Thoits, 1982). The social strain model (Rook, 1990) is a variation of the stress-buffering model and it emphasizes how the quality of interpersonal relationships may affect well-being (Coyne & Bolger, 1990; Coyne & DeLongis, 1986; Rook, 1984). In this model, discordant marriages could cause health problems by increasing stress. While social support is usually conceptualized as beneficial, it can also be experienced as problematic if it is not needed or wanted. Negative aspects of social support have only begun to be studied and little is known about their influences on the transition to parenthood (Affeck, Tennen, Rowe, Roscher, & Walker, 1989; Coyne & DeLongis, 1986).

The buffering hypothesis asserts that social support protects (i.e., buffers) people from the negative effects of stress, alcohol use, physical and illness. Thus, evidence for a moderating effect of social support is abundant in the literature, especially when specific sources of life stress to specific types of social support have been investigated (Johnson, Winett, Meyer, Greenhouse,

& Miller, 1999; Mallinckrodt & Bennett, 1992; Penninx et al., 1998).

Several researchers (Cohen & Wills, 1985, Cutrona, & Russell, 1990) have emphasized the need for a specificity-hypothesis regarding the buffering effect of social support. According to this hypothesis, a buffering relationship for a specific life stress will be obtained only for social supports aimed at alleviating a specific stressor. In other words, different types of psychosocial stressors may require different forms of social support.

A number of mechanisms have been described to explain the buffering effects of social support (for review, see Vaux, 1988). Some authors posit that the psychological benefits of social support might result from its effects on subjective appraisal of stressors, increased positive feelings about the self (e.g., self-esteem and personal mastery), or choice of coping strategies (Cohen & McKay, 1984; Pearlin, Menaghan, Lieberman, & Mullen, 1981; Thois, 1982). In conclusion, regardless of whether social support influences health outcomes directly via its main-effects or through its moderating-buffering effects, what is of ultimate significance is that social support is of theoretical and practical value in its positive influence on health and other outcomes.

Statement of the Problem

Synopsis of the study

Given the substantial empirical evidence pointing to pregnancy adaptation as a reliable predictor of birth outcome, the objective of this study was to investigate the relationship of marital quality and social support in adaptation to pregnancy in an Internet sample of pregnant women.

Marital quality was measured in terms of the degree of self-reported levels of dyadic consensus, affectional expression, dyadic satisfaction, and dyadic cohesion in couples since the beginning of the pregnancy. Pregnancy adaptation was measured in terms of self-reported levels of depression, state anxiety, pregnancy-specific anxiety, and number of pregnancy complications.

Furthermore, this study examined the stress-buffering effects of non-spousal supportive relationships on pregnancy adaptation as potential mediating variable between martial quality and measures of pregnancy adaptation. How social support may influence pregnancy adaptation against a background of high or low marital quality is a question that has not been fully addressed in the literature. Non-spousal social support will be measured in terms of perceived support received from sources outside the marital relationship during the pregnancy.

Considering the human, social, and economic costs associated with poor pregnancy adaptation and possible adverse birth outcomes for individuals, families, and society, this avenue of research appears to be a fruitful and worth endeavor.

Hypotheses

Two possible roles for marital quality and social support were investigated. First, the direct effect of self-reported marital quality on pregnancy adaptation was examined. It was expected that perceived high marital quality would be associated with indications of positive pregnancy adaptation, while perceived low marital quality would be associated with indications of poor pregnancy adaptation.

Secondly, the possible mediating effect of non-spousal social support on pregnancy adaptation

was investigated. It was expected that this form of support would be found to modify the relationship between marital quality and pregnancy adaptation. It was speculated that there would be differences in measures of pregnancy adaptation among the four following categories of pregnant subjects:

1) those reporting HIGH marital quality and HIGH social support;

2) those reporting HIGH marital quality and LOW social support;

3) those reporting LOW marital quality and HIGH social support;

4) and those reporting LOW marital quality and LOW social support.

II. METHODS

Participants

The participants were 808 pregnant women in the third trimester of pregnancy. Ages ranged from 18 to 50 years, with an average age of 28.04 years (*Mdn* = 27, *SD* = 5.5). Seven hundred participants (86.6%) were Caucasian, 28 (3.5%) were African-American, 29 (3.6%) were Hispanic, 12 (1.5%) were Asian, 32 (4%) were of other ethnic backgrounds, and 7 (.9%) were missing scores. Six hundred sixty-two participants (82.3%) reported being married (82.3%), 83 (10.3%) were living with a partner, 47 (5.8%) were single, 12 (1.5%) were divorced and 4 (.5%) were missing scores. Of the 808 participants, 434 women (53.7%) indicated they were having their first child, 193 women (23.9%) were having their second child, 104 women (12.9%) were having their third child, 47 women (5.8%) were having their fourth child, 22 women (2.8%) indicated they were having their fifth, sixth, seventh, or eighth child, and eight participants (1%) were missing scores. The vast majority of the sample (97.2%) reported having received prenatal care.

Twenty-one participants (2.6%) had not completed high school, 109 (13.5%) were high school graduates, 259 (32.1%) had had some college education, 233 (28.8%) were college graduates, 118 (14.6%) had obtained graduate education, and 68 (8.4%) were missing scores. Annual household incomes ranged from less than $20,000 to over $60,000, with a median household annual income of approximately $50,000. Almost half (375) of the participants (47%) reported working full time, 277 (34.3%) were stay-home-mothers, 101 (12.5%) were working part time, 49 (6.1%) indicated to be doing something else, and 1 (.1%)was a missing score. With the exception of States of Montana and Vermont, most respondents (703) lived in all 48 of the 50 United States,

with the largest groupings representing the States of California (n = 59, 7.3%) and Texas (n = 54, 6.7 %). One hundred and five participants (13%) reported to live outside the United States.

Procedures

E-mail addresses of pregnant women in their third trimester of pregnancy were secured by accessing Internet-based pregnancy-related public forums/bulletin boards where members customarily post their email addresses and pregnancy due dates as well as other personal information such as age, marital status, family structure, number of previous children, and region of domicile. Inclusion criteria for this study were being at least 18 years of age and being in the last trimester of pregnancy. Approximately 3,200 e-mail addresses were emailed an invitation to participate in the study by means of a generic email (see Figure A). About 280 emails (8.7%) returned "undeliverable" messages because the email accounts reached were no longer open. Of the 2,920 recipients of the generic email, 934 (31.9%) participated in the survey. However, 126 logged off early and thus the data from these participants were eliminated from the analyses resulting in a final study sample of 808 participants. Response rate (31.9%) was remarkably higher than the typical 5-10 % reported in previous research for on-line research (Weible & Wallace, 1998). For reasons of privacy protection of participants since dozens of potential participants were contacted at once, email addresses of recipients were blocked to other viewers by using the blind copy option. The blind copy procedure offers the additional privacy benefit that it does not keep a record of those who were contacted. Email recipients were told where their email addresses had been accessed by the researcher. The e-mail invitation included a link to a university-based web site http://web.utk.edu/~abaird/survey.html which is no longer active. Complete web site pages can be found in Figures B, C, D, E, F, G, H, I, J, K and L.

On entering the web site, participants were met by a welcome page. This page introduced the study and emphasized that the data collected were treated confidentially. Furthermore, readers were informed that their email and ip addresses would not show in their responses to the survey, and that participation in the study was voluntary. The research packet included a consent statement to which the subject must acknowledge (click "yes") in order to continue. The statement reads, *"I am at least 18 years old, in the third trimester of my pregnancy, and consent to participate in this study."* The consent included a warning that information sent via e-mail may not be completely confidential. No identifying data were requested and therefore the principal investigator(s) have no way of knowing the identities of the participants. Subjects were offered the option of contacting the principal investigator and/or faculty advisor via e-mail for questions about the research project. The principal investigator received emails from several participants reporting having filled out the survey and offering comments and well wishes on the research endeavor.

The data entered by the participants went into a server-based database from which it was transferred to SPSS version 9.0 for Windows for statistical analyses. The data will remain in a secured electronic file in the principal investigator's computer for the amount of time specified by the University of Tennessee Human Research Committee guidelines.

Measures

In addition to a welcome/information page, the consent form, and the demographic information page, the online research packet included the following measures (1) a medical risk factors questionnaire (pre-pregnancy medical history), (2) a pregnancy health questionnaire, and slightly

modified versions of (3) the Dyadic Adjustment Scale (Spanier, 1967), (4) the Social Provisions Scale (Cutrona, 1987), (5) the Beck Depression Inventory (Beck et al., 1961), (6) the State Scale of the Trait-State Anxiety Scale (Spielberg, 1983), and (7) the Pregnancy-related Anxiety Scale (Rini et al., 1999; Wadhwa, et al., 1993). Each of these seven measures can be seen in Figures E, F, G, H, I, J and K respectively.

Medical risk factors

The medical risk factors inventory is a list composed of 11 obstetric factors known to affect pregnancy course. These risk factors are often found as part of the standard health history questionnaire in obstetric practices. The conditions, in alphabetical order, are (1) anemia (2) anxiety, (3) chronic kidney disease, (4) chronic lung disease, (5) depression, (6) diabetes, (7) heart disease, (8) hypertension, (9) obesity, (10) problems with alcohol abuse, and (11) problems with illegal substance abuse. Levy-Shiff, Lerman, Har-Even, & Hod (2002) state that when the number and type of medical risk factors --maternal or fetal-- may adversely affect the outcome of pregnancy, such pregnancy is considered high-risk.

Participants were asked to indicate whether they have had any of those conditions "*before this pregnancy*" and responded in a dichotomous rating fashion (yes = 1, no = 0). In this study, each item endorsed counted as one score toward a possible total of 11 point. The internal reliability (Cronbach's $\alpha = .66$; $N = 802$) of this non-standardized measure was not expected to be high since medical risk factors reflect individual medical history and thus respondents were not expected to share similar pre-pregnancy medical histories.

Pregnancy complications

Prenatal complications have been associated with a number of short and long-term problems for the offspring in both animal and human research (Dow-Edwards, 1991; Levy-Shiff, Lerman, Har-Even, & Hod, 2002; Stefanis, Frangou, Yakeley, Sharma, O'Connell, Morgan, Sigmudsson, Taylor, & Murray, 1999). Among the most researched obstetric complications are hypertension, substance abuse, diabetes, smoking, diabetes, anxiety and depression.

The two most common ways to study obstetric complications appear to be (1) using medical information retrieved from medical charts and (2) self-report measures of signs and symptoms of pregnancy and obstetric complications. Some authors criticize this latter method of data collection as less objective than the former because of *recall bias*, a phenomenon that influences perception and reporting and that has been widely researched (Greenblatt, Mozdzierz, & Murphy, 1984; Kaufman, Tarnowski, Simonian, & Graves, 1991; McIntosh, Holmes, Gleeson, Burns, Hodges, Byrne, Dobbie, Miller, Lawrie, & Johnstone, 2002; Morrison & Hunt, 1996). However, self-report continues to be a widely useful and popular method of data collection considered to offer many advantages (Davidson & MacGregor, 1998; Leigh, 2000; Richter & Johnson, 2001; Stone & Shiffman, 2002).

In this study the pregnancy complications questionnaire is a 26-item list of pregnancy complication signs and symptoms known in the medical literature as markers of pregnancy health, including smoking, hypertension and gestational diabetes. This list is a modified version of one previously used in the literature (Rodriguez, Bohlin & Lindmark, 1999) and a popular pregnancy standard history used in obstetric practices. Participants were asked to indicate, on a yes-no basis, whether they have had any of 26 conditions/symptoms "*during this pregnancy.*" A

total score was computed. The internal reliability of this measure was acceptable (Cronbach's α = .60; N = 799). Given the expected individual differences in pregnancy complications across subjects, respondents did not respond to this list in similar fashion thus the lower internal reliability of this measure.

Marital quality

The Dyadic Adjustment Scale (DAS; Spanier, 1976) is a 32-item multiple-choice instrument that measures the frequency of agreement in a marriage-like relationship. The DAS yields a total score and a subscore for each of the four subscales: Dyadic Consensus (13 items), Dyadic Satisfaction (10 items), Dyadic Cohesion (5 items), and Affectional Expression (4 items). The items were written at an 8th grade reading level and scores range from 0 to 151, with higher values indicating more favorable adjustment. Response format for the items varies; for example, for ratings of agreement, 0 = *always disagree* and 5 = *always agree*; for ratings of frequency, 0 = *all the time* and 5 = *never*; and for dichotomous ratings, 0 = *yes* and 1 = *no*. The DAS has shown discriminant validity by distinguishing between married and divorced couples, and concurrent validity by correlating with the Marital Adjustment Test (Locke & Wallace, 1959), and other measures of marital adjustment (Norton, 1983).

Carey, Spector, Lantinga and Krauss (1993) reported that the DAS may be the most used of the marital adjustment scales available. Spanier (1988) reported that the DAS had been used in more than 1,000 studies in the interval between 1976 and 1988. The DAS has been used with a variety of samples, including cancer patients (Manne & Schnoll, 2001), pain patients (Hewitt, Flett, &

Mikail, 1995), depressed and non-depressed subjects (Sher, Baucom, & Larus, 1990), couples' response to marital therapy (Whisman & Jacobson, 1990), and conjugal loss (Bonanno, Notarius, Gunzerath, Keltner, & Horowitz, 1998).

Despite its popularity, the DAS has been criticized because of the uncertain clinical significance of some items (Eddy, Heyman & Weiss, 1991). Furthermore, Norton (1983) argued that the DAS is problematic because it combines interactional process (e.g., disagreeing, leaving the room during an argument) with outcome (e.g., subjective evaluations of the current degree of happiness). In one study of both partners from 538 married heterosexual couples and 197 cohabiting homosexual, reliability data for each subscale was acceptable but confounding issues were found (Kurdek, 1992).

The DAS however seems to offer many advantages over other marital adjustment instruments, including brevity, applicability to nonmarried couples, and strong psychometric properties (Cohen 1985). Research has examined internal consistency, validity, factorial structure, and temporal (test-retest) stability of the DAS (Carey et al. 1999; Gentili, Contreras, Cassaniti, & D'Arista, 2002; Hunsley, Best, Lefebvre, & Vito, 2001; Lim & Ivey, 2000; Sharpley & Cross, 1982). The DAS has been shown to distinguish during pregnancy between women who do and do not go on to develop postpartum depression (O'Hara, 1986). In this study, the overall score of the DAS was used. Participants were asked to rate the extent of agreement and disagreement in their marriage relationship *"during this pregnancy."* The internal reliability of the scale was high (Cronbach's $\alpha = .94$; $N = 738$) and similar to prior findings (Busby, Crane, Larson, &

Christensen, 1995; Spanier, 1976; Spanier & Thompson, 1982; Sharpley & Cross, 1982).

Social support

The Social Provisions Scale (SPS; Cutrona & Russell, 1987) is a 24-item scale that was developed to assess six relational provisions (or dimensions of social support) first described by Weiss (1974). The SPS assesses the extent to which social relationships supply each of the provisions. The six social provisions described in the scale include guidance, reliable alliance, reassurance of worth, attachment, social integration, and opportunity to provide nurturance. The sixth component does not involve receiving, but rather providing, support. The author argued that while the opportunity to provide nurturance is not considered a type of support, feeling central to the well-being of another may have some beneficial effects as other types of support.

Four items assess each of the six social provisions, two that describe the presence and two that describe the absence of the provision. For example, two of the items on the attachment subscale are "*I have close relationships that provide me with a sense of emotional security and well-being*," and "*I lack a feeling of intimacy with another person.*" Statements are rated along a 4-point scale ranging from "*Strongly Disagree*" to *"Strongly Agree."*

The Social Provisions Scale is a widely used scale and evidence for its validity is found in studies of diverse populations, including adolescent mothers (Cutrona, 1984), athletes (Ryska & Yin, 1999), the elderly (Cutrona, Russell & Rose, 1986), public school teachers (Russell, Altmaier, & Van Veltzen, 1987), spouses of cancer patients (Baron, Cutrona, Hicklin, & Russell, 1990), college students (Ptacek, Pierce, Eberhardt, & Dodge, 1999), dislocated blue-collar workers (Mallinckrodt & Bennett, 1992), postpartum women (Cutrona, 1984), and counseling center staff

(Ross, Altmaier, & Russell, 1989). The discriminant validity of the scale has been demonstrated against measures of mood (e.g., depression), personality (e.g., introversion-extraversion), and social desirability (Cutrona & Russell, 1987; 1990).

In this study, subjects were asked to respond to what extent each of the 24 statements describe the participants' current relationships *outside marriage* such as friends, family, co-workers, neighbors, cyber-friends, and so on. Using the SPS, scores can be derived for each of the six provisions as well as for a global social support score. The latter score was used in this study. The internal reliability of the scale was high (Cronbach's $\alpha = .93$; $N = 724$).

Depressive symptomatology

The Beck Depression Inventory (BDI; Beck, Shaw, Rush, & Emery, 1979) is a 21-item self-report measure of the presence and severity of depression in psychiatrically diagnosed patients and in normal populations of both adolescents and adults. The BDI was initially intended as a measure of depressive severity for individuals already diagnosed as clinically depressed (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). Each item in the BDI is rated on a 4-point scale (0-3), yielding summary scores that range from 0 to 63. Factor analytic studies of the BDI have revealed between one and seven factors depending on the specific sample used, however, a three-factor solution has been most frequently identified in the literature. This model indicates that there are three highly correlated factors pertaining to (1) negative attitudes towards self, (2) performance impairment, and (3) somatic disturbance (Beck et al., 1988).

In both psychiatric and student samples, the BDI has shown strong convergent validity with

psychiatric ratings of depression (Santor, Zuroff, Ramsay, & Cervantes, 1995). Beck, Steer and Garbin (1988) reported coefficient alphas for psychiatric patients, ranging from .76 to .95. A similar range (.73-.92) was reported for nonpsychiatric populations. Test-retest reliability has been adequate but more variable (Lightfoot & Oliver, 1985) and factorial validity has been adequate (Beck et al., 1988).

The BDI has been described as consisting of items composed of cognitive or emotional symptoms of depression as well as items reflecting somatic complaints often associated with depression (Smith, Peck, Milano, &Ward, 1988). Evidence for the popularity of the BDI comes from the many non-psychiatric populations researched, including oncology out-patients (Berard, Boermeester, & Viljoen, 1998), allied health and medical female students (Hojat & Lyons, 1998), elderly persons (Halpert, Braunschweig, & Peters, 1998), primary care patients (Steer, Cavalieri, Leonard, & Beck, 1999), a non-clinical populations (Endler, Rutherford, & Denisoff, 1999). The BDI has been validated with many international populations, including post-civil war undergraduate students in Lebanon (Abdel-Khalek, 1998), a normative sample of 1,508 residents of Mexico City (Jurado, Villegas, Mendez, Rodriguez, Loperena, & Varela, 1998) and a random stratified sample of 608 community residents in Argentina (Bonicatto, Dew, & Soria, 1998).

Consistent with previous uses of the BDI in chronic illness populations (Smith, Christensen, Peck, & Ward, 1992; Peterson, Kimmel, Sacks, & Mesquita, 1991) only the 14 items reflecting the non-somatic or cognitive factor were included in this study of pregnant women. The internal reliability of the scale was high (Cronbach's $\alpha = .86$; $N = 791$).

State anxiety

State anxiety was measured using the 20-item State Anxiety Scale from Spielberger's (1983) State-Trait Anxiety Inventory (STAI, Form Y). Form Y is the latest refinement of the English version of the STAI. This measure consists of two separate 20-item, self-report rating scales for measuring state and trait anxiety. Higher scores reflect more state and trait anxiety. State anxiety (A-State) is conceptualized as a " transitory condition of unpleasant, consciously perceived feelings of tension, apprehension, and nervousness that vary in intensity and fluctuate in time as a reaction to circumstances that are perceived as threatening" (Novy, Nelson, Goodwin, & Rowzee, 1993, p. 343).

The STAI-State has been found to be a sensitive indicator of changes in transitory anxiety, which is different from trait anxiety (A-Trait) in that the latter refers to a relatively stable characteristic of the individual that is not influenced by situational stress. Using a 4-point scale ranging from 1 (*Not at all*) to 4 (*Very much*), items of the (A-State) scale assess the extent to which participants experience anxiety-related symptoms *"at this moment."*

The examination of the psychometric properties of STAI has been tested in translated versions of the inventory (Spielberger & Diaz-Guerrero, 1976, 1983), and across different ethnic groups and gender (Novy, Nelson, Goodwin, & Rowzee, 1993), including ethnically diversified adolescents (Hishinuma, Miyamoto, Nishimura, & Nahulu, 2000). The STAI-S has also been widely validated with richly diverse medical populations, including myocardial infarction patients (Yoshida, Kohzuki, Yoshida, Hiwatari, Kamimoto, Yamamoto, Meguro, Endo, Kato, Kanazawa, & Sato, 1999), women undergoing breast cancer genetic testing (Watson, Lloyd, Eeles, Ponder,

Easton, Seal, Averill, Daly, Ormiston, & Murday, 2001), parents visiting their children in the post-anesthesia care unit, (Bru, Carmody, Donohue-Sword, & Bookbinder, 1993), patients having received heart transplantation (Triffaux, Wauthy, Bertrand, Limet, Albert, & Ansseau, 2001) and patients in a smoking cessation program (Takemura, Akanuma, Kikuchi, & Inaba, 1999).

Furthermore, the STAI (S-Scale) has been validated when examining anxiety and stress during pregnancy (Da Costa, Larouche, Dritsa, & Brender, 1999), prenatal anxiety and perinatal outcome (Bhagwanani, S.G., Seagraves, K., Dierker, L. J., & Lax, 1997), prenatal and postpartum depression (Maes, Ombelet, Libbrecht, Stevens, Kenis, De Jongh, Lin, Cox, & Bosmans, 1999), fetal movement and heart rate (Sjoestroem, Valentin, Thelin, & Marsal, 2002), and salivary cortisol levels in pregnant women (Sikkema, de Medina, Schaad, Mulder, Bruinse, Buitelaar, Visser, & Franx, 2001). The internal reliability of this scale in the present study with pregnant women was high (Cronbach's $\alpha = .92$; $N = 802$).

Pregnancy-specific anxiety

Pregnancy-specific anxiety (or pregnancy-related anxiety) is often defined as a pregnant woman's reported fears of perinatal loss, adverse birth outcome, and complicated labor and delivery. Pregnancy-specific anxiety has been associated with reports of depression, state anxiety, and beliefs that maternal behavior affects fetal health (Da Costa, Larouche, Dritsa, & Brender, 2000; Franche & Mikail, 1991; Rizzardo, 1985; Sikkema et al., 2001).

The pregnancy-related anxiety scale used in this study (Rini et al., 1999) is a list of pregnancy-specific items based on a scale previously developed by Wadhwa et al. (1993) and validated with

a pregnant sample. The original scale was designed to assess the frequency and extent of self-reported concerns about the pregnancy and the unborn baby. In this study, participants indicated the extent to which they have experienced pregnancy-related anxiety "during the last week" by using a 3-point scale ranging from 1 (*not at all*) to 3 (*very much*). After reversing scores when appropriate, a total score is calculated which represents the mean score of responses to all items. The internal reliability of the scale was acceptable (Cronbach's $\alpha = .75$; $N = 802$).

III. RESULTS

Correlational analyses

Table 1 shows descriptive statistics for all of the variables included in the study. There were a total of 15 variables studied, including marital quality and social support as independent variables, four outcome measures, and nine background variables. All tables are included in Appendix 1.

Zero-order correlations among all study variables including age, number of children, ethnicity, education, marital status, employment status, family income, number of medical risk factors, reported levels of marital quality, social support, and indices of state anxiety, depressive symptomatolgy, pregnancy-specific anxiety, and number of pregnancy complications are shown in **Table 2**. Both marital quality and social support were related significantly to each other (r = .36, < .01). Marital quality was significantly and negatively related to number of pregnancy complications (r = -.30, < .01), state anxiety (r = -.43, < .01), and depressive symptomatology (r = -.46, < .01), and pregnancy-specific anxiety (r = -.20, < .01). Marital quality was significantly, yet weakly, related to background variables such as age (r = .12, < .01), medical risk factors (r = -.17, < .01), number of children (r = -.10, < .01), family income (r = .20, < .01), education (r = .15, < .05), ethnicity (r = -.08, < .05), and marital status (r = -.16, < .01), but was not significantly related to employment status.

Social support was significantly and negatively related to number of pregnancy complications (r = -.23, < .01), state anxiety (r = -.44, < .01), and depressive symptomatology (r = -.42, < .01), and pregnancy-specific anxiety (r = -.25, < .01). Social support was significantly related to five

background variables: medical risk factors (r = -.18, < .01), age (r = .09, < .01), education level (r = .15, < .01), employment status (r = -.09, < .01), and family income (r = .19, < .01) but was not significantly related to number of children, ethnicity, and marital status.

Zero-order and partial correlations for age and ethnicity with the main study variables are shown in **Table 3**. Age had a significant but weak relationship to marital quality (r = .11, < .01), social support (r = .09, < .001), number of pregnancy complications (r = -.16 < .01), state anxiety (r = -.15, < .001) depressive symptomatology (r = -.19), < .001, pregnancy-specific anxiety (r = -.09, < .01), but no significant relationship to medical risk factors or ethnicity. Similarly, ethnicity showed a significant yet weak relationship to marital quality (r = -.08, < .05) and had no significant relationship to any of the other study variables. The trend was similar for all variables when corrected for medical risk factors. Thus, given these weak relationships, and the fact that age and ethnicity were not central to the study hypotheses, age, ethnicity, and medical risk factors were dropped from inclusion in further analyses.

Zero-order and partial correlations for marital quality, social and all outcome variables when controlled for biomedical risks factors are shown in **Table 4**. These data indicate that marital quality and social support are significantly and positively associated with each other (r = .35, < .001) and significantly and negatively related to depressive symptomatology (r = -.46, < .001), state anxiety (r = -.41, < .001), number of pregnancy complications(r = -.26, < .001), and pregnancy-specific anxiety(r = -.19, < .001), even when controlling for biomedical risk factors. Given the strength of these associations and the centrality of these variables to the study, these four outcome variables were included in multivariate regression analyses.

Marital quality and pregnancy adaptation measures

To investigate the direct effect of self-reported martial quality on measures of pregnancy adaptation, the sample was dichotomized according to reported levels of marital quality. Using the Median statistic, marital quality was split at *Med* = 120 thus creating 2 groups. **Table 5** presents data on means for depressive symptoms, state anxiety, pregnancy-specific anxiety, and number of pregnancy complications for both groups. There were significant group differences between the high and low marital quality groups on all outcome measures. The Mean for depressive symptoms was significantly greater, $t(735) = -10.10$, $p < .000$; as well as for state anxiety, $t\ (735) = -11.66$, $p < .000$, for levels of pregnancy-specific anxiety, $t\ (731) = -6.59$, $p < .000$, and for number of pregnancy complications, $t\ (730) = -7.25$, $p < .000$.

To identify indirect paths among the study relationships, marital quality was tested as a predictor of each of the four outcome variables. Regression analyses were performed on depressive symptomatology, state anxiety, number of pregnancy complications, and pregnancy-specific anxiety. The results are shown in **Table 6**. The overall F obtained for depressive symptomatology was significant ($F\ 1, 735 = 202.12$, $p < .001$) as well for state anxiety ($F\ 1, 735 = 162.26$, $p < .001$), pregnancy-specific anxiety ($F\ 1, 731 = 31.46$, $p < .01$), and number of pregnancy complications ($F\ 1, 730 = 69.91$ .001). In this model, depressive symptomatology explained 22% of the variance, state anxiety explained 18%, number of pregnancy complications explained 9%, and pregnancy-specific anxiety explained 4%.

Given the theoretical and clinical significance and relationship of the four outcome measures being studied, a conceptual indicator of pregnancy adaptation was created named the Pregnancy Adaptation Index (PAI). This global index is comprised of four components previously regressed

for marital quality. The scores of each of four scales were subsequently standardized and these, in turn, summed into one scale thus creating the PAI. Furthermore, the PAI was correlated with both independent variables and showed a significant and negative relationship with marital quality (r = -.45, < .001) and with social support (r = -.43, < .001).

The buffering effects of social support

In addition to assessing the effects of perceived marital quality on adjustment to pregnancy, another goal was to determine whether perceived social support had a buffering effect on the relationship between marital quality and the outcome measures. In other words, the question was whether there was a significant difference among the four outcome measures for those subjects reporting different levels of marital quality as well as different levels of social support. To test this hypothesis, the sample was dichotomized according to reported levels of marital quality and social support. Using the Median statistic, marital quality was split at *Med* = 120, and social support at *Med* = 82, thus creating four groups:

(1) those reporting ***high*** marital quality and ***high*** social support (group #1, n = 215),

(2) those reporting ***high*** marital quality and *low* social support (group #2, n = 118),

(3) those reporting *low* marital quality and ***high*** social support (group #3, n = 134), and

(4) those reporting *low* marital quality and *low* social support (group #4, n = 224).

Descriptive statistics for these 4 groups according to levels of marital quality and social support are shown in **Table 7**.

A general linear model showed significant differences among the four groups for depressive symptomatology (F 3, 690 = 48.83, p < .0001), state anxiety (F 3, 690 = 65.47, p < .0001), number of pregnancy complications (F 3, 690 = 20.20, p < .0001), and pregnancy-specific

anxiety (F 3, 690 = 18.38, $p < .0001$). These findings indicate that overall there were significant differences among the means of all four groups. Post hoc analyses revealed however that group #1, those reporting high marital quality and high social support, was significantly different from groups # 2, group #3, and group #4 in levels of depressive symptomatology and state anxiety. Furthermore, group #1 was also significantly different from group #3 and group #4 but not different from group #2 in number of pregnancy complications. Lastly, Group #1 was significantly different from group #4 but not from group #2 and group #3 in levels of pregnancy specific-anxiety.

Group #2, i.e., those reporting high marital quality and low social support, was significantly different from groups # 1 and group #4 but nor from group #3 in levels of depressive symptomatology and state anxiety. Furthermore, group #2 was also significantly different from group #4 but not different from group #1 and group #3 in number of pregnancy complications. Lastly, Group #2 was significantly different from group #4 but not from group #1 and group #3 in levels of pregnancy specific-anxiety.

Group #3, i.e., those reporting low marital quality and high social support, was significantly different from groups # 1 and group #4 but not from group #2 in levels of depressive symptomatology and state anxiety. Furthermore, group #3 was also significantly different from group #1 and group #4 but not different from group #2 in number of pregnancy complications. Lastly, Group #3 was significantly different from group #1 and group #4 but not from group #2 in levels of pregnancy specific-anxiety.

Finally, group #4, those reporting low marital quality and low social support, was significantly

different from groups #1, group #2, and group #3 in levels of depressive symptomatology, state anxiety, pregnancy-specific anxiety and in number of pregnancy complications. In conclusion, group # 1 and group #4 were clearly differentiated from each other and from groups #2 and group #3, while the latter were almost indistinguishable from each other. Summaries of breakdown for each group and each outcome variable as well as mean differences among them are shown in **Table 8**.

IV. DISCUSSION

Identifying psychological dysfunction during pregnancy is important for several reasons, including the well-being of the pregnant woman, the strong link between prenatal depression and postpartum depression, the association between prenatal stress and adverse birth outcome, and the association between pregnancy adaptation and the mother-infant relationship. The results of this study indicate that marital quality and social support are important factors that can influence pregnancy adaptation.

Implications of findings

The first hypothesis evaluated the direct effect of self-reported marital quality on indices of pregnancy adaptation. It was expected that perceived high marital quality would be associated with indications of positive pregnancy adaptation. Similarly, the second hypothesis stated that participants who scored lower on marital quality would be expected to report higher levels of depressive symptomatology, state anxiety, and pregnancy-specific anxiety as well as a larger number of pregnancy complications. As hypothesized, a significant relationship was found between self-rating of marital quality and the outcome measures. The strength of this relationship is noteworthy; those participants scoring lower on marital quality reported almost twice as many pregnancy complications. Furthermore, the lower marital quality group showed greater signs of distress as indicated by elevated scores of depressive symptomatology, state anxiety, and pregnancy-specific anxiety.

The reason for the above association, however, might be bi-directional: psychological disorders are frequently associated with relational difficulties and might lead to marital dissatisfaction;

conversely, marital tension might have caused, or at least amplified, psychiatric symptoms such as anxiety and depression which in turn might influence levels of pregnancy-specific anxiety and number of obstetric complications. Studies have shown elevated rates of marital dissatisfaction among women diagnosed with postpartum depression (e.g., Cox, Connor, & Kendell, 1982) and two prospective investigations identified marital tension during pregnancy as a strong predictor of postpartum depression (O'Hara, 1986; Watson, Elliot, Rugg, & Brough, 1984). This study shows that those who reported higher levels of marital quality also reported fewer pregnancy adaptation issues, therefore suggesting that a satisfying marital relationship may lead to an enhanced sense of well-being during pregnancy.

Depressive and anxiety symptoms appear to be relatively common during pregnancy, although not all women suffer emotional burdens during this time and some report enhanced self-esteem and a largely positive developmental experience (Cowan, & Cowan, 1988). The high comorbidity of depression and anxiety as clinical phenomena is well established empirically but not well understood conceptually, in terms of either psychological or biological mechanisms (Keller, Nitschke, Bhargava, Deldin, Gergen, Miller, & Heller, 2000). In studies using self-report screening scales similar to the ones used in this study, about 30% of pregnant women showed elevated scores in measures of depression during the third trimester (Klein & Essex, 1995) compared with estimates of 10% to 20% among women of childbearing age in community surveys (Schoenborn & Horn, 1993; Simonsick, 1991). The percentage of women who reported experiencing depressive symptomatology in the present sample was 30.2%, which is generally compatible with prior findings ranging from 28% (O'Hara et al., 1984) to 34% (Rees & Lutkins, 1971). Between 3% and 6% of pregnant women have been found to meet standard clinical criteria for major depression (O'Hara, 1986) as compared with a rate for major depression between 4%

and 5% among childbearing-aged women in community studies (Weissman, 1987). About 2 % of the respondents in this study reported depressive symptoms severe enough to meet criteria for major depression. The lower prevalence of severe depression in this sample is likely to be related to the more advantageous socioeconomic variables that characterize the participants in this study, as most were Caucasian, well-educated, middle class women. Since the pregnant woman is the environment of the developing fetus, psychological alterations or mental disorder may affect the fetus, even when manifestations of psychopathology are not severe (Huizink et al., 2002).

There are important clinical implications for these findings. Given the association of marital quality with pregnancy-specific anxiety and number of pregnancy complications, prenatal care protocols should incorporate measures of detection and treatment of psychosocial issues from an interdisciplinary framework. Obstetricians, psychologists, social workers, psychiatrists, pediatricians and nurses should join efforts to follow-up the high-risk family across the transition to parenthood, and in some cases beyond. Encouraging pregnant women and their partners to report relationship stress and to participate in consultations with the interdisciplinary team might lead to earlier treatment of psychosocial disturbances. Furthermore, one of the most important implications of the above findings is the critical significance of identifying depression, and applying timely clinical interventions early on in the pregnancy, as a preventive measure for the development of postpartum depression. The strongest predictors of postpartum depression include prenatal depression, poor marital relationship, limited social support, and history of psychopathology (Beck, 2001; O'Hara, 1996). All of these factors can be easily identified during prenatal visits. Interestingly, risk factors for depression during pregnancy include history of depression, marital conflict, limited social support, living alone or having a greater number of children, young age of the pregnant woman, and ambivalence about the pregnancy (Altshuler,

Hendrick, & Cohen, 2000). Given the importance of these factors, failure to identify and treat depression and anxiety during pregnancy can have severe consequences for the pregnant woman, the developing fetus, and the newborn infant. In addition to individual treatment for depression and anxiety, clinical interventions might include marital therapy when applicable, increased medical follow-ups, home visits by a social worker in some cases, and consultation with other specialists as necessary.

The stress buffering effects of social support

The effect of non-spousal social support was expected to modify the relationship between marital quality and measures of pregnancy adaptation. The question was whether social support would offer protective benefits against psychiatric symptoms when marital quality was low. Four categories of subjects were investigated to evaluate this hypothesis: (1) those reporting high marital quality and high social support, (2) those reporting high marital quality and low social support, (3) those reporting low marital quality and high social support, and (4) those reporting low martial quality and low social support. Overall, the findings confirmed the hypothesis. Significant differences were found among the four described groups on measures of depressive symptomatology, state anxiety, pregnancy-specific anxiety, and number of pregnancy complications. However, post hoc tests revealed that there were no significant differences between group 2 (those reporting high marital quality and low social support) and group 3 (those reporting low marital quality and high social support) on all four measures of pregnancy adaptation.

Results indicated that the group made up of those reporting high marital quality and high social support showed the strongest indices of positive pregnancy adaptation. Moreover, the group

reporting low marital quality and low social support showed the highest level of difficulties across all measures. Those in the middle, however, appeared to compensate for low marital quality with high social support, or to counteract the effects of low social support with high marital quality, thus suggesting that marital quality and social support could be interchangeable in some situations. This finding suggests that both social support and marital quality may become target interventions when the pregnant woman is experiencing significant difficulties in pregnancy adaptation related to either low levels of marital quality or low levels of social support.

Consistent with seminal research on the value of social support in health and illness (Berkman & Syme, 1979), supportive relationships may serve as a buffer against the anxiety and depression that can result from marital distress during pregnancy. In contrast, a positive marital relationship may alleviate issues of psychological adaptation that can result from chronic stress in a medically high-risk pregnancy, in cases of unplanned hospitalization, during medically-prescribed extended bed rest (when support networks may not be readily available), or in the presence of adverse socioeconomic variables that pose additional stressors during pregnancy.

Limitations of the study

While the sample size (N = 808) showed acceptable properties as a total sample, the majority of the respondents (86.6%) were of Caucasian origin, therefore rendering these findings not applicable to other ethnic groups. The number of respondents for each ethnic group was low (African-American = 28 (3.5%), Hispanic = 29 (3.6%), Asian = 12 (1.5%) and Other = 32 (4 %), which precluded further analyses of group differences because of insufficient sample size. Previous research has found differences ethnic differences in marital quality during pregnancy (Crohan, 1996; Levy-Shiff, 1994) and in the availability of social support network across ethnic

groups (Miller-Loncar, Erwin, Landry, Smith, & Swank, 1998).

Regarding attrition, it is unclear as to why 126 participants logged off early from the study. The research packet was informally tested a priori and showed an average completion time of approximately 12 minutes. It is speculated that the number and length of the questionnaires might have influenced the subjects' decision to drop out of the study early. The number of respondents completing all the questionnaires decreased systematically across the scales suggesting that some subjects might have found the last scales too long to complete. An additional concern might be that all of the instruments were self-report scales. Replication with scales administered by trained interviewers would be useful.

It has been noted that issues related to corroborating demographic data might pose a significant challenge in the interpretation of research conducted over the Internet. Few are the situations in which the Internet researcher has access to significant demographic information prior to data collection. In this study, criteria for participation included being at least 18 years of age and in the third trimester of pregnancy. Only those women who had already posted age and due date information on pregnancy-related forums were invited to participate in the study. It seems therefore safe to assume that those who participated in this study were indeed those women who were initially invited to participate and for whom age and due dates were confirmed in advance.

Despite the limitations cited above, this study clearly documents the significant roles of marital quality and social support in pregnancy. Furthermore, these data provide evidence that middle class women are vulnerable to significant psychosocial issues during pregnancy even when protected by more favorable socioeconomic variables.

Recommendations for future research

Significant progress has been made in understanding the role of the marital relationship in health but not enough in its relationship to pregnancy health. More research is needed on the health-promoting versus stress-exacerbating aspects of the marital relationship across the reproductive years.

Emotionally supportive relationships are known as important mental health resources. Studies are needed to identify the skills that foster interpersonal satisfaction and contribute to the receipt of support during pregnancy. Also, the increasingly variable pathways that people choose in forming families (i.e., assisted conception, ovum and semen donation, surrogate motherhood, homosexual parents) are providing unique opportunities for understanding how social support during family formation can impact psychosocial adaptation to pregnancy, the well-being of parents, and birth outcome.

Additional research is needed on identifying couples at risk for poor pregnancy health and birth outcome. Examples of such cases include couples with substance abuse and domestic violence problems. Finally, not enough psychosocial intervention studies have been carried out in recent years. Most pregnant women on prescribed bed-rest, or who are hospitalized, report high levels of depression and anxiety, as do women medically categorized as carrying high-risk pregnancies. The role of social relationships in high-risk pregnancies deserves special attention with the overall goal of designing psychosocial interventions that decrease stress and increase support.

Conclusion

It is interesting that despite over 70 years of published research on the topic of pregnancy adaptation and birth outcome, the pathways of this relationship remain elusive. It is noteworthy that the hypotheses examined in the earliest published studies are conceptually very similar to the questions addressed in recent studies. Despite significant advances in methodologies and more sophisticated statistical analyses of data, conclusions continue to be tentative and are often challenged by new findings. Data from animal research are strong and yet present serious limitations for generalization to human populations.

Given the fact that about 90% of all women become pregnant at least once, it seems relevant to investigate psychological changes during pregnancy (Huizink, et al., 2002). Continued research efforts in pregnancy health can contribute critical knowledge to the complex equation that impacts postpartum depression as well as rates of infant morbidity and mortality throughout the world. In other words, pregnancy research has immeasurable social value in that it can indirectly yet permanently shape the future lives of millions of persons.

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APPENDIX 1 – Tables

Table 1: Summary of Descriptive Statistics for the Study Variables (N = 808)

Variable	*N*	*X*	*SD*	Min-Max*
1. Age	805	28.04	5.46	18.00-50.00
2. Number of children	800	1.81	1.14	1.00-8.00
3. Ethnicity	801	1.31	0.93	1.00-5.00
4. Education level	740	3.43	1.06	1.00-5.00
5. Marital status	804	1.40	0.94	1.00-4.00
6. Employment status	807	2.59	1.49	1.00-5.00
7. Family income	786	3.01	1.00	1.00-4.00
8. No. of medical risk factors	802	0.95	1.41	0.00-11.00
9. No. of pregnancy complications	799	1.83	1.89	0.00-11.00
10. State anxiety (state-trait)	802	38.13	11.33	20.00-79.00
11. Depressive symptoms	791	19.48	4.87	14.00-47.00
12. Pregnancy-specific anxiety	802	19.15	5.05	10.00-37.00
13. Marital quality	738	115.94	20.45	08.00-150.00
14. Social support	724	79.44	11.92	38.00-96.00

Note: * Minimum-Maximum

Table 2: Correlations Among Study Variables (N = 808)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age	—													
2. Number of children	.28**	—												
3. Ethnicity	.04	.01	—											
4. Marital status	-.23**	-.11**	.07*	—										
5. Education level	.38**	-.18**	.03	-.19**	—									
6. Employment status	-.14**	.20**	.02	.04	-.24**	—								
7. Family income	.48**	.04	-.02	-.28**	.43**	-.30**	—							
8. No. of medical risk factors	.00	.09*	.01	.07*	-.10**	-.01	-.13**	—						
9. Depressive symptoms	-.17**	.05	.03	.12**	-.19**	.12**	-.21**	.24**	—					
10. State anxiety (state-trait)	-.14**	-.04	-.01	.09*	-.10**	.01	-.16**	.15**	.54**	—				
11. Pregnancy-specific anxiety	-.08*	-.19**	.01	-.01	.01	-.03	-.05	.08*	.35**	.50**	—			
12. No. of pregnancy complications	-.16**	.11**	.02*	.15**	-.17**	.10**	-.20**	.33**	.47**	.42**	.33**	—		
13. Marital quality	.12**	-.10**	-.08	-.15**	.15**	-.01	.20**	-.17**	-.46**	-.43**	-.20**	-.30**	—	
14. Social support	.09*	-.07	.01	-.06	.15**	-.09*	.19**	-.18**	-.41**	-.44**	-.25**	-.23**	.36**	—

Note: No. = Number. * <.05 (two-tailed). ** <.01 (two-tailed).

Table 3: Descriptive Statistics, Zero-Order and Partial Correlations for Age, Ethnicity, and Main Study Variables

Variable	*Mean*	*SD*	Age		Ethnicity	
			Zero-Order	PC	Zero-Order	PC
1. Marital quality	16.35	20.16	.11**	.12***	-.08*	-.08*
2. Social support	79.89	11.67	.09***	.10***	.00	.00
3. Depressive symptoms	19.28	4.66	-.19***	-.20***	.02	.02
4. State anxiety	37.44	11.43	-.15***	-.15***	-.01	.00
5. No. of pregnancy complications	1.73	1.83	-.16**	-.19***	.02	.03
6. Pregnancy-specific anxiety	18.95	4.90	-.09**	-.09**	.01	.01
7. Age	28.10	5.37	-----	-----	.05	.05
8. Ethnicity	1.29	.91	.05	.05	-----	-----
9. No. of medical risk factors	.87	1.17	.04	-----	-.01	-----

Note: PC = Partial correlation with study variable, controlling for medical risk factors. No. = Number.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4: Zero-Order and Partial Correlations for Marital Quality, Social Support and Outcome Measures (N=688)

Variable	Marital Quality		Social Support	
	Zero-Order	PC	Zero-Order	PC
1. Marital quality	----	----	.36*	.35**
2. Social support	.36*	.35**	----	----
3. Depressive symptoms	-.46*	-.46**	-.42*	-.39**
4. State anxiety (state-trait)	-.43*	-.41**	-.44*	-.41**
5. No. of pregnancy complications	-.30*	-.26**	-.25*	-.18**
6. Pregnancy-specific anxiety	-.20*	-.19**	-.23*	-.23**

Note: PC = Partial correlation with study variable, controlling for medical risk factors. No. = Number.
* $p < .01$ (two-tailed). ** $p < .001$. (two-tailed).

Table 5: Comparison of the Means of the Outcome Measures for High and Low Marital Quality

Outcome Measures		N	$\overline{X}$	SD	t	df	p
Depressive Symptoms	>= 120.00	375	17.7707	3.4223	-10.099	735	.000
	< 120.00	362	21.1326	5.4248			
State Anxiety (trait-state)	>= 120.00	374	33.4385	9.9616	-11.655	735	.000
	< 120.00	363	42.4518	11.0196			
Pregnancy-specific anxiety	>= 120.00	373	17.8820	4.6780	-6.587	731	.000
	< 120.00	360	20.2528	5.0645			
No. of Pregnancy Complications	>= 120.00	374	1.3128	1.4740	-7.252	730	.000
	< 120.00	358	2.2849	2.1097			

Note. High Marital Quality >= 120. Low Marital Quality < 120. No. = Number

Table 6: Summary of Linear Regression Analysis for Outcome Measures Predicting Marital Quality.

Outcome Measures	*B*	*SE*	*t*	*p*
Depressive Symptomatolgy	-.109	.008	-14.21	.000
State Anxiety	-.237	.019	-12.74	.000
Pregnancy-specific Anxiety	-4.96	.009	- 5.61	.000
No. Pregnancy Complications	-2.71	.003	- 8.36	.000

Note. No. = Number

Table 7: Selected Demographic Characteristics of the Groups by Levels of Marital Quality and Social Support (N = 622)

		Age		Ethnicity		No. of Children		Education		Family Income		Marital Status	
Groups	*N*	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
1. High* - High**	191	29.16	5.71	1.22	.80	1.70	1.11	3.56	1.01	3.28	.93	1.26	.84
2. High* - Low**	102	27.25	4.64	1.35	0.96	1.61	1.03	3.50	.95	3.05	.96	1.29	.87
3. Low* - High**	123	27.88	5.14	1.38	1.01	1.88	1.14	3.44	1.00	3.09	.93	1.48	1.04
4. Low* - Low**	206	27.93	5.28	1.23	.79	1.92	1.12	3.29	1.03	3.11	.97	1.46	1.01

Note: No. = Number. * Marital quality. ** Social support.

Table 8: Means for the Total Sample and by Subgroups According to Levels of Marital Quality and Social Support

Variable	Total Sample	High-High (N = 215)	High-Low (N = 118)	Low-High (N = 134)	Low-Low (N = 224)	*F*	*p*
1. Depressive symptomatology	19.48 (n = 791)	17.08	18.67	18.94	21.88	49	*
2. State anxiety (state-trait)	38.13 (n = 802)	31.1	36.09	37.3	44.48	65	*
3. No. of pregnancy complications	1.83 (n =799)	1.14	1.46	1.75	2.42	20	*
4. Pregnancy-specific anxiety	19.15 (n = 802)	17.32	18.65	18.86	20.65	18	*

Note: No. = number. * < .001 (two-tailed).

APPENDIX 2 – Figures

Hi Mommy-to-be,

First of all... congratulations on your pregnancy!

For your peace of mind, let me clarify that I got your email address from the public board of ePregnancy. I am blind-copying 50 other Moms who have, like you, stated having a due date in [name of moth] 2003. And once the blind copy goes out, your email address is gone forever, as I do not keep a record of my email-recipients.

My name is Alicia Baird. I am a Stay-at-Home-Mom to 2 little boys and an advanced graduate student in psychology at UTK. I am looking for Moms who would like to respond to a 10-15 minute survey on psychological aspects of pregnancy health.

I will have no way of knowing if you responded to my survey, but I want you to know that you and all other "Moms/participants" will be in my thank-you prayers. Please forgive me and quickly delete me if you find my introduction out-of-place. Also, feel free to write back if you would like to know more about my research and me.

My work is legitimate. Please help me if you can.

Please click on this link: http://web.utk.edu/~abaird/survey.html

Thank you and God bless you and your new baby!

Warm regards,

Alicia Baird-Fassardi

.....

Figure 1. Invitation to Participate in a Pregnancy Health Research Project

This research project has been approved by

The University of Tennessee, Knoxville

Psychology Department

Hello Soon-to-be Mommy!

My name is Alicia Baird and I am a doctoral student in psychology at The University of Tennessee, Knoxville. I am also the Mom of two boys, ages 6 and 3.

I would like to invite you to participate in a survey on interpersonal aspects of pregnancy. You must be 18 years old or older and in the last trimester of your pregnancy to participate in this study. Neither your email address nor your ip address will show on your responses. It takes approximately 15 minutes to answer this survey.

In case you have any questions, you may contact me at the address below or you can reach my Doctoral Committee Chair, Professor L. Handler, Ph.D. at handler@utk.edu. This contact information will be repeated at the end of the survey.

Thank you for participating in my survey.

May you have a very healthy baby!

Warm regards,

Continue

Alicia Baird-Fassardi
The University of Tennessee, Knoxville
Psychology Department
Suite 310, Austin Peay Building
email: baird@utk.edu

Figure 2. Welcome Page



Informed Consent Form

This website is designed to collect data for a doctoral dissertation. The purpose of this research is to examine interpersonal aspects of pregnancy health. I thank you for taking the time to participate in my study. Please note that you must be 18 years or older to participate in this study and in the third trimester of your pregnancy.

You will be asked questions about your health, your pregnancy, your feelings, and your relationships. Completing the survey takes about 15 minutes. There are 7 questionnaires of approximately 10-30 items each. These questionnaires are widely used in contemporary psychological research.

Your participation is voluntary. You won't be getting any direct benefits for responding to my survey, except the satisfaction that you are helping someone else. You may choose not to answer any questions that make you feel uncomfortable, and you may withdraw from the study at any time without penalty by closing your web browser.

You understand you are being asked to provide confidential information about yourself. All of your answers will be kept confidential. Your privacy is important to me. Your email address will **NOT** be part of your responses to the study. Once you submit your responses, only your responses will be sent to me. Neither your email address nor your ip address will be available to me. Also, I am only interested in the collective responses of all of the pregnant women who complete this survey. Only my committee members and myself will have access to the confidential responses that, again, will NOT include your email or ip addresses. Please be as honest as you can when responding.

Any questions may be directed to me, Alicia Baird-Fassardi at baird@utk.edu, or to my Dissertation Committee Chair, Dr. Leonard Handler lhandler@utk.edu telephone: (865) 974-2161.

I know that as a Mom-to-be your time is very valuable and I appreciate your time and effort. Clicking the box below will serve as your consent to participate in the study and indicate that you have read and understood all the information provided.

I am at least 18 years old, in the third trimester of my pregnancy, and I consent to participate in this study.

Figure 3. Informed Consent Form

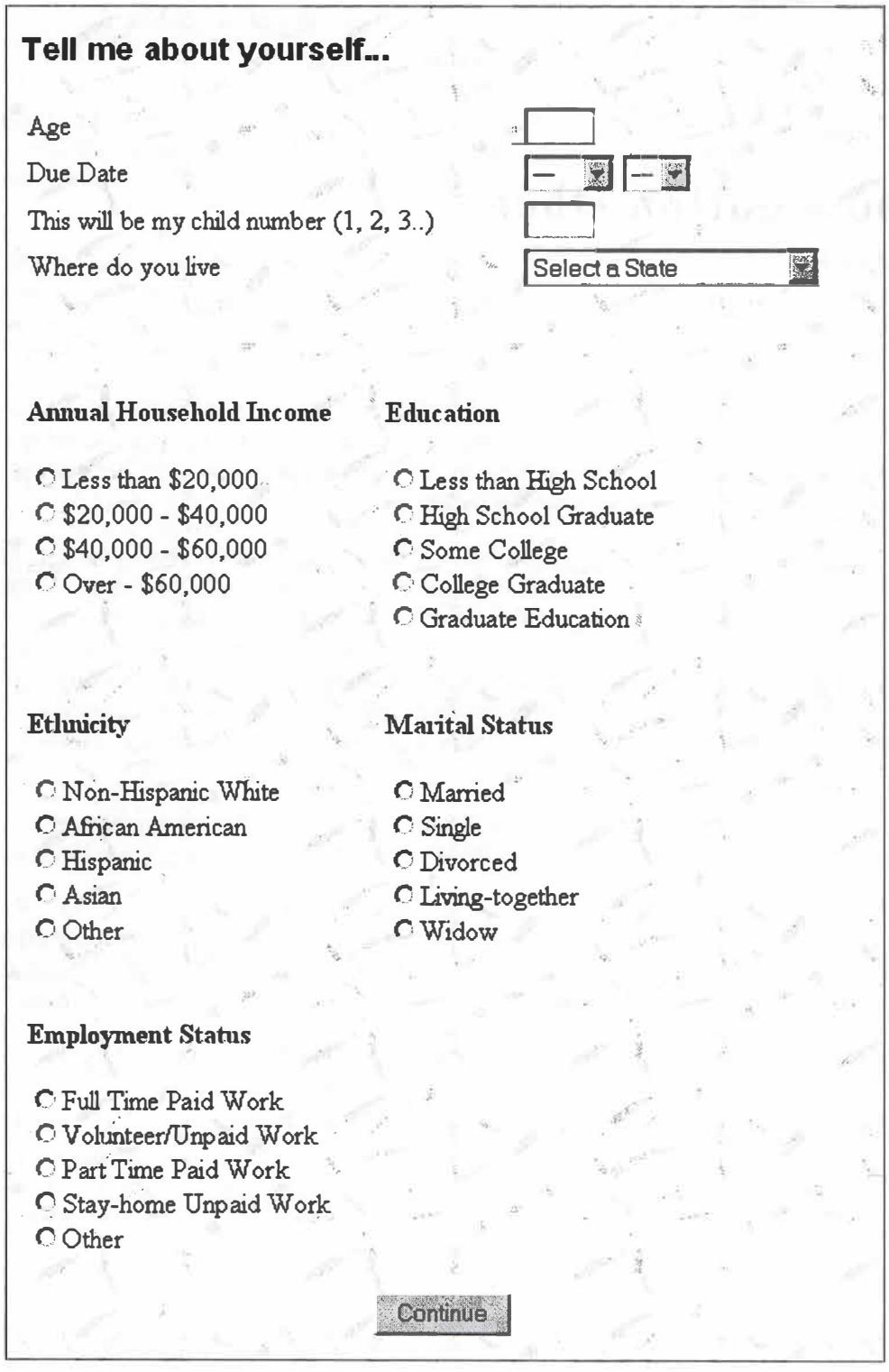


Figure 4. Demographic Information

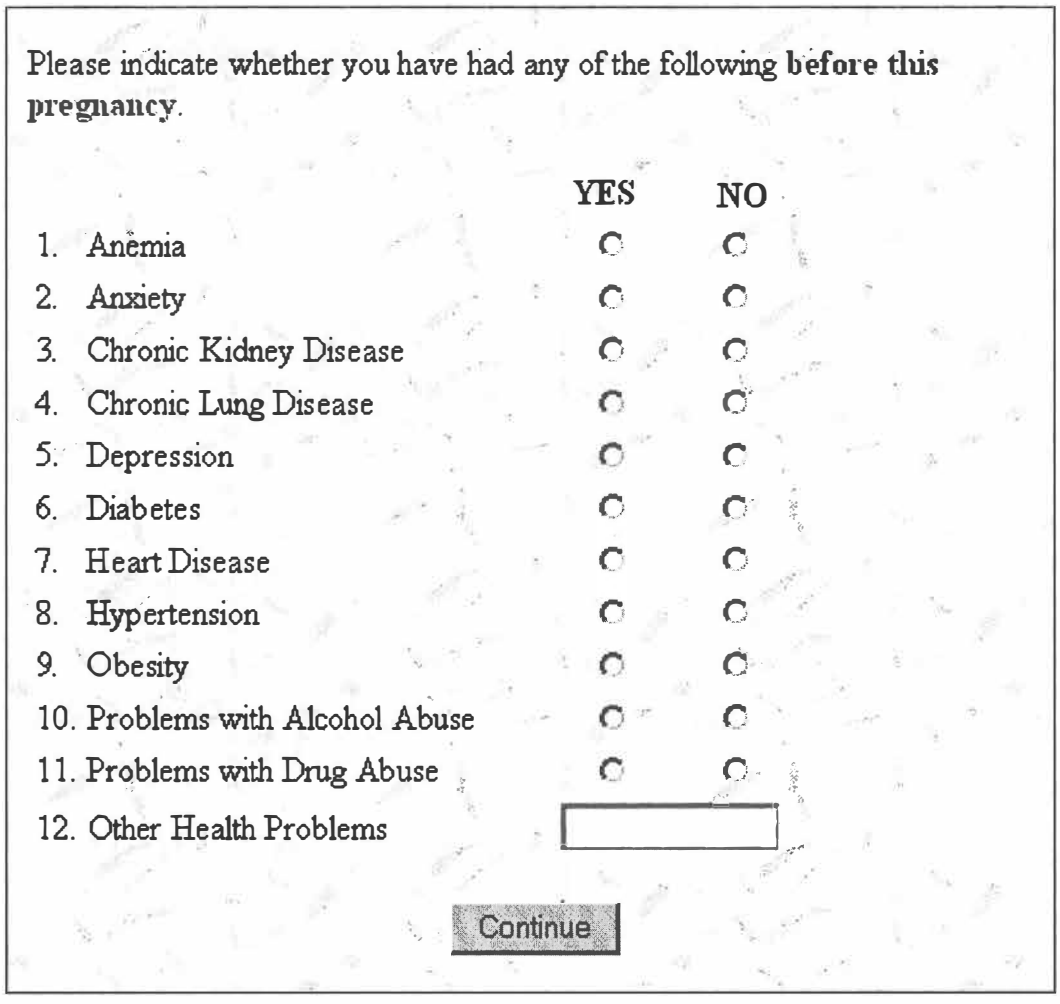


Figure 5. Medical Risk Factors Questionnaire

Please indicate whether you have had any of the following during this pregnancy.

		YES	NO
1.	Prenatal Care	○	○
2.	Anxiety (too much worrying)	○	○
3.	Kidney Disease	○	○
4.	Lung Disease	○	○
5.	Depression	○	○
6.	Diabetes	○	○
7.	Heart Disease	○	○
8.	Hypertension	○	○
9.	Problems with Alcohol Abuse	○	○
10.	Problems with Drug Abuse	○	○
11.	Bleeding 3rd Trimester	○	○
12.	Not Enough Amniotic Fluid	○	○
13.	Doctor Prescribed Bed Rest	○	○
14.	Hepatitis (any Type)	○	○
15.	Not Enough Weight Gain	○	○
16.	Venereal Disease	○	○
17.	Baby Not Growing Well in Uterus	○	○
18.	Nausea or Vomiting (Requiring Treatment)	○	○
19.	Placenta Previa	○	○
20.	Pre-Eclampsia	○	○
21.	Rubella	○	○
22.	Smoking	○	○
23.	Threatened Abortion	○	○
24.	Too Much Amniotic Fluid	○	○
25.	Too Much Stress	○	○
26.	Urinary Infection	○	○
27.	Vaginal Infection	○	○
28.	Other Health Problems		

Continue

Figure 6. Pregnancy Health Questionnaire

Please indicate the extent to which each statement describes your **current** feelings about your pregnancy.

	Not at All	Occasionally	Sometimes	A Lot of the Time
1. I am confident of having a normal childbirth	○	○	○	○
2. I think my labor and delivery will go normally	○	○	○	○
3. I am concerned about having a premature baby	○	○	○	○
4. I am worried that the baby could be abnormal	○	○	○	○
5. I am afraid that I will be harmed during delivery	○	○	○	○
6. I am worried about how the baby is growing and developing inside me	○	○	○	○
7. I am worried about losing the baby	○	○	○	○
8. I am worried about having a hard or difficult labor and delivery	○	○	○	○
9. I am worried about taking care of a newborn	○	○	○	○
10. I am worried about developing medical problems during my last trimester	○	○	○	○

Continue

Figure 7. Pregnancy-related Anxiety Scale

Please read each statement and then indicate how you feel **right now**, that is, **at this moment**. Do **not** spend too much time on any one statement but give the answer which seems to best describe your present feelings.

	Not at All	Somewhat	Moderately	Very Much
1. I feel calm	○	○	○	○
2. I feel secure	○	○	○	○
3. I feel tense	○	○	○	○
4. I feel strained	○	○	○	○
5. I feel at ease	○	○	○	○
6. I feel upset	○	○	○	○
7. I am worrying over possible misfortunes	○	○	○	○
8. I feel satisfied	○	○	○	○
9. I feel frightened	○	○	○	○
10. I feel comfortable	○	○	○	○
11. I feel self-confident	○	○	○	○
12. I feel nervous	○	○	○	○
13. I am jittery	○	○	○	○
14. I feel indecisive	○	○	○	○
15. I am relaxed	○	○	○	○
16. I feel content	○	○	○	○
17. I am worried	○	○	○	○
18 I feel confused	○	○	○	○
19. I feel steady	○	○	○	○
20. I feel pleasant	○	○	○	○

Continue

Figure 8. State Anxiety Scale (from State-Trait Anxiety Scale)

Please read the entire group of statements in each category. Then pick out and click on the one statement in that group which best describes **the way you feel today**, that is, **right now!**

1. ○ I do not feel sad
   ○ I feel blue or sad
   ○ I am blue or sad all the time and I can't snap out of it
   ○ I am so sad or unhappy that I can't stand it

2. ○ I am not particularly pessimistic or discouraged about the future
   ○ I feel discouraged about the future
   ○ I feel I have nothing to look forward to
   ○ I feel that the future is hopeless and that things cannot improve

3. ○ I do not feel like a failure
   ○ I feel I have failed more than the average person
   ○ As I look back on my life, all I can see is a lot of failure
   ○ I feel I am a complete failure as a wife/partner

4. ○ I am not particularly dissatisfied
   ○ I don't enjoy things the way I used to
   ○ I don't get satisfaction out of anything anymore
   ○ I am dissatisfied with everything

5. ○ I don't feel particularly guilty
   ○ I feel bad or unworthy a good part of the time
   ○ I feel quite guilty
   ○ I feel as though I am very bad or worthless

6. ○ I do not feel I am being punished
   ○ I have a feeling that something bad may happen to me
   ○ I feel I am being punished or will be punished
   ○ I feel I deserve to be punished

7. ○ I do not feel disappointed in myself
   ○ I am disappointed in myself
   ○ I am disgusted with myself
   ○ I hate myself

Figure 9. Beck Depression Inventory (14 non-somatic items only)

8. ○ I don't feel I am any worse that anybody else
○ I am very critical of myself for my weakness or mistakes
○ I blame myself for everything that goes wrong
○ I feel I have many bad faults

9. ○ I don't cry any more than usual
○ I cry more now than I used to
○ I cry all the time now. I can't stop it
○ I used to be able to cry but now I can't cry at all even though I want to

10. ○ I am no more irritated now that I ever am
○ I get annoyed or irritated more easily than I used to
○ I feel irritated all the time
○ I don't get irritated at all at the things that used to irritate me

11. ○ I have not lost interest in other people
○ I am less interested in other people than I used to be
○ I have lost most of my interest in other people and have little feeling for them
○ I have lost all of my interest in other people and don't care about them at all

12. ○ I make decisions about as well as ever
○ I try to put off making decisions
○ I have great difficulty in making decisions
○ I can't make any decisions at all anymore

13. ○ I don't feel I look any worse than I used to before pregnancy
○ I am worried that I am looking old or unattractive
○ I feel that there are permanent changes in my appearance and they make me feel unattractive
○ I feel that I am ugly or repulsive looking

14. ○ I can work about as well as before
○ It takes extra effort to get started at doing something
○ I have to push myself very hard to do anything
○ I can't do any work at all

Continue

Figure 9. Continued

Most couples have disagreements in their relationships. Please indicate below the approximate extent of agreement or disagreement between you and your partner during this pregnancy on each item on the following list.

	Always Agree	Almost Always Agree	Occasionally Disagree	Frequently Disagree	Almost Always Disagree	Always Disagree
1. Handling family finances	○	○	○	○	○	○
2. Religious matters	○	○	○	○	○	○
3. Demonstrations of affection	○	○	○	○	○	○
4. Sex relations	○	○	○	○	○	○
5. Friends	○	○	○	○	○	○
6. Philosophy of life	○	○	○	○	○	○
7. Ways of dealing with parents or in-laws	○	○	○	○	○	○
8. Aims, goals, and things believed important	○	○	○	○	○	○
9. Amount of time spent together	○	○	○	○	○	○
10. Making major decisions	○	○	○	○	○	○
11. Household tasks	○	○	○	○	○	○
12. Career decisions	○	○	○	○	○	○
13. Delivery/Birth plans	○	○	○	○	○	○
14. Health/medical care of baby	○	○	○	○	○	○
15. Names for baby	○	○	○	○	○	○

	All the Time	Most of the Time	More Often Than Not	Occasionally	Rarely	Never
16. How often do you discuss or have considered divorce/separation?	○	○	○	○	○	○
17. How often have you or your mate left the house after a fight	○	○	○	○	○	○
18. How often you think things between you and your mate are going well?	○	○	○	○	○	○
19. Do you confide in your partner?	○	○	○	○	○	○
20. Do you ever regret that you married (or lived together)?	○	○	○	○	○	○
21. How often do you and your partner quarrel?	○	○	○	○	○	○
22. How often do you and your partner "get on each other's nerves"?	○	○	○	○	○	○

Figure 10. Dyadic Adjustment Assessment (Adapted)

23. Do you kiss your partner?

- Every day
- Almost Every day
- Occasionally
- Rarely
- Never

24. Do you and your partner engage in outside interests together?

- All of them
- Most of them
- Some of them
- Very few of them
- None of them

How often during this pregnancy would you say the following events occur between you and your mate?

	Never	Less than once a month	Once or twice a month	Once or twice a week	Once a day	More often
25. Have stimulating exchange of ideas?						
26. Laugh together						
27. Calmly discuss something						
28. Work together on a project						

Next are some things about which couples sometimes agree and sometimes disagree. Please indicate if either item listed below caused differences of opinion or were problems in your relationship during this pregnancy.

	Yes	No
29. Being too tired for sex		
30. Not showing love		

31. The numbers on the following line represent different degrees of happiness in your relationship. The point, "happy", represents the degree of happiness of most relationships. Please indicate the degree that best describes your relationship during this pregnancy.

- Extremely unhappy
- Fairly unhappy
- A little unhappy
- Happy
- Very happy
- Extremely happy
- Perfect

32. Which of the following statements best describes how you feel about the future of your relationship:

- I want desperately for my relationship to succeed and would go to almost any lengths to see that it does.
- I want very much for my relationship to succeed and will do all that I can to see that it does.
- I want very much for my relationship to succeed and will do my fair share to see that it does.
- It would be nice if my relationship succeeded, and I can't do much more than I am doing now to help it succeed.
- It would be nice if it succeeded, but I refuse to do any more than I am doing now to keep the relationship going.
- My relationship can never succeed, and there is no more that I can do to keep the relationship going.

Continue

Figure 10. Continued.

Please think about your **relationships outside your marriage** (e.g. friends, family, co-workers, neighbors, cyber-friends, and so on). Please indicate the extent to which each statement describes your relationship with those people **during this pregnancy**.

	Strongly Disagree	Disagree	Agree	Strongly Agree
1. There are people I can depend on to help me, if I really need it	○	○	○	○
2. I feel that I do not have any close personal relationships with other people	○	○	○	○
3. There is no one I can turn for guidance in times of stress	○	○	○	○
4. There are people who depend on me for help	○	○	○	○
5. There are people who enjoy the same social activities I do	○	○	○	○
6. Other people do not view me as competent	○	○	○	○
7. I feel personally responsible for the well-being of another person	○	○	○	○
8. I feel part of a group of people who share my attitudes and beliefs	○	○	○	○
9. I do not think other people respect my skills and abilities	○	○	○	○
10. If something went wrong, no one would come to my assistance	○	○	○	○
11. I have close relationships that provide me with a sense of emotional security and well-being	○	○	○	○
12. There is someone I could talk to about important decisions in my life	○	○	○	○

Figure 11. Social Support Provisions

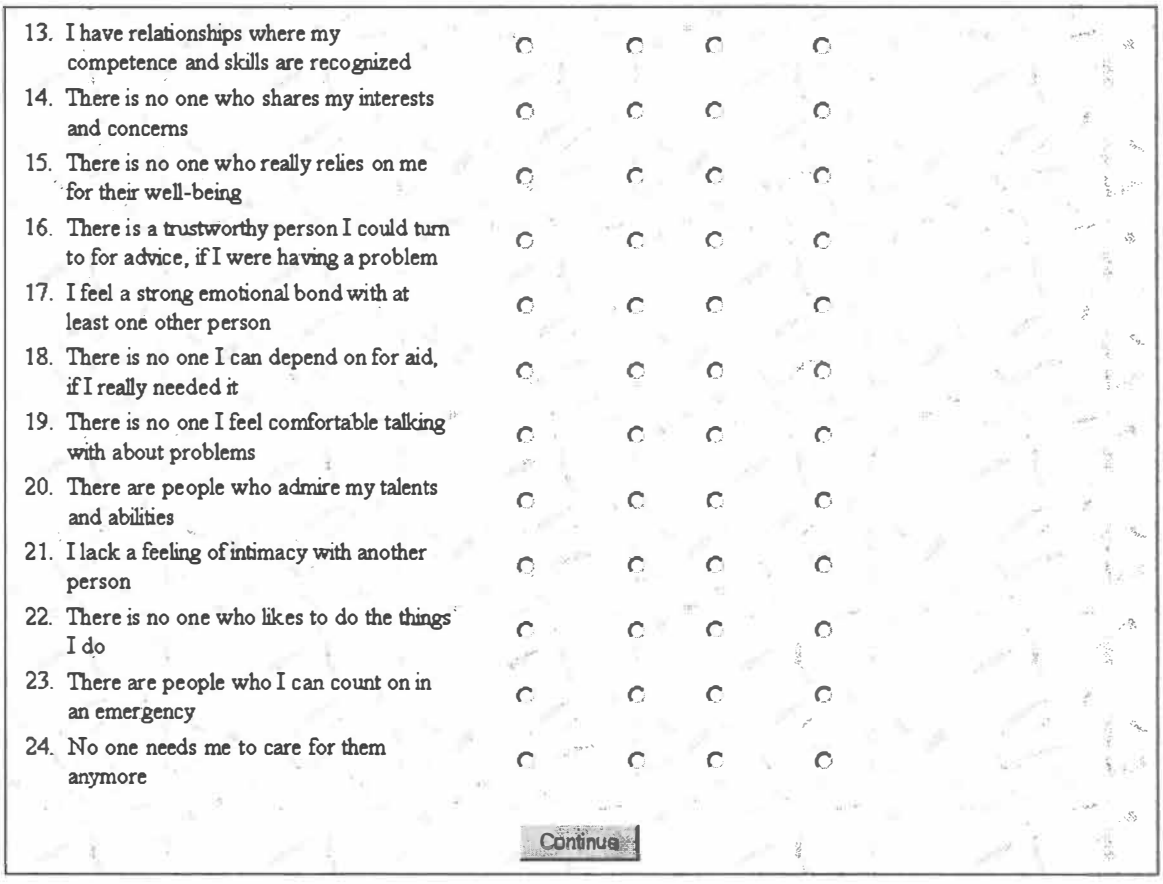


Figure 11. Continued.

The University of Tennessee, Knoxville

Psychology Department



Thank you very much for taking the time to respond to this survey.

Should you need to contact us about this survey, please call

Alicia Baird-Fassardi @ (760) 752-1016 or email baird@utk.edu, or

Dr. Leonard Handler, Professor @ (865) 974-2161 or email lhandler@utk.edu

Figure 12. Closing Page: Thank You!

VITA

Alicia R. Baird-Fassardi completed a predoctoral internship in clinical psychology at the Jerry L. Pettis Memorial Veterans Hospital in Loma Linda, CA. Through her course of study, Ms. Baird-Fassardi has been involved in different capacities, including as project director, in several research projects conducted at the Psychology Department of The University of Tennessee. Findings from her research projects have been presented at various professional conferences. She has conducted neuropsychological research overseas as a member of the international human rights organization Physicians for Human Rights, Boston, MA. Ms. Baird-Fassardi has worked as a psychotherapist at the University of Tennessee Psychological Clinic and for the not-for profit organization Cherokee Health Systems in Morristown, TN. Ms. Baird-Fassardi's current research interests include psychosocial aspects of pregnancy health, the treatment and prevention of psychological disturbances during pregnancy, and the influence of marital quality and social support on health and illness.

Alicia R. Baird-Fassardi was born and raised in Argentina and immigrated to the United States at age 25. She currently lives in California with her husband and children.

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