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RELATIONS OF DEPRESSION, SOCIAL SUPPORT, AND SOCIO-DEMOGRAPHIC
FACTORS ON HEALTH BEHAVIORS OF MOTHERS WITH PREMATURE INFANTS
HOSPITALIZED IN A NEONATAL INTENSIVE CARE UNIT (NICU)

A thesis submitted in partial fulfillment of the requirements for the degree of Master of
Science at Virginia Commonwealth University.

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Table of Contents

	Page
Acknowledgments	ii
List of Tables	v
List of Figures	vi
Abstract	vii
Introduction	1
Literature Review	4
Preterm Birth	4
Cost of Preterm Birth	4
Postpartum Depressive Symptomatology	7
Social Support	10
Health Behaviors	12
Hypotheses	16
Method	18
Study Overview	18
Recruitment and data collection procedures	19
Participants	20
Measures	20
Results	25
Data Screening	25

Preliminary Analyses	27
Hypothesis Testing	34
Discussion	44
Summary of Findings	44
Hypotheses Findings	45
Implications	49
Limitations	49
Future Research	51
References	52
Appendices	64
Appendix A. Structured Interview & Demographics	64
Appendix B. Revised BDI	66
Appendix C. Social Support Scale	69
Appendix D. Health and Well-Being Behavior Scale – Revised	71
Appendix E. One-Month Follow-up Questionnaire.....	73
Vita	77

List of Tables

		Page
Table 1.	Maternal demographics	21
Table 2.	Summary of Measures for Present Study	24
Table 3.	Distribution of Scales and Subscales	28
Table 4.	Internal Consistency Reliability Estimates for Scales	29
Table 5.	Percentage of Distribution of HWBS items	31
Table 6.	Correlations among Demographic and Independent Variables	32
Table 7.	Non-significant Functions summary	35
Table 8.	Correlations Standardized Canonical Coefficients, Canonical Correlations between Predictor Variables and Health Behaviors for Function 1	36
Table 9.	Kruskal-Wallis Test for Effects of Depression Levels on Health Behaviors	38
Table 10.	One-Way Analysis of Variance (ANOVA) for Effects of Education and Income on Depression Levels (between subjects)	40
Table 11.	Summary of Hierarchical Regression Analyses for Depression and Social Support As Predictors of a Mother's Health Behaviors	43

List of Figures

	Page
Figure 1. Pender's Health Promotion Model (revised) (2006)	14
Figure 2. Model for present study.....	16
Figure 3. Illustration of the first function in a canonical correlations analysis for the present study.....	37

Abstract

RELATIONS OF DEPRESSION, SOCIAL SUPPORT, AND SOCIO-DEMOGRAPHIC FACTORS ON HEALTH BEHAVIORS OF MOTHERS WITH PREMATURE INFANTS HOSPITALIZED IN A NEONATAL INTENSIVE CARE UNIT (NICU)

By Surbhi Kanotra, B. A.

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science at Virginia Commonwealth University.

Virginia Commonwealth University, 2010

Major Director: Marilyn Stern, Ph.D.
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The present study examined the relationships of depression, social support, and socio-demographic factors on health behaviors of mothers with preterm infants hospitalized in the neonatal intensive care unit (NICU). In addition, the study also assessed the moderation effect of social support on the relationship between depression and health behaviors. Eighty-nine mothers with hospitalized infants in the central Richmond area participated in the study. Analyses found that mother's education level and her marital status to be significantly associated with her health behaviors. Mothers with a higher level of education and those who were married, were less likely to smoke and more likely to incorporate high fiber foods in their diet. In addition, the more support a mother perceived from family and friends, the less likely she was to smoke cigarettes. Neither depression nor social support from the father was significantly related to health behaviors. This study did not find social support to be a moderator between depression and health behaviors. However, the study found direct effects of socio-demographic factors and certain types of support on health behaviors. Assessing a

mother's personal and interpersonal factors will inform clinicians of possible areas of interventions for mothers during the postpartum period.

Relations of Depression, Social Support, and Socio-Demographic Factors on Health Behaviors of Mothers with Premature Infants Hospitalized in a Neonatal Intensive Care Unit (NICU)

The average length of human gestation from conception to birth spans 40 weeks; when birth occurs prior to 37 weeks gestation, it is defined as “preterm” (Martin et al., 2005). The preterm infant birth rate in the United States increased nearly 20% between 1990 and 2006 (Martin et al, 2010). In 2004, 12.5% of all live births were preterm births. This translates to approximately 500,000 premature infant births each year (Institute of Medicine, 2006).

Premature infants usually require immediate and often extended hospitalization in a neonatal intensive care unit (NICU). The often unexpected premature birth thrusts parents into a NICU environment that is both unfamiliar and frightening as parents are unprepared for this experience (e.g., Stengel, 1982; von Gontard, Schwarte, Kribs, & Roth, 1999). Being in an environment that is so unfamiliar, most parents perceive their infants’ NICU hospitalization as highly stressful (e.g., Affleck, Tennen, & Rowe, 1991; Davis, Edwards, Mohay, & Wollin, 2003; Reichman, Miller, Gordon, & Hendricks-Munoz, 2000). As mothers are more involved with the pregnancy, birth, and care of the infant, they are at an increased risk of postpartum psychological distress (e.g., Miles & Holditch-Davis, 1997; von Gontard, et al., 1999). Social support from friends and family can serve as a protective factor at times of stress (Coyne & DeLongis, 1986) and yet many times, parents are isolated from their usual sources of support (Blackburn & Lowen, 1986) and receive less support than they had expected (Davis, Logsdon, & Birkmer, 1996) while their child is in the NICU. Lower levels of perceived social support have been associated with higher levels of depression, hostility, and anxiety (Doering, Moser, Dracup, 2000).

Various intervention programs have been developed in an effort to provide additional support for the parents. Some of the programs have been found to lead to better outcomes for mothers on parents-infant interaction and home environment (Barrera, Rosenbaum, & Cunningham, 1986; Browne & Talmi, 2005; Newnham, Milgrom, Skouteris, 2009; Resnick, Armstrong, & Carter, 1988; Ross, 1984). However, a majority of the interventions focus on the mother-child interaction and the well-being of the child and often times neglect maternal well-being during this postpartum period (Walker & Tinkle, 1996).

As mothers transition into motherhood they must contend with many changes in their lives as well as adjusting to having a newborn. Some of the changes include making decisions about their health behaviors, such as exercise, weight loss, food intake, and smoking. Research has found that during the postpartum period, as mothers **adjust** to the many demands of motherhood, they often have decreased self-care, such as reduced physical activity and obtaining adequate amounts of sleep (Tulman, Fawcett, Groblewski, & Silverman, 1990) and increased physical illness (Jones & Parks, 1990; Mercer, 1986). Mothers often engage in unhealthy health behaviors which not only affect their health (e.g. not participating in regular exercise, consuming unhealthy foods) but also their infant's respiratory health (e.g. smoking) (Gennaro & Krouse, 1996; Gennaro, Dunphy, Dowd, Fehder, & Douglas, 2001; Gennaro, Fehder, Nuamah, Campbell, & Douglas, 1997).

Physical activity has been shown to decrease symptoms of depression and anxiety and increase positive moods for women generally (Stephens 1988) and postpartum women (Koltlyn & Schultes, 1997). Several studies have examined the health behaviors of women in the postpartum period. However, there is limited research on health behaviors of mother with preterm infants and factors that affect maternal health behaviors. It is essential to

delineate these factors so that intervention programs can be effectively designed to address them specifically.

In order to examine how a number of different factors interact to affect individuals' health behaviors, Pender (Pender, Murdaugh, & Parsons, 2006) proposed a health promotion model. This model posits that different personal factors, including biological (e.g. age, body mass index), psychological (e.g. self-esteem, depression), and sociocultural factors (e.g. race, socioeconomic status), affect individuals' use of health promoting behavior. The model also proposes that certain interpersonal influences (e.g. social support from family, peers, etc.) may interact with the above mentioned personal factors to affect how individuals pursue health. Thus, while personal factors may directly affect health promoting behaviors, the effect of personal factors on health promoting behaviors may also be moderated by interpersonal influences. Pender's model was used in this study to delineate how factors such as depression, social support, and socio-demographic variables affect maternal health behaviors.

In summary, premature birth has implications for both the infant and the mother. The added stress and anxiety of having a preterm infant often place mothers at risk for postpartum psychological distress. With mothers at risk for decreased self-care during the postpartum period, psychological distress has an impact on their own and their child's health. By determining what psychosocial variables affect maternal health behaviors, intervention programs designed to promote healthy behaviors can be developed. The goal of the present study is to explore whether certain psychosocial factors influence maternal health behaviors. The aims of the current study are to 1) determine if depressive symptomology, social support,

and socio-demographic variables are related to maternal health behaviors, and 2) determine if social support moderates the relationship between depression and health behaviors.

This present study examines the relationships among socio-demographic characteristics, psychological well-being, social support, and health behaviors in mothers with infants hospitalized in the neonatal intensive care unit. The following section provides a selective review of the well-being of mothers as they face the hospitalization of their child in the NICU. Social support literature, as well as the hypothesized relationships between social support and well-being is reviewed. Finally, the literature of maternal health behaviors is reviewed.

Literature Review

Preterm Birth

According to the Centers for Disease Control's National Center for Health Statistics report on Preliminary Births for 2007, there were approximately 508,000 preterm births in the United States, representing 12.7% of all live births. Between 1990 and 2004, the preterm infant birth rate in the United States increased nearly 18% (Martin, et al, 2010). Preterm births are defined as births that occur before 37 completed weeks of gestation. The infants are admitted to the neonatal intensive care unit (NICU) if they are born prematurely, have low birth weight, or both, (O'Brien et. al 1995).

Costs of Preterm Birth

It is estimated that in 2005, the annual societal economic cost (medical, education, and lost productivity) in the United States associated with preterm births was at least \$26.2 billion or \$51,600 per infant born preterm (Institute of Medicine, 2006). In addition to economic costs, the strain on parents who have infants in the NICU is tremendous. Parents

of preterm infants not only have additional financial burdens (medical costs, time-off from work, etc.), they also have added emotional and psychological stress of having a child in the NICU.

Having a child in the NICU has been shown to be very stressful for the parents of the child (Robson, 1997). Previous research has found that parents with infants in the intensive care unit have many sources of stressors (Miles & Carter, 1982). Through observation of parents in the Pediatric Intensive Care Unit (PICU) and interviews of parents with infants in the PICU, Miles and Carter identified 79 items that were categorized into eight dimensions of PICU stressors. The eight dimensions include: sights and sounds, child's appearance, procedures, child's behavior, child's emotions, staff communication, staff behavior, and parental role deprivation.

Miles and Holditch-Davis (1997) found that aspects of the NICU environment that parents found to be stressful were the loud support and monitoring equipment, bright lights, chemical odors of the NICU, and seeing their child being connected to tubes and equipment. However, research has shown that the parents find the stressors related to the infant's health and the physical separation due to the hospitalization (Hughes & McCollum, 1994) and the loss of their expected and desired parental role to be the most stressful aspect of having their child in the NICU (Miles, Funk, & Kasper, 1992; Miles, Funk, & Carlson, 1993). Parents anticipate taking care of the child and performing other normal parenting functions, such as feeding their child. However, with their child hospitalized, parents have reported being frustrated and disappointed that they cannot perform these tasks due to the barriers created by the NICU environment. The stress of worrying about their child's health, learning about the NICU environment, and being separated from their child can be very trying on the parents.

The experience of having an infant in a NICU typically results in higher maternal distress than normal childbirth experiences (Miles, Funk, & Kasper, 1992). These stressors can have an influence on the parent's psychological well-being (Meyer et al, 1995; Singer, Davillier, Bruening, Hawkins, & Yamashita, 1996) and their physical health (Jones & Parks, 1990; Mercer, 1986). Meyer and colleagues investigated the psychological distress of mothers (n= 142) with premature infants. The investigators utilized the Symptom Checklist 90-R, which includes the subscales for depression, anxiety, somatization, obsessive-compulsive, interpersonal sensitivity, hostility, phobic anxiety, paranoid ideation, and psychoticism. The study found that 28% of mothers with preterm infants reported clinically significant psychological distress as compared to 10% in a normative sample.

Recent studies have shown that many of these parents have symptoms of posttraumatic stress disorder (PTSD: Pierrehumbert, Nicole, Muller-Nix, & Forcada-Guex & Ansermet, 2003; Holditch-Davis, Bartlett, Blickman, & Miles, 2003) and acute stress disorder (ASD: Shaw et al, 2006). As compared to fathers, mothers report the NICU experience as more stressful (Hughes & McCollum, 1994). A study found that mothers were more poorly adjusted and were more hostile, depressed, and anxious than the fathers with infants in the NICU (Doering, Dracup, & Moser, 1999). This is understandable, as mothers are more involved with the NICU experience through their physiological participation in the pregnancy, birth, and postpartum recovery process. Studies have also shown the relationship between parental stress and symptoms of depression and anxiety (Miles, 1989; Miles, Carter, Hennessey, & Eberly, 1989).

High levels of postpartum maternal stress have been linked to poor subsequent caretaking behaviors and parenting efficacy. These factors in turn are consistently related to

subsequent poor infant developmental outcomes (e.g., Dunkel-Schetter, Gurung, Lobel, & Wadhwa, 2001; Levy-Shiff, Sharir, & Mogilner, 1989). Mother's distress may negatively affect their ability to emotionally relate to their children and respond contingently to their infants' communication of needs in both the short- and long-term (Graven et al., 1992; Jarvis & Creasey, 1991). All the stressors a mother faces while having a child in the NICU can negatively affect both the infant and the mother's well-being.

Postpartum Depressive Symptomatology

Prevalence and Characteristics. Following childbirth, some mothers may suffer from postpartum depression. Approximately 15 – 20% of new mothers meet the criteria for major depressive disorder with postpartum onset (Beck 2001; O'Hara & Swain, 1996). However, research suggests that a larger percentage of new mothers suffer from subclinical levels of postpartum depression, which do not meet the *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition text revision (DSM-IV-TR: American Psychiatric Association, [DSM-IV-TR] 2000), therefore the rates may be underestimated and do not capture the actual prevalence of the disorder (Lee, Yip, Chui, & Chung, 2000). In a study of mothers with children ages 18 months or younger, nearly 40% of mothers reported recent depression (Kahn et al., 1999). In a recent longitudinal study (Miles, Holditch-Davis, Burchinal, & Nelson, 1999) it was reported that at time of hospital discharge and 12 months later, 45% and 36% (respectively) of mothers of medically fragile infants reported scores which indicated a risk for depression.

Of note, mothers can experience depression after the birth of their child on a spectrum ranging from subclinical depressive symptoms (commonly known as “postpartum blues” or “baby blues”) to a clinical diagnosis of postpartum mood disorder to postpartum psychosis.

As many as 75% women develop baby blues in their first postnatal year, 15 – 20% develop postpartum depression (PPD), and 0.1 – 0.2% develop a postpartum mood disorder with psychotic features (Klempner, 2008; Cohen, 1998). The symptoms of postpartum blues are usually limited to two weeks postpartum and include mild mood swings, anxiety, insomnia, and irritability (O’Hara, Schlechte, Lewis, & Wright, 1991).

Outcomes Associated with Depressive Symptoms. Depressed mood has consistently been associated with poorer maternal interactions with infants and subsequent negative effects in infant development (Field, 1998; Gelfand & Teti, 1990, Reck et al, 2004). There is a large body of research which focuses on maternal depression and its effects on infant outcomes. Research has shown that depressed mothers speak less to their infants (Reissland, Shepard, & Herrera, 2003) and touch and cuddle their infant less (Herrera, Reissland, & Shepard 2004), which effects the attachment formed between mother and infant (Chase-Brand, 2008). Other studies have shown that both clinical and subclinical levels of maternal depression are associated with lower developmental assessment scores (Lyons-Ruth et al., 1986) and with a range of emotional and behavioral problems in children of all ages (e.g., Downey & Coyne, 1990; Gelfand & Teti, 1990; Beck, Reynolds, & Rutowski, 1992).

There is also evidence that depression affects the mothers’ health promoting behaviors, such as exercise, nutrition, or smoking cessation. Research has shown that depressed mothers are more likely to smoke, which not only affects their health but may also have health implications for their child (Groer & Morgan, 2007; Leiferman, 2002). A large scale study (Leiferman, 2002) investigated (n=8145, age range 15-49) the relationship between depression and maternal health behaviors and found that maternal depression was associated with maternal behaviors; depressed mothers were more likely to smoke, less likely

to administer vitamins to their child, and less likely to restrain their child in appropriate car seats.

Many factors play a role in predicting and offsetting depressive symptomatology for mothers, such as history of depression, amount of stress experienced, and their coping resources, including available social support. During and after NICU hospitalization, the support of the partner, as well as other family members and friends can facilitate coping and mitigate some of the negative effects of this stressful event (Coyne & DeLongis, 1986).

Socio-demographic Factors Affecting Depressive Symptoms. Various maternal socio-demographic factors contribute to the onset of depression in the postpartum period, such as lower socioeconomic status (SES: Beck, 2001; Hobfoll, Ritter, Lavin, Hulsizer, & Cameron, 1995; O'Hara & Swain, 1996), marital status (Beck, 2001; Weissman, Leaf, & Bruce, 1987), stressful life events (Boyce, 2003; Kessler, 1997), adolescent motherhood (Paykel, Emms, Fletcher, & Rassaby, 1980), and unsupportive partner and a poor social support network (O'Hara & Swain, 1996). Beck conducted a meta-analysis of the predictors of postpartum depression and found thirteen significant predictors. The thirteen predictors include prenatal depression, self esteem, childcare stress, prenatal anxiety, life stress, social support, marital relationship, history of previous depression, infant temperament, maternity blues, *marital status*, *socioeconomic status*, and unplanned/unwanted pregnancy (Beck 2001). This study limits its focus to SES, marital status, and race. Race was also included as a recent study found there to be racial differences in factors associated with postpartum depression symptoms (Howell, Mora, Horowitz, & Leventhal, 2005). That study found as compared to white mothers, African-American and Hispanic mothers are at higher risk for reporting early postpartum depression.

Research has shown that low income and low SES increases the risk of common diagnosable mental disorders, such as depression (Dohrenwend & Dohrenwend, 1981; Kessler et al, 1994). Neugebauer and colleagues found psychopathology to be two and half times more prevalent in those with the lowest SES than those with highest SES (1980). Studies focusing on women found that women caring for young children and who are strained financially are more likely to suffer from depressive symptoms than other women (Brown, Bhrolchain, & Harris, 1975). Financial strain can lead to a host of other stressors, such as concerns about housing, education, and health care. Studies have shown that poorer women experience more frequent and less controllable stressful life events (Brown et al, 1975). Hobfoll and colleagues (1995) found the rates of postpartum depression to be double for women of lower SES than those from the middle-class. These studies indicate the importance of measuring and analyzing a mother's SES because it may be related to the mother's depressive symptoms.

Research also suggests that marital status may also be a predictor of postpartum depression. In a meta-analysis of the predictors of postpartum depression, Beck (2001) found marital status to be one of 13 significant predictors. Studies have shown that unmarried women are more vulnerable to depression as they have the sole responsibility of caring for their families and do not have a supportive partner they can turn to in stressful times.

Social Support

Social support can be defined as the gratification of one's basic social needs, whether it is through social interaction with others or through the relative presence or absence of psychosocial support services from significant others (Kaplan, Cassel, & Gore, 1997). House

(1981) categorized four types of social support: emotional (e.g. comfort), informational (e.g. advice), instrumental (tangible or material support), and appraisal (encouragement).

Perceived social support has been shown to be protective against the deleterious effects of life stress and positive health and well-being (Cohen & Wills, 1985). Research indicates that women with high levels of stress but who report having good social support available also show fewer pregnancy complications and display lower levels of depression during pregnancy and postnatally (Stern & Bitsko, 2003). Some researchers even suggest that the positive effect of social support on health may be more direct and possibly stronger than the negative effect of stress on health (House, Landis, & Umberson, 1988). Furthermore, predictors of postpartum depression include the experience of stressful life events during pregnancy and inadequate social support (DeMier, Hynam, Harris, & Manniello, 1996; Holditch-Davis et al, 2003).

A woman's partner is generally considered one of her most important sources of support. Having positive partner support can limit the risk of depression and generally serve as a buffer against non-normative stressors, such as unexpected premature birth and NICU hospitalization (Lavee, MuCCubbin, & Olson, 1987). Those mothers who report having supportive partners tend to be more responsive to their child, whether they are premature or full-term (Crnic, et. al., 1983). Lack of effective social support has been linked to worsened mental health and high levels of depressive symptomatology (Levy-Shiff, Dimitrovsky, Shulman, & Har-Even, 1998; Terry, Rawle, & Callan, 1995). This suggests that mothers without the support of their partners may be at higher risk for depression, which in turn could affect how they respond to their infant and increase the risk of development difficulties for the child.

For mothers who do not have support from their partners, it is important to determine if they have other sources of support, such as from other family members. Research has identified a new mother's partner, as well as her parents as the most important and the most available sources of support during the postpartum period (Logsdon, Birkimer, & Barbee, 1997). Research shows that mothers who have high levels of support from their own mothers tend to be more actively involved with their infant during hospitalization (Minde, 1992).

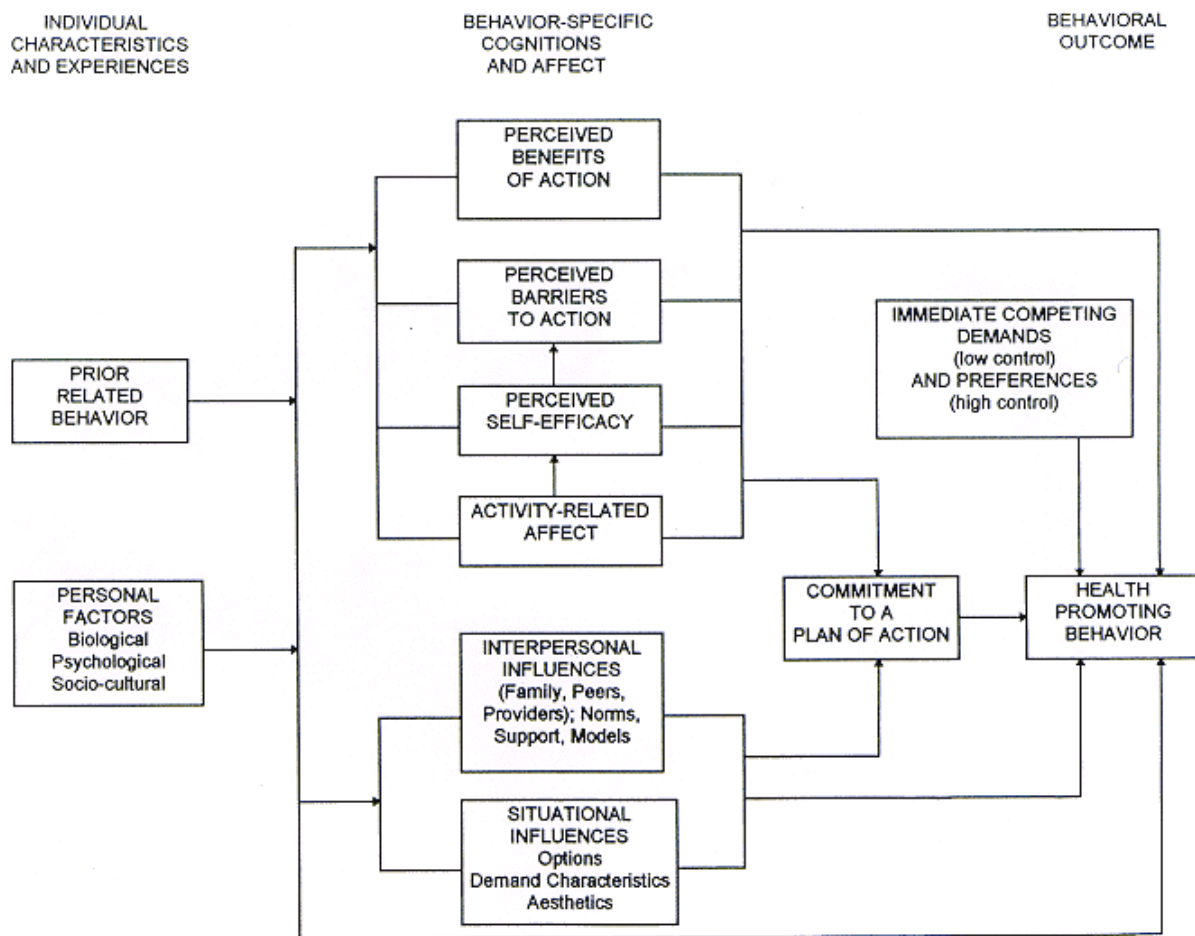
Research has shown that social support positively influences adaptive maternal behaviors, decreases stress levels, and improves health status (Baker & Taylor, 1997). Social support can also increase participation in health promoting behaviors (e.g. exercise and proper nutrition) and decrease participation in health risk behaviors (e.g. alcohol or drug use, smoking) (Haber, Cohen, Lucas, Baltes, 2007; McNamara, Orav, Wilkins-Haug, & Chang, 2006). It is important to examine what kinds of support resources a mother has available during her infant's NICU hospitalization and determine if it affects the mother's health behaviors. This study examines whether a connection exists between perceived social support and maternal health behaviors.

Health Behaviors

In 1975, Pender published her "Conceptual Model for Preventive Health Behavior" which conceptualized how individuals made decisions about their own health care (Schmieding, 2006). This model would be used to develop Pender's Health Promotion Model (HPM: Figure 1) by integrating constructs from Feather's (1982) expectancy-value theory and Bandura's (1985) social cognitive theory. The HPA provides a framework that integrates nursing and behavioral science perspectives for factors which influence health behavior. The determinants of health behaviors are categorized into cognitive-perceptual

factors and modifying factors. The behavior-specific cognitions and affective factors are identified as the primary motivation to acquire and maintain health promoting behaviors and include the importance of health, perceived control of health, and definition of health, perceived health status, perceived self-efficacy, perceived benefits, and perceived barriers. The modifying factors include demographic, biological, interpersonal, situational, and behavioral factors (Pender, Murdaugh, Parsons, 2006). The model depicts the multidimensional nature of a person's pursuit to health promoting behaviors by interacting with his or her interpersonal and physical environments. Portions of Pender's HPM model are utilized in the present study to test the hypotheses of this study.

As women transition into motherhood and try to balance all their old and new responsibilities, their health behaviors may change (Walker & Wilging, 2000). With their added responsibilities of caring for an infant, women reduce or even abandon regular exercise (Tulman et al, 1990) and eat unhealthily (Ohlin & Rosner, 1996; Gennaro et al, 1997). On the other hand, in an effort to lose weight gained during their pregnancy, some women may engage in vigorous exercise (Dewey, Heinig, & Nommsen, 1993) or unhealthy restricted eating behaviors (Gennaro, Fehder, York, & Douglas, 1997). Studies have shown that 40% of women smokers quit during their pregnancy (McBride & Pirie, 1990; Mullen, Richardson, Quinn, & Ershoff, 1997). However, although women stop smoking during their pregnancy, they do not necessarily quit smoking. Studies have shown that at 6 months postpartum, the relapse rates are between 43 – 65% (McBride et al, 1999; McBride & Pirie, 1990; Mullen et al, 1997) and nearly 70% at 12 months postpartum (Stotts, DiClemente, Carbonari, & Mullen, 1996).



Revised Health Promotion Model

Figure 1: Pender's Health Promotion Model (revised)

Source: Pender, N.J., Murdaugh, C.L., & Parsons, M.A. (2006). *Health Promotion in Nursing Practice* (5th ed). Upper Saddle River, NJ: Prentice Hall.

There are numerous studies that have examined the predictors of health-promoting behaviors in various populations, including college students (Huang & Chiou, 1997), the elderly (Lucas, Orshan, & Cook, 2000; Riffle, Yoho & Sams, 1989; Wang, 2001), cancer patients (Frank-Stromberg, Pender, Walker, & Sechrist, 1990), and nurses (Piazza, Conrad, & Wilbur, 2001). Although there are several studies that have investigated the health behaviors of postpartum women, few have examined other factors that may influence their

health behaviors. Gennaro and Fehder (2000) compared the health behaviors of mothers with term and preterm infants; however, this study strictly explored health behaviors and did not examine the depression levels and how it may relate to their health behaviors.

The present study examines whether socio-demographic characteristics, depression, and social support are reliably related to postpartum women's health behaviors. Utilizing Pender's Health Promotion Model (2006), the study focuses on the personal factors (psychological and sociocultural), interpersonal influences, and behavior outcomes (Figure 2). In Pender's model, the biological factors include "age, body mass index, pubertal status, menopausal status, aerobic capacity, strength, agility, or balance. The psychological factors include, self-esteem, self-motivation, and perceived health status. Sociocultural factors include, race, ethnicity, acculturation, education, and socioeconomic status" (p 52). For the present study, the psychological factor is depressive symptomology and the sociocultural factors include SES, marital status, and race. From Pender's Behavior Specific Cognitions and Affect part of the model, the present study examines interpersonal influences, specifically social support from the partner and others. For the Behavioral Outcome portion of the model, the present study examines the health behaviors of mothers, such as nutrition (eating both healthy and unhealthy foods), exercise, smoking, and alcohol and caffeine consumption.

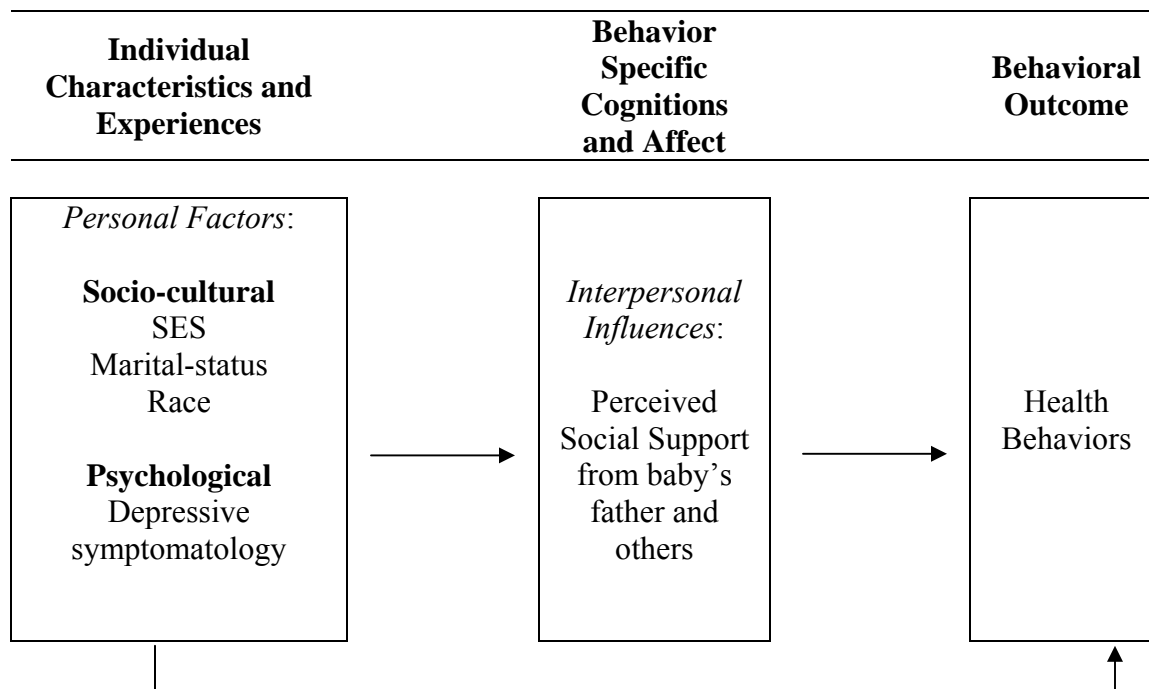


Figure 2: Model for present study

Hypotheses

Based on the central aim of the study and the previous literature review, two sets of hypothesis are developed.

1. The health behaviors of mothers with preterm infants will be related to their postpartum depression, perceived social support, and their socio-demographic characteristics.
 - a. Depression levels will be associated with health behaviors of mothers with preterm infants.
 - i. In comparison to women with lower levels of depression, women with moderate to severe levels of depression will show more negative health

behaviors in the form of smoking, infrequent exercise, unhealthy food consumption, and frequent alcohol consumption.

- b. Levels of perceived social support will be associated with health behaviors of mothers with preterm infants.
 - i. Women who perceived higher levels of from the child's father or from others, will demonstrate positive health behaviors in the form of eating healthy, exercising, and minimal or no smoking and drinking alcohol.
 - c. Health behaviors will be associated with various socio-demographic characteristics of mothers with preterm infants.
 - i. Mothers with a lower socioeconomic status will have higher depression levels and more negative health behaviors.
 - ii. Single mothers will have higher depression levels and more negative health behaviors.
 - iii. African-American and Hispanic mothers will have higher depression levels and more negative health behaviors.
2. Social support will moderate the relationship between depression and health behaviors.
- a. Women with depressive symptoms and higher levels of perceived social support will demonstrate more positive health behaviors than women with depressive symptoms and unsatisfactory social support.

Method

Study Overview

The data utilized in the current study is a subset of data collected for a study exploring the relationship between maternal adaptation to an infant's NICU hospitalization and mother-infant interactions. The data were collected from mothers of infants who were hospitalized in three participating NICU's in the Richmond, Virginia area. Data were collected from participants in two separate waves of data collection, both of which were examining maternal adaptations to having an infant in the NICU. Other than a few minor procedural changes, both waves examined the same constructs. In the first wave of data collection, subjects were not compensated for their participation in the study. In the second wave, initiated in 2005, mothers who completed and returned the questionnaires were given a \$15 gift certificate to Target®.

The data were collected at three different time points. The first time-point of data were collected from both an interview conducted with the mother while in the NICU and through self-report questionnaires that the mothers completed. The second time-point of data were collected via a brief telephone interview, one-month following the infant's discharge from the NICU. The third time point of data were collected when infants reached three months corrected age. The three-month follow-up consisted of mothers completing a set of questionnaires and an observation of mother-infant interaction and administration of several items from the Bayley Scales of Infant Development (3rd edition). The data used for the present study is derived from data collected during the initial and one-month follow-up time points.

Recruitment and data collection procedures

Initial contact to identify willing mothers was made by the NICU staff. To participate in the study, mothers had to be at least 18 years of age. The staff informed the research personnel whether or not a mother was willing to consider participating in the study, only after they had reached some emotional stability and their infant's medical status had stabilized. Additionally, NICU staff determined if mothers had sufficient facility speaking and understanding English to complete the interviews and questionnaires. The exclusion criteria included infants whose medical charts indicated neurological damage, who had serious handicapping conditions, and who were born to mothers with drug addictions.

Once potential mothers were identified, trained graduate students approached the mothers to determine their interest in participating in the study. The students obtained consent from mothers who were interested in participating and arranged for a structured interview to be conducted when the mother was visiting her child in the NICU. The interview consisted of obtaining mother's demographic information, infant's birth and health information, and focused on a range of issues related to having an infant in the NICU. In addition to the interview, the mothers were asked to complete a set of empirically valid questionnaires assessing maternal well-being, adaptation to parenting, and maternal perceptions about their infant.

Mothers were contacted via telephone approximately one-month after their infant had been discharged from the NICU. A brief telephone interview was conducted which focused on the health of the mother and the infant.

Participants

Mothers whose preterm infants were hospitalized in one of the participating NICUs and who met the selection criteria were recruited for the study between September 2003 and July 2008. A total of 175 mothers completed the initial structured interview and questionnaires. Of those 175 participants, 89 mothers completed the one-month follow-up questionnaires from which health behavior data was derived. The participating NICU's consisted of Virginia Commonwealth University Health System's Medical College of Virginia (MCV) Hospital ($n = 30$, 34.10%), Bon Secours Health System's St. Mary's Hospital ($n = 47$, 52.30%), and Henrico Doctors' Hospital, Forest Campus ($n = 12$, 13.60%). Maternal demographic information are summarized and presented in Table 1. The current sample of mothers ranged in age from 18 to 40 years ($M = 29.67$ years) and was ethnically diverse (70.8% Caucasian; 22.5% African American; 1.1% Hispanic; 3.4% Asian; 2.2% other). For most mothers, this was their first child (55.1% primiparous) and most were either married or living with the baby's father (82.0%). Of the participants, 18% had a high school diploma, and 55.1% had some college credits or a college degree and many had a household income of \$45,000 or above (66.2%).

Measures

The data were collected from a structured interview and through questionnaires that mothers completed during the initial phase of the project. At the one-month follow-up, mothers reported their health behaviors and additional questions by responding to a small questionnaire (See Appendix E for more details).

Table 1.

<i>Maternal Demographics</i>		
Variable	Number of participants	Percent
Ethnicity (n = 89)		
Caucasian	63	70.8
African-American	20	22.5
Hispanic	1	1.1
Asian	3	3.4
Other	3	2.2
Marital Status (n = 89)		
Single	14	15.7
In contact with baby's father	2	2.2
Living with baby's father	5	5.6
Married	68	76.4
Education (n = 89)		
Less than high school diploma	4	4.5
High school diploma	16	18.0
Some college	23	25.8
College degree	26	29.2
Some graduate school	8	9.0
Graduate degree	12	13.5
Household income (n = 89)		
Less than \$15,000	11	12.4
\$15,000 - \$24,999	7	7.9
\$25,000 - \$34,999	9	10.1
\$35,000 - \$44,999	3	3.4
\$45,000 - \$59,999	19	21.3
\$60,000 or above	40	44.9
Child birth order (n = 87)		
Firstborn	49	55.1
Other	38	42.7

Structured Interview and Demographic Information (See Appendix A).

Structured interviews were conducted by trained graduate students when the mothers were visiting their infant in the NICU. Basic demographics information about the infant and the mother were collected. The interview questions delved into the mother's experience of

having her child hospitalized in the NICU and focused on different aspects of parenting, coping, and social support. Specific items focused on those aspects of parenting adaptation affected by the stress associated with having a premature infant. Some of the questions asked during the interview included questions about the mothers' pregnancy, the types of stressors they had experienced in the past year, and how they feel they are dealing with the stress associated with having an infant in the NICU. This Structured Interview format has been used in previous studies, primarily to obtain qualitative information pertaining to mothers' perceptions about their infant and their hospital experience (Stern et al., 2000; 2006). For the current study, only the measures pertinent to the aims and hypotheses of the study are described below.

Depression (See Appendix B). The existence and the severity of depressed mood were measured by a modified Beck Depression Inventory (BDI: Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), which was included in the questionnaires mothers completed. Each of the 19 items corresponds to a symptom of depression and there is a four-point scale for each item ranging from 0 to 3. All the items were summed to determine a single score for the BDI. In psychiatric and non-clinical samples, the BDI has shown high convergent validity with psychiatric ratings of depression severity (Beck et al., 1961; Bumberry et al., 1978). The ability of the BDI to detect episodes of depression is generally high (Oliver & Simmons, 1984). Also, the BDI has been used extensively in research on prenatal and postpartum depression, and is appropriate for measuring non-clinical levels of depression. In a study of prenatal and postpartum affect (DeLuca, Lobel, & Meyer, 1999), the α coefficient for the BDI was 0.78. Cronbach's alpha based on these 19 items among the present sample was 0.94, demonstrating good internal consistency (DeVellis, 2003).

Social Support (See Appendix C). Perceived social support was assessed by a 4-item version of a scale developed by Collins and colleagues (1993). Each item represents one of four forms of support identified as being most applicable to this population: material aid, assistance with tasks, information or advice, and listening to one's problems or concerns. Mothers indicated whether or not they perceive themselves as receiving each type of support in the last seven days; if they responded affirmatively, they were then asked to rate how satisfied they were with the support they received. Participants completed this scale for the support they received from the baby's father and from others (including family and friends). For the present study an overall score of perceived support was computed for each participant. This instrument has demonstrated high predictive validity in research on birth outcomes (Collins et al., 1993) and on postpartum adjustment (DeLuca et al., 1999; Stern & Bitsko, 2003). Cronbach's alpha for the father's support scale among the present sample was 0.93, demonstrating good internal consistency (DeVellis, 2003). For the support of others, the Cronbach's alpha was 0.64, which demonstrates a fair to moderate internal consistency according to the number of scale items and the current study sample size (Ponterotto & Ruckdeschel, 2007).

Health Behavior (See Appendix D). Health habits and behaviors were measured by the Health and Well-Being Behavior Scale (HWBS: DeLuca & Lobel, 1995). The mothers were asked to indicate how often in the past two weeks they had engaged in various health behaviors (such as eating habits, sleep, exercise, and drug use). Mothers rated each of the 27 items from "never" to "very often." A subset of 7 items from this scale was used in the study. The items includes, "In the last two weeks, how often did you: eat fatty foods; eat fiber; smoke cigarettes; drink things with caffeine; get enough sleep; exercise; and drink

alcohol?” Items that indicated a negative health behavior or the absence of positive health behaviors were reverse coded. The items were then summed to obtain a total positive health behavior score, where a higher score indicated more positive health behaviors. The scale has been found to have adequate reliability ($\alpha = 0.70$) and has also been used in previous research with pregnant and parenting mothers (see Lobel et al., 2008; Lobel, DeVinent, Kaminer, Meyer, 2000). Reliability analyses for the current sample is unacceptable ($\alpha = 0.54$) according to established guidelines (DeVellis, 2003). Hence, for the present study the summed score was not used and instead each of the seven items were analyzed separately, controlling for Type I error.

The measures administered during the different stages of the study are summarized in Table 2 below. The italicized measures were used in the current study.

Table 2.

Summary of Measures for Present Study

Data Collection Phase	First Wave of Study	Second Wave of Study
NICU Phase (baseline)	Demographics BDI Social Support	Demographics BDI Social Support HWBS
1- Month Follow-up	HWBS	HWBS
3-Month Follow-up	Social Support HWBS	BDI Social Support HWBS

Results

This chapter delineates the statistical analyses utilized to address the specific aims and the hypotheses set forth in the present study. The majority of the analyses were conducted using the Predictive Analytical Software (PASW), Version 18.0. Some tests were completed in the Statistical Analysis System (SAS), Version 9.2. The data pertaining to this thesis were derived from a larger data set, which included data from 175 mothers of infants in the NICU in the greater Richmond, Virginia area. As the present study focuses on data from the initial interview and the one-month follow-up, participants who did not complete both the initial and one month follow-up were excluded ($n = 92$) from the analyses.

Data Screening

Missing Data. The remaining subset of the data set was reviewed and evaluated for any missing data. The original raw data collected during the initial interview, initial questionnaires, and the one-month follow-up were referenced in this process. When one or two data points were missing for a measure, the original data packets were reviewed and if the missing data was found within the hard-copy file it was entered into original data file. If the participant had completed 80% or more of the total scale items, values were estimated from the mean of participant responses to other scale items belonging to the scale containing missing data (Tabachnick & Fidell, 1996). If more than 20% of the items were missing on a scale, participant responses for that particular scale were excluded from analysis. In three cases, data regarding the mother's income was missing from the original data file. These values were replaced by calculating a subgroup mean based the demographics of the mother's at the participating hospitals. Previous studies with this dataset have found

significant differences between mother's education, income, and marital status at the varying hospitals (Durette, 2007).

During the course of preliminary data screening, eight cases were found to be missing all items of the Health and Well-Being Behavior Scale (HWBS) from the one-month follow-up. Follow-ups were most often completed via telephone and the HWBS questions are the last set of questions asked. If the participant was short on time, the questions were not asked or the participant was unable to complete the questions if they were not able to stay on the phone to complete the full follow-up. In these cases, the questionnaire was mailed to the participant, along with a pre-stamped return envelope. These questionnaires, however, were not returned. As health behavior is a primary focus of this thesis, these 8 cases were excluded from analysis. Additional data screening found three cases to be missing all items from the Beck Depression Inventory (BDI); it was determined that these participants had not returned their questionnaire packets and were excluded from the analysis. Two cases had responses for only five of the twenty items of the BDI; original data packets were inspected and it was determined the questionnaire packets had been assembled incorrectly and each had a missing page, which included the first 15 items. As depression scores are an important part of this thesis, these two cases were removed.

Outliers. The data were examined for univariate outliers by checking the minimum and maximum range of standardized values for each variable. A score was considered a univariate outlier if it exceeded three standard deviations from the mean. When univariate outliers were identified, the participant's original data file was checked to determine if the outlier was due to a data entry error. When data entry errors were discovered, correct values were entered in the database.

Normality of distributions. Descriptive statistics were obtained (means, standard deviations, ranges, skewness, and kurtosis) for all measured variables to determine the normality of distributions and to test for the assumptions of hierarchical multiple regression analyses (Cohen, et al., 2003). Diagnostic test yielded skewness and kurtosis absolute values close to 1, indicating normal distributions for the BDI and the HWBS. However, the social support scale assessing the father's support indicated skewness (-2.3) and kurtosis (3.6). The social support scale assessing other's support also indicated skewness (-3.1) and kurtosis (9.9). The histograms of both scales revealed a negatively skewed scores and a peaked distribution curve, i.e., most mothers reported high perceived support from both fathers and others. However, as the scale total is ordinal in nature (i.e. 0 = no support received, 1 = one type of support, 2 = two types of support and so on.), Siegel and Castellan state "they [ordinal variables] tend to have few or no assumptions" (as cited in Fidell, & Tabachnick, 2003, p. 116). At the item level, smoking cigarettes and alcohol consumption also both indicate skewness and kurtosis. However, as these are also ordinal items, they do not have the same assumptions of normality. Distributions for all scales and items are presented in Table 3 below.

Preliminary Analyses

To determine if any differences existed between maternal demographics across the hospital NICUs, one-way analyses of variance (ANOVAs), chi-square tests for independence, and Fisher's exact tests (FET) were utilized. Among the mothers across hospitals, there were no significant differences in maternal age, $F(2, 84) = 1.56, p = .217$; parity, $\chi^2(2, N = 87) = .831, p = .660$, ethnicity ($p = .960$, FET); and education ($p = .080$, FET). However, annual household income ($p = .006$, FET) and marital status ($p = .032$,

FET) varied significantly at the different hospitals. Mothers of infants at St. Mary’s and Henrico Doctor’s Hospitals reported greater household income and were more likely to be married than mothers of infants at MCV.

Table 3.

Distribution of Scales and Subscales

Measure	Range	Mean	SD	Median	Skewness	Kurtosis
BDI	0 – 35	11.89	9.87	9	.73	-.74
Father Support	0 – 4	3.49	1.24	4	-2.28	3.60
Other Support - 3 items	0 – 3	2.77	0.61	3	-3.07	9.93
HWBS						
Total	7 – 26	16.46	4.34	16	0.09	-0.36
Exercise	0 – 4	1.46	1.46	1	0.47	-1.14
Sufficient Sleep	0 – 4	2.10	1.28	2	-0.08	-0.965
Oily or Fatty foods consumption	0 – 4	1.75	1.07	2	0.01	-0.464
Smoking Cigarettes	0 – 4	3.44	1.28	4	-2.05	2.54
Caffeine consumption	0 – 4	1.71	1.27	2	0.18	-0.94
High Fiber Foods consumption	0 – 4	2.58	1.06	3	-0.31	-0.61
Alcohol consumption	0 – 4	3.41	0.92	4	-1.80	3.41

Reliability of measures. To determine the consistency of scale items among the present sample, Cronbach’s alpha coefficients were calculated for the Beck Depression Inventory (BDI), Social Support Scale (for Fathers and Others), and the Health and Well-

Being Behavior Scale (HWBS) (see Table 4). Internal consistency values were acceptable (DeVellis, 2003) for total scale scores among the present sample on the BDI ($\alpha = .93$) and the Social Support Scale – Father ($\alpha = .93$) and are similar to those reported in other studies. The internal consistency estimates for the Social Support Scale – Other ($\alpha = .50$) and for the HWBS ($\alpha = .54$) produced unacceptable alphas (DeVellis, 2003), i.e., below 0.60. The low internal consistency for the Social Support Scale – Other is reasonable, given that it combines a variety of sources of support, which would not be expected to correlate. By deleting one item on the Social Support – Other scale (*Since you had the baby, has anyone provided financial support or a place to live?*) the Cronbach’s alpha increased to 0.64, which demonstrates a fair to moderate internal consistency according to the number of scale items and the current study sample size (Ponterotto & Ruckdeschel, 2007). The total score of the HWBS will not be used in analysis but rather each item will be used, therefore no steps were taken to improve the Cronbach’s alpha of the total score.

Table 4.

Internal Consistency Reliability Estimates for Scales

Instrument	Alpha
Beck Depression Inventory (BDI) Total	0.94
Social Support Scale (Father) Total	0.93
Social Support Scale (Others) Total (4-items)	0.50
Total (3-items)	0.64
Health and Well-Being Behavior Scale (HWBS) 1-Month Total	0.54

Descriptives. Means, standard deviations, median ranges, skewness, and kurtosis for all study measures are presented above in Table 3. The average BDI score ($M = 11.89$, $SD = 9.87$) was similar to that reported by Kersting and colleagues (2004) in their study with mother's with very preterm infants ($M = 10.58$, $SD = 7.9$) at two weeks postpartum. The BDI was also used by Allen and colleagues (2004) in studies with mothers of preterm infants with a mean score of 9.7 ($SD = 7.8$). The BDI total scores between 0 – 9 indicates minimal depression, 10 – 16 indicates mild depression, 17 – 29 indicates moderate depression, and 30 – 63 indicates severe depression. In the present study, 51.7% ($n = 56$) mothers reported minimal depression, 13.5% ($n = 12$) reported mild depression, 24.7% ($n = 22$) reported moderate depression, and 4.5% ($n = 4$) reported severe depression.

The average reported perceived social support from the baby's father was 3.47 ($SD = 1.24$) and by social support by others was 2.77 ($SD = 0.61$). In the original scale development studies, Collins and colleagues (1993) obtained lower reported support totals ($M = 1.7$, $SD = 0.94$) from a sample of low-income pregnant women. Collins' study asked mothers to report if they received different types of support from anyone and did not specify from whom they received this support. For social support from the father, 9.3% of participants for the present study reported receiving no support, 2.3% reported receiving at least one type of support, 1.2% reported receiving two types of support, 4.7% reported receiving three types of support, and 82.6% reported receiving all four types of support. For social support from others, 2.3% reported receiving no support, 2.3% reported receiving at least one type of support, 11.6% reported receiving two types of support, and 83.7% reported receiving three kinds of support (recall that one item was removed to improve reliability for

the scale). The Collins and colleagues' study (1993), four percent of their sample reported receiving no support, while two percent reported receiving all four types of support.

The mean of the HWBS among the present sample was 16.46 ($SD = 4.34$). As the present study utilized a subset of the original 20 item scale (DeLuca & Lobel, 1995), it is not possible to compare current sample distributions to other studies. For the average score to be more meaningful, the total score was categorized into levels of health behaviors: 0 – 6 indicates poor health behaviors, 7 – 13 indicates fair health behaviors, 14 – 20 indicates good health behaviors, and 21 – 28 indicates excellent health behaviors. With this categorization, 23.5% ($n = 19$) reported fair health behaviors, 60.5% ($n = 49$) reported good health behaviors, and 16.0% ($n = 13$) reported excellent health behaviors. With these categorizations, a mean of 16.46 falls in the good health behavior level. Exploring the scale at the item level, a majority of the participants reported that they never smoked (82.7%, $n = 67$), never drank alcohol (61.7%, $n = 50$), and 40.7% ($n = 33$) reported they never exercised in the last two weeks. The responses to each item are summarized in Table 5.

Table 5.

Percentage of Distribution of HWBS items (n = 81)

Health Behavior Item	Never	Almost Never	Sometimes	Fairly Often	Very Often
Exercise	40.7	11.1	23.5	11.1	13.6
Sufficient Sleep	13.6	18.5	29.6	21.0	17.3
Oily or Fatty foods consumption	4.9	17.3	40.7	22.2	14.8
Smoking Cigarettes	82.7	1.2	2.5	4.9	8.6
Caffeine consumption	9.9	17.3	29.6	21.0	22.2
High Fiber Foods consumption	2.5	13.6	29.6	32.1	22.2
Alcohol consumption	61.7	23.5	11.1	1.2	2.5

Intercorrelations among variables. Results for correlational analyses of demographic and independent variables are reported and summarized in Table 6. Pearson correlations (r) were utilized for all analyses between two continuous variables or analyses between one continuous and one dichotomous variable. Spearman's rank correlation coefficient (ρ) was utilized for correlations between two ordinal variables or one ordinal and one continuous variable. Phi (ϕ) correlations were conducted for correlational analyses between two dichotomous variables. Cramér's V (V) correlations were utilized for correlations between two nominal variables or between one nominal and one dichotomous variable.

Table 6.

Correlations among Demographic and Independent Variables

Variable	1	2	3	4	5	6	7	8
1. Ethnicity	1							
2. Education	.241	1						
3. Income	-.360*	.547**	1					
4. Parity	.208	.168	.233	1				
5. Marital Status	-.421	.511**	.545**	.287	1			
6. BDI	.049	.250*	.068	.019	.120	1		
7. Father Support	.251	.304**	.334**	.138	.598**	.266*	1	
8. Other Support	.101	.034	.033	..227	-.097	-.051	.047	1

Note: $N = 89$. * $p < .05$, ** $p < .01$. Pearson correlations for analyses with two continuous variables or one continuous and one dichotomous variable, phi correlations for analyses with two dichotomous variables, Spearman's rho correlation for analyses with two ordinal variables or one ordinal and one continuous variable, Cramér's V correlations for analyses with two nominal variables.

Correlations revealed that household income was significantly negatively correlated to mother's ethnicity ($r = -.279, p < .01$) and positively correlated to mother's education ($r = .526, p < .01$). Social support from the father was positively correlated to mother's education, income, and mother's reported depression levels. Father's support was highly

correlated to marital status as expected because marital status is another indicator of spousal support. However, the positive correlation between father's support and depression was unexpected as research has found these variables to be inversely related (Younger, Kendell, & Pickler, 1997; Amankwaa, Pickler, & Boonmee, 2007). To tease out the meaning of these findings, further exploration of these relations were conducted on a post-hoc basis. Other studies have found that dissatisfaction with the support perceived from the baby's father was associated with higher depressive symptomology (Sheng, Le, & Perry, 2010) and in turn satisfaction with social support led to decreased likelihood of experiencing depressed mood (Neter, Collins, Lobel, & Dunkel-Schetter, 1995). Although not proposed as a part of the current hypotheses, satisfaction with the father's support was examined. Again a significant positive relationship was found between satisfaction with support from the father and BDI ($r = .275, p < .05$). This indicates that as depression increases, the satisfaction of the support perceived from the father increases as well. It is likely that mothers with higher levels depression perceived more support from the baby's father and were more satisfied with the support they perceived. This is consistent with the present data where amount of support perceived from the father had a significantly positive relationship with support satisfaction from the father ($r = .722, p < .01$). In addition, an ANOVA found a significant difference between depression levels and satisfaction with father support [$F(3, 12.70) = 5.48, p = .012$] with a medium effect size ($\eta^2 = .08$). Post-hoc comparisons using Games-Howell test indicated that the mean score for mothers with moderate levels of depression ($M = 14.5, SD = 1.01$) was significantly different for mothers with minimal level of depression ($M = 11.3, SD = 6.05$).

The samples in the support satisfaction studies (Netter et al 1995; Sheng et al 2010) consisted of socioeconomically disadvantaged women and predominately Latina women. The present sample is predominately Caucasian (70.8%) and middle-class (66%), earning \$45,000 or above, and this variance in ethnicity and income levels may account for the differences seen in the relationship between depression and support satisfaction.

Hypothesis Testing

Hypothesis 1. The health behaviors of mothers with preterm infants will be related to their postpartum depression, perceived social support, and their socio-demographic characteristics.

Analysis of hypothesis 1. To test the overall model, a canonical correlation analysis (CCA) was conducted using the demographic (education and income), psychological (depression), and interpersonal influences (social support) as predictors of the seven health behaviors to evaluate the multivariate shared relationship between the two variable sets (i.e. predictor variables and health behaviors). The analysis yielded six functions with squared canonical correlations (R^2_c) of .393, .233, .144, .050, .023, and .001 for each successive function. Collectively, the full model across all functions was statistically significant using the Wilks's $\lambda = .370$ criterion, $F(42, 298.95) = 1.683$, $p < .05$. Because Wilks's λ represents the variance unexplained by the model, $1 - \lambda$ yields the full model effect size in an r^2 metric or the proportion of variance shared between the variable sets across all functions. Therefore, for the set of six canonical functions, the r^2 type effect size is .63, which indicates that the full model explained a substantial portion, about 63%, of the variance shared between the variable sets.

As noted, the full model (Functions 1 to 6) was statistically significant. The other Functions (2 to 6, 3 to 6, 4 to 6, 5 to 6, and 6 to 6) were not significant (see Table 7). With only the first function being significant, it explains 39% of the variance within Function 1.

Table 7:

Non-significant Functions summary

Function	F	df	error df	<i>p</i>
2 to 6	1.14	30	258.0	.293
3 to 6	.78	20	216.5	.734
4 to 6	.42	12	174.9	.952
5 to 6	.28	6	134.0	.946
6 to 6	.04	2	68.0	.956

The standardized canonical function coefficients and structure coefficients (r_s) for Function 1 are presented in Table 8. The squared structure coefficients (r_s^2) are also given for each variable. Looking at Function 1 coefficients, it is apparent that the relevant criterion variables were primarily smoking cigarettes and fiber consumption. This conclusion was supported by the squared structure coefficients (r_s^2). These criterion variables also tended to have the larger canonical function coefficients. Additionally, these relevant criterion variables' structure coefficients have the same sign, indicating that they were both positively related.

Table 8.

Correlations Standardized Canonical Coefficients, Canonical Correlations between Predictor Variables and Health Behaviors for Function 1

Variable	Function 1		
	Coef	r_s	r_s^2 (%)
Exercise	.018	.077	.60
Sleep	-.368	-.382	14.61
Fat consumption	.135	.283	8.04
Smoking	.422	.691	47.80
Caffeine consumption	-.015	.330	10.88
Fiber consumption	.644	.816	66.60
Alcohol consumption	.079	.098	.96
R^2_c			39.31
<i>BDI</i>	-.014	.089	.80
<i>Father Support</i>	-.080	.442	19.50
<i>Marital Status</i>	.633	.636	40.39
<i>Other Support</i>	.384	.430	18.49
<i>Education</i>	.675	.833	69.46
<i>Income</i>	-.267	.349	12.21

Note: Canonical coefficients (Coef) are analogous to beta weights in regression; Squared canonical structure coefficients (r_s^2) are analogous to similar r^2 -type effect size.

Regarding the predictor variable set in Function 1, marital status and education variables were the primary contributors to the predictor synthetic variable. Both these variables are also positive, indicating that they are positively related to the health behaviors (smoking and fiber consumption). This indicates that mothers with higher education and

married were likely to participate in healthy behaviors (i.e. less likely to smoke and more likely to consume high fiber foods). Figure 3 illustrates the first function for this CCA. The hypothesis was partially supported.

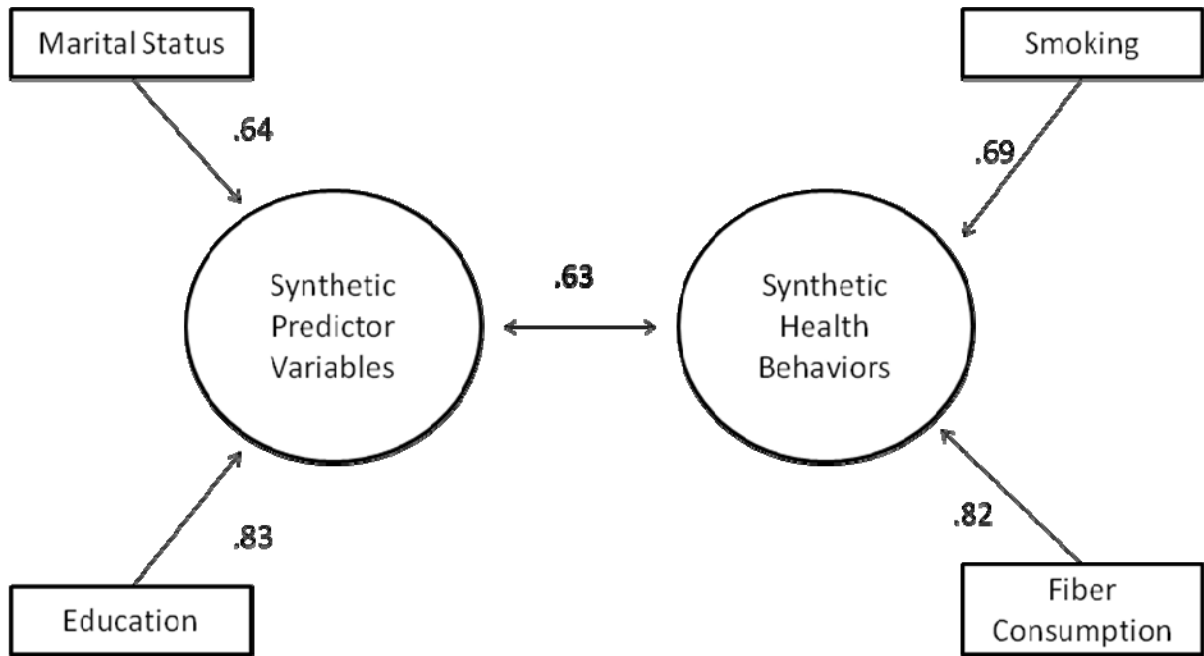


Figure 3: Illustration of the first function in a canonical correlations analysis for the present study.

Hypothesis 1a. Depression levels will be associated with health behaviors of mothers with preterm infants; specifically mothers with higher levels of reported depression will demonstrate more negative health behaviors.

Analysis of hypothesis 1a. The Kruskal-Wallis Test (which is analogous to one-way between-groups ANOVA) was conducted to determine if there was significant difference between health behaviors and levels of depression. This non-parametric test is utilized because it does not make assumptions about the distribution of the population. As stated previously, the seven HWBS items are at the ordinal level and do not meet assumptions of

normal distributions. No significant differences were found between depression levels and the various health behaviors (see Table 9). Therefore, the hypothesis was not supported.

Table 9.

Kruskal-Wallis Test for Effects of Depression Levels on Health Behaviors

Variable	H(3)	<i>p</i>
Exercise	1.32	.72
Sleep	6.78	.08
Fat consumption	3.34	.34
Smoking	1.20	.75
Caffeine consumption	2.42	.49
Fiber consumption	3.09	.38
Alcohol consumption	2.52	.47

Hypothesis 1b. Levels of perceived social support will be associated with health behaviors of mothers with preterm infants; specifically mothers who perceive higher levels of support (from the baby’s father or others) will demonstrate more positive health behaviors.

Analysis of hypothesis 1b. The Kruskal-Wallis Test was conducted to determine if there was significant difference between health behaviors and levels of perceived support (from the baby’s father and from others). There was no significant difference between the level of support received from the baby’s father and health behaviors. For social support of others, smoking behavior was significantly affected by the level of support from others, $H(3) = 10.84, p = .013$. A Mann-Whitney Test (which is analogous to an independent samples t-test) was used to follow up this finding. A Bonferroni correction was applied and all are

effects reported at a .025 level of significance. It appears that those with 3 types of support from others are significantly less likely to smoke than those with no support ($U = 14, r = -.34$). Therefore, the hypothesis was partially supported.

Hypothesis 1c. Health behaviors and depression levels will be associated with various socio-demographic characteristics (including SES, marital status, and ethnicity) of mothers with preterm infants. Specifically, mothers with lower socioeconomic status (SES), single mothers, and Hispanic and African-American mothers will show more negative health behaviors and higher depression levels.

Analysis of hypothesis 1c. As the occupation of the mother was not available, education and income were used as proxy for SES. A Kruskal-Wallis Test was conducted to determine if there was significant difference between education and health behaviors. The test indicated that the level of education significantly affected health behaviors, specifically smoking cigarettes, $H(5) = 11.25, p = .047$ and consuming fiber, $H(5) = 13.77, p = .017$. A Mann-Whitney test was used to follow up this finding. A Bonferroni correction was applied and all are effects reported at a .025 level of significance. Mother's with a graduate degree were significantly less likely to smoke ($U = 54, r = -.47$) and more likely to consume fiber ($U = 26, r = -.63$) than mothers with a high school diploma. A Kruskal-Wallis test found no significant differences between maternal health behaviors and household income.

A one-way between-groups analysis of variance (ANOVA) was conducted to explore the impact of education on levels of depression, as measured by the Beck Depression Inventory (BDI). Subjects were divided into five groups according to their level of completed education. There was no significant difference in BDI scores for the six education level groups. A similar ANOVA was conducted to explore the impact of income on the

levels of depression. There was no significant difference in BDI scores for the six income level groups (see Table 10).

Table 10.

One-Way Analysis of Variance (ANOVA) for Effects of Education and Income on Depression Levels (between subjects)

Variable and Source	SS	MS	F(5, 78)	<i>p</i>	η^2
Education					
Between	542.39	108.48	1.12	.36	.07
Within	7541.64	96.69			
Income					
Between	214.64	42.93	.43	.83	.03
Within	7869.39	100.89			

Note: SS = Sum of Squares; MS = Mean Square; η^2 = Eta squared

To determine if there was a significant difference between marital status and health behaviors, a Mann-Whitney Test was conducted. As a majority of the participants were married, marital status was recoded from five categories to two categories, not-married (23.5%) and married (76.5%). The test indicated that marital status significantly influenced smoking behavior and fiber consumption. Mothers who were married were significantly less likely to smoke ($U = 433.5, z = -2.63, p = .008, r = -.30$) and more likely to consume fiber ($U = 348.5, z = -2.78, p = .005, r = -.31$) than mothers who were not married.

An independent samples t-test was conducted to compare the depression scores of married and not married mothers. There was no significant difference in scores ($t(82) = -1.06, p = .29$) for not married participants ($M = 9.79, SD = 9.66$) and married participants (M

= 12.51, $SD = 9.92$). The magnitude of the differences in the means was small (eta squared = .013).

A Kruskal-Wallis Test was conducted to determine if there were significant differences between ethnicity and health behaviors. Ethnicity was recoded to combine groups with low numbers (Group 1 = Caucasian, Group 2 = African American, Group 3 = Other). No significant differences were found. An ANOVA was conducted to explore the relations between ethnicity and levels of depression. There was no significant difference in BDI scores for the three ethnicity groups ($F(2, 81) = 1.19, p = .31$). Overall, the hypothesis that health behaviors and depression would be associated with various socio-demographic characteristics was partially supported.

Hypothesis 2. Depression and social support will interact to produce significant differences in maternal health behaviors over and above the variance accounted for by each predictor variable alone. Specifically, social support will moderate the relationship between depression and health behaviors. It is expected that mothers with depressive symptoms and higher levels of perceived social support will demonstrate more positive health behaviors than women with depressive symptoms and lower levels of perceived social support.

Analysis of hypothesis 2. With the low reliability of the HWBS total score, seven separate hierarchical regression analyses were conducted with both support from the father and support from others. A Bonferroni correction was conducted and items would need to reach a $p < .007$ to be considered significant. None of the items reached significance.

To obtain additional information, two hierarchical regression analyses were conducted to test this hypothesis by using the total HWBS score as the dependent variable. The variables of interests (depression and social support) were centered and an interaction

term was created (depression x social support). Equation 1 examined social support from the baby's father. Maternal education and income was entered in Step 1. The main effect variables for depression and father's support were entered in Step 2 and the interaction term was entered in Step 3 (see Table 9). The overall model tested by Equation 1 was not significant, $F(1, 70) = .019, p = .891$ and the hypothesis was not supported.

Support by others was examined in Equation 2. Maternal education and income were controlled for by entering them in Step 1. The main effect variables for depression and support by others were entered in Step 2 and the interaction term was entered last. The overall model tested by Equation 2 was not significant, $F(1, 70) = .478, p = .492$ and the hypothesis was not supported. The regression analysis is summarized in Table 11. Overall, hypothesis 2 was not supported.

Table 11.

Summary of Hierarchical Regression Analyses for Depression and Social Support As Predictors of a Mother's Health Behaviors (N = 76)

Predictor	<i>B</i>	<i>SE B</i>	β	R^2	$R^2\Delta$	<i>F</i> Δ	<i>Sig. F</i>
Equation 1: Predicting health behaviors with Father Support (FS)							
Step 1				.06	.06	2.39	.10
Education	.92	.43	.29*				
Income	.08	.33	.03				
Step 2				.11	.05	1.81	.17
Depression	-.10	.07	-.22				
FS	-.04	1.00	-.01				
Step 3				.11	.00	.02	.90
BDI x FS	.02	.11	.03				
Equation 2: Predicting health behaviors with Other Support (OS)							
Step 1				.06	.06	2.39	.10
Education	.72	.43	.23				
Income	.13	.31	.05				
Step 2				.13	.07	2.80	.07
Depression	-.09	.05	-.20				
OS	.83	.92	.12				
Step 3				.14	.01	.48	.49
BDI x OS	.07	.10	.09				

Discussion

The purpose of the present study was to examine the relationship between depression, social support, socio-demographic factors, and health behaviors of mothers with preterm infants hospitalized in the NICU. As discussed in previously, caring for an infant hospitalized in the NICU has been shown to be highly stressful for parents, especially mothers (Affleck et al, 1991; Davis et al, 2003; Reichman et al, 2000). Social support has been found to serve as a protective factor against stress (Coyne & DeLongis, 1986) and depressed mood (Neter et al 1995). Depressed mood has been linked to negative infant outcomes (Reissland et al, 2003; Herrera et al, 2004; Chase-Brand, 2008) and maternal behaviors which affects the infants health, such as smoking and not administering vitamins (Groer & Morgan, 2007; Leiferman, 2002). The primary goal of the present study was to determine the role of personal factors (including socio-demographic and psychological factors) and interpersonal factors (social support) in maternal health behaviors. The second aim of the study was to assess if social support moderates the relationship between depression and health behaviors.

In this section, the present study's results are summarized and discussed based on extant literature and theoretical model proposed for the study. In addition, the implications of the current findings are explored, the study's limitations are enumerated, and suggestions for future research directions are put forth.

Summary of Findings

Descriptive findings. One unexpected result of the present study was a significant positive association between the perceived social support from the father and depression. Prior studies have consistently found inverse correlations between social support and

depression (Younger et al, 1997; Amankwaa et al, 2007). Several explanations for this unexpected finding are suggested here. One possible reason for the discrepant result could be that although mothers perceived support from the baby's father, they were not satisfied with the support given. Studies have shown that dissatisfaction with support from the father was associated with high levels of depressive symptoms (Neter et al, 1995; Sheng, Le, & Perry, 2010). This relationship was actually possible to explore, to some extent, with the present data set. However, the present data found a significant positive relationship between father support satisfaction and depression levels. This suggests that mothers who were more depressed were satisfied with the support provided by the father. It is possible that the fathers were aware of the mother's depressed mood and were more supportive and in turn the mothers were satisfied with the provided support.

An alternate explanation for the discrepant association between depression and support is that the stress and anxiety of having their child in the NICU is so distressing to the mothers that the support from the father is not yet a protective factor against depressive symptoms. Future research would be needed to examine this possibility more carefully. The present study is unable to tease out such relationships as this question goes beyond the limits of the data set.

Hypotheses Findings. The present study tested two sets of hypotheses. The first hypothesis examined the overall model of the study to determine the association between personal factors, interpersonal factors, and health behaviors. The results found that two socio-demographic factors, maternal education and marital status, were related to two maternal health behaviors (smoking and fiber consumption). As predicted, these factors were all positively correlated. As a mother's level of education increases she is less likely to

smoke cigarettes and more likely to incorporate high fiber foods in diet. Conversely, as a mother's level of education decreases, she is more likely to participate in unhealthy behaviors (i.e. smoke and not eat high fiber foods). These findings are consistent with extant research, which has found more negative health behaviors among lower- SES groups (Pampel, Krueger, & Denney, 2010). As stated previously, education and income were used in proxy of a standard SES index. In the present sample, education is the important variable in the association between SES and health behaviors.

The overall model also found marital status to be positively correlated to health behaviors. As the mother's marital status increases (on a spectrum from single to married), the less likely she is to smoke and more likely to consume fiber. This is consistent with research which has found that married individuals are healthier than their non-married counterparts and are less likely to engage in unhealthy behaviors (Bloom, 1990; Ross, Mirowsky, & Goldstein, 1990)

Another sub-hypothesis was that the level of perceived social support would be associated with health behaviors. Results found that those who perceived more support from others were less likely to smoke than those who perceived no support from others. Although no significant associations were found between father support and health behaviors, marital status could be utilized to represent partner support as marital status was rank ordered from single to married. Further exploration (hypothesis 1c) found that mothers who were married were less likely to smoke and more likely to consume high fiber foods. This is consistent with research studies that found that social support can increase an individual's participation in health promoting behaviors and decrease participation in health risk behaviors (Haber et

al, 2007; McNamara et al, 2006). Social support can influence an individual to make better decisions about their health behavior.

It was hypothesized that the overall model would reveal associations between depression, social support, and health behaviors. However, in the present sample, depression was not found to be related to health behaviors. Prior studies have found that depressed mothers are more likely to smoke and engage in other behaviors which have implications on the health of their infant (Groer & Morgan, 2007; Leiferman, 2002). Both of these studies looked only at smoking habits and/or the implication of maternal behavior on the infants' health. Few studies have explored the connection of health behaviors and depression specifically. Chen and colleagues (2007) explored the association between depression and health behaviors for Taiwanese postpartum women. The study found women who were suffering from severe postpartum depression to engage in fewer health promoting activities (i.e. self-actualization, interpersonal relationships, stress management, and nutrition). The study utilized a health promotion lifestyle profile (HPLP) which seems to incorporate physical, emotional, and mental health for an individual. The health behavior scale utilized in the present study focuses on nutrition, exercise, sleep, and drug use. It is possible that some these health behaviors may not be directly associated with depression levels and a more multidimensional concept of health maybe associated with depression.

Another sub-hypothesis tested the association between SES and depression levels. Research studies indicate that low SES is associated with increased depressive symptoms (Goyal, Gay, & Lee, 2010). However, as a standard SES index was not determinable, education and income were used in proxy in the present study. No significant results were found, likely due to the lack of a composite SES score. Also, it is likely that being in such a

distressing situation of having a child in the NICU, SES may not play an independent role in the development of depressive symptoms. Ethnicity was another demographic variable that was hypothesized to be associated with health behaviors and depression. Studies have found racial differences in depressive symptomology (Howell et al, 2005) and health behaviors (Williams & Collins, 1995). No significant differences were found between different ethnicities. As a majority of the sample was Caucasian (70.8%), it is likely no differences in depression levels and health behaviors were able to be detected.

The second aim of the current study was to determine if social support moderates the relationship between depression and health behaviors. It was hypothesized that mothers with depressive symptoms, who also reported higher levels of perceived social support, would demonstrate more positive health behaviors. Conversely, mothers with depressive symptoms, who reported lower levels of perceived social support, would demonstrate more negative health behaviors. No significant interaction was found and this hypothesis was not supported.

One explanation for the lack of a significant moderation effect for the present study is the low reliability of the health behavior measure. As Tabachnick and Fidell state, “unreliable variables degrade an analysis whereas reliable ones enhance it” (2007: pp. 11). Due to the low reliability, it is possible that no interaction was able to be detected in the regression analysis.

Another explanation for the lack of a moderation effect is that there was no relationship to moderate. With education and income being controlled, there was no significant relationship between depression and health behaviors. It is likely that during the postpartum period, while their child is still in the NICU, depression is not an important factor

in the decisions a mother makes about her health behaviors. It will be important for future studies to follow-up with mothers after their infant has been released from the NICU to track the changes in the mother's depression levels and health behaviors. This was the goal of the large study being conducted; however, relatively few mothers returned for the three-month follow-up, where all the major measures were re-administered.

Implications

The results of the present study validate some of the relationships conceptualized by Pender (2006) in her revised Health Promotion Model. Although, the model used for the present study only utilized portions of Pender's model, both personal factors and interpersonal influences were associated with health promoting lifestyle practices. A mother's education level (a personal factor), marital status (personal and interpersonal factor), and social support from others (interpersonal factor) was significantly associated with a mother's health behaviors. Although further research would be needed to confirm the findings of these relationships, results from the present study revealed that social support may not moderate the relationship between personal and health behaviors, but may have direct influence on health behavior.

With education levels, marital status, and support from others being associated with health behaviors of mothers, it is important for clinicians to assess the mother's personal and interpersonal factors. This will inform clinicians about the areas of possible interventions a mother might need during the postpartum period.

Limitations

One of the limitations for the present study was the measurement issues which compromised the overall strength of the study design. The key outcome, an overall health

measure (HWBS) had low reliability, which resulted in the necessity of testing individually the seven different health behaviors making up the total scale. The use of the single items prevented any estimates on its measures reliability and validity. Chen and colleagues (2007) utilized a Health Promotion Lifestyle Profile (Walker, Sechrist, & Pender, 1987) for their study, which includes six dimensions of the health-promoting lifestyle (self-actualization, health responsibility, exercise, nutrition, interpersonal support, and stress management). Using a similar scale may provide a more accurate and more complete picture of how a mother is taking care of emotional, physical, mental health. Another limitation of the Health-Well Being Scale was that social desirability bias may have increased the number of mothers who reported engaging in positive health behaviors (e.g. not smoking, eating fiber, etc.). In addition, response to the HWBS items may have been dependent on the level of education a mother had. For example, an educated mother might have more information about which foods are considered healthy, high fiber foods. It is not clear whether all participants understood what is meant by high fiber foods, which is one of the few items that reached significance. Further research would be needed to determine the reliability of these findings.

Another limitation of the study is that although the overall larger study was designed as a longitudinal study, low retention rates of subjects limited the amount of data available from follow-ups. Therefore, only a snapshot assessment of many of the measurements (depression, social support, health behaviors) was available and no information on how these variables changed over a period of time as a mother transitioned from having a child in the NICU to home. Low retention rates in follow-up resulted in a small sample size ($N = 89$). This is a limitation because to prevent Type-II errors, 10 – 15 cases are suggested per variable to conduct a canonical correlation analysis, (Hair, Anderson, Tatham, & Black,

1998). For the present study, with 13 variables included in the CCA, a minimum of 130 participants were needed.

Another limitation of the present study pertains to the extent to which this study is generalizable. To be recruited for the study, the mothers were first screened by NICU staff and only after mother and infant and both achieved stability were the mothers approached about participation. Mothers with infants that were critically ill, mothers who were experiencing severe distress, and those who did not speak English were screened out. One main criterion the NICU staff observed about the mothers was their depressive symptomology and mothers who exhibited severe depression were screened out by the staff. Therefore, the current sample likely did not include several mothers with high levels of depression. Mothers who met all the inclusion criteria were then approached and they had the option to participate or decline participation. It is possible that mothers that declined to participate or those that were screened out may have responded to the measures differently than mothers who decided to participate.

Future Research

This study utilized portions of Pender's Health Promotion Model (2006) to determine the associations between personal, interpersonal and health behaviors of mother's with infants in the NICU. Future research may explore how the Behavior Specific Cognitions and Affect for a mother who is coping with having a child in the NICU influence her health behaviors. A comparison of mother of preterm infants and term infants may provide insight as the specific needs of mothers with preterm infants and therefore can lead to targeted interventions for the NICU mothers.

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Appendix A

Structured Interview

Interviewer: _____

Location: _____

Date: _____

Child Demographic Information

Infant's first name _____

Date of birth _____

Gestational age _____ (#wks early) _____

Birth weight _____ (weight) _____

Number of days requiring ventilation _____ (#days vent) _____

Date of discharge _____

Number of days in hospital _____ (#days in hosp) _____

Type of delivery: Vaginal Caesarian

Diagnosis _____

Parent's Demographic Information

Relationship to infant: mother father

Age _____

Ethnicity:

Caucasian African -American Hispanic Asian Other _____

Highest level of completed education:

- Less than high school diploma
- High School diploma
- Some college
- College degree
- Some graduate school
- Graduate degree

Approximate annual household income:

- Less than \$15,000
- \$15,000- \$24,999
- \$25,000-\$34,999
- \$35,000-\$44,999
- \$45,000-\$59,999
- Greater than \$60,000

Marital status:

- Married
- Living with baby's parent
- In contact with baby's other parent
- Single
- Living with non-parental partner

Appendix B

Revised Beck Depression Inventory

Current Feelings (Beck Depression Inventory)

In this section there are groups of statements. Please read each group of statements carefully. Then put a check next to the statement in each group which best describes the way you have been feeling the PAST WEEK, INCLUDING TODAY. If several statements in the group seem to apply equally well, check each one. Be sure to read each of the statements before making a choice.

1. I do not feel sad.
 I feel sad.
 I am sad all of 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 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 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 failures.
 I feel I am a complete failure as a person.

4. I get as much satisfaction out of things as I used to
 I don't enjoy things the way I used to.
 I don't get real satisfaction out of anything anymore.
 I am dissatisfied or bored with everything.

5. I don't feel particularly guilty
 I feel guilty a good part of the time.
 I feel quite guilty most of the time.
 I feel guilty all of the time.

6. I don't feel I am being punished.
 I feel I may be punished.
 I expect to be punished.
 I feel I am being punished.

7. I don't feel disappointed in myself
 I am disappointed in myself.
 I am disgusted with myself.
 I hate myself.

Reminder: Put a check next to the statement in each group which best describes the way you have been feeling the PAST WEEK, INCLUDING TODAY.

8. I don't feel I am worse than anybody else.
 I am critical for myself for my weaknesses and mistakes
 I blame myself all the time for my faults
 I blame myself for everything bad that happens
9. I don't have any thoughts of killing myself.
 I have thoughts of killing myself, but I would not carry them out.
 I would like to kill myself.
 I would kill myself if I had the chance.
10. I don't cry more than usual.
 I cry more now than I used to.
 I cry all the time now.
 I used to be able to cry, but now I can't cry even though I want to.
11. I am no more irritated now than I ever am.
 I get annoyed or irritated more easily than I used to.
 I feel irritated all of the time now.
 I don't get irritated at all by the things that used to irritate me.
12. I have not lost interest in other people.
 I am less interested in other people than I used to be.
 I have lost most my interest in other people.
 I have lost all my interest in other people.
13. I make decisions about as well as I ever could.
 I put off making decisions more than I used to.
 I have greater difficulty making decisions than ever before.
 I can't make decisions at all anymore.
14. I don't feel like I look worse than I used to.
 I am worried that I am looking unattractive.
 I feel that there are permanent changes in my appearance that make me look unattractive.
 I believe that I look ugly.
15. I can work about as well as before.
 It takes extra effort to get started on something.
 I have to push myself hard to do anything.
 I can't do any work at all.

Reminder: Put a check next to the statement in each group which best describes the way you have been feeling the PAST WEEK, INCLUDING TODAY.

16. I can sleep as well as usual.
 I don't sleep as well as I used to.
 I wake-up 1-2 hours earlier than usual and find it hard to get back to sleep.
 I wake up several hours earlier than I used to and cannot get back to sleep.
17. I don't get more tired than usual.
 I get tired more easily than I used to.
 I get tired from doing almost anything.
 I am too tired to do anything.
18. My appetite is no worse than usual.
 My appetite is not as good as it used to be.
 My appetite is much worse now.
 I have no appetite at all anymore.
19. I haven't lost much weight , if any lately.
 I have lost more than 5 pounds.
 I have lost more than 10 pounds.
 I have lost more than 15 pounds.
20. I am purposely trying to lose weight by eating less.
 Yes No

Appendix C

Social Support Scale

Help You Receive from the Baby's Father

The following questions are about help or support from the baby's father since you had the baby. Please circle your answer.

1. Since you had the baby; has the baby's father provided financial support or things like a place to live?

YES NO (circle one if answer is "no" skip to question 2)

1a. If he did how satisfied were you with his help?			
Not at all	Somewhat	Moderately	Very Much
0	1	2	3

2. Has he helped you with things you have to do such as errands, household tasks or childcare, since you had the baby?

YES NO (circle one if answer is "no" skip to question 3)

2a. If he did how satisfied were you with his help?			
Not at all	Somewhat	Moderately	Very Much
0	1	2	3

3. Since the baby was born has the baby's father listened to your worries or concerns?

YES NO (circle one if answer is "no" skip to question 4)

3a. If he did how satisfied were you with his help?			
Not at all	Somewhat	Moderately	Very Much
0	1	2	3

4. Has the baby's father helped you solve problems that come up since you had the baby?

YES NO (circle one if answer is "no" skip to question 5)

4a. If he did how satisfied were you with his help?			
Not at all	Somewhat	Moderately	Very Much
0	1	2	3

5. Overall, since your baby was born how satisfied are you with the help and support given to you by the baby's father?

Not at all	Some what	Moderately	Very much
0	1	2	3

Help You Receive from Others

The following questions are about help or support from people **BESIDES** the baby's father (like friends or other family) since you had the baby. Please circle your answer.

1. Since you had the baby; has anyone provided financial support or things like a place to live?

YES NO (circle one if answer is "no" skip to question 2)

1a. If someone did how satisfied were you with this help?			
Not at all	Somewhat	Moderately	Very Much
0	1	2	3

2. Has anyone helped you with things you have to do such as errands, household tasks or childcare, since you had the baby?

YES NO (circle one if answer is "no" skip to question 3)

2a. If someone did, how satisfied were you with this help?			
Not at all	Somewhat	Moderately	Very Much
0	1	2	3

3. Since the baby was born has anyone listened to your worries or concerns?

YES NO (circle one if answer is "no" skip to question 4)

3a. If someone did, how satisfied were you with this help?			
Not at all	Somewhat	Moderately	Very Much
0	1	2	3

4. Has anyone helped you solve problems that come up since you had the baby?

YES NO (circle one if answer is "no" skip to question 5)

4a. If someone did how satisfied were you with this help?			
Not at all	Somewhat	Moderately	Very Much
0	1	2	3

5. Overall, since your baby was born how satisfied are you with the help and support given to you by friends and family other than the baby's father?

Not at all	Some what	Moderately	Very much
0	1	2	3

Appendix D

Health and Well-Being Behavior Scale – Revised

TAKING CARE OF YOURSELF

The following items are things people sometimes do that affect their health. Please think about what you did in the last two weeks. Keep in mind that we want to know what you actually did, not what you would like to have done. Please use one of the following answers to describe how often you did each thing:

(USE RESPONSE CARD)

Never	Almost Never	Sometimes	Fairly Often	Very Often
0	1	2	3	4

In the last two weeks, how often did you: **(REPEAT PROMPT AS NEEDED)**

1)...exercise for at least 15 minutes?

(IF APPROPRIATE:) What exercise did you do? _____

Never	Almost Never	Sometimes	Fairly Often	Very Often
0	1	2	3	4

2)...get enough sleep?

Never	Almost Never	Sometimes	Fairly Often	Very Often
0	1	2	3	4

3)...eat fatty or oily foods?

Never	Almost Never	Sometimes	Fairly Often	Very Often
0	1	2	3	4

4)...smoke cigarettes?

Never	Almost Never	Sometimes	Fairly Often	Very Often
0	1	2	3	4

In the last two weeks, how often did you:

5)...drink things with caffeine such as coffee or colas?

Never	Almost Never	Sometimes	Fairly Often	Very Often
0	1	2	3	4

6)...eat high-fiber foods such as whole grain breads or cereals?

Never	Almost Never	Sometimes	Fairly Often	Very Often
0	1	2	3	4

7)...drink alcohol, including wine or beer or liquor?

Never	Almost Never	Sometimes	Fairly Often	Very Often
0	1	2	3	4

NOTE: This scale was re-administered during the one-month follow-up interview.

Appendix E

One-Month Follow-up Questionnaire

ID _____

Date _____

Structured Interview at Follow-up
(by telephone, 1 month following discharge)

What was the date of your baby's discharge? _____

How long was your baby in the hospital? _____ days (convert to days for data analysis)

Baby's gender: _____

- In retrospect how well do you feel like you coped with your infant's hospitalization/having your child in a special care nursery?

0.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
Not well at all very well

- What was most helpful to you in coping with the NICU/SCN experience? (mark one)

- _____ addressing the problem directly
- _____ asking for information from health professionals
- _____ learning to view the situation differently
- _____ reminding yourself of some person or meaning
- _____ venting your emotions
- _____ not dealing with the situation
- _____ interacting with friends or family

- What was the least helpful/ what interfered with your ability to cope well with the NICU/SCN experience? (mark one)

- _____ trying to address the problem directly
- _____ asking for information from health professionals

- _____ learning to view the situation differently
- _____ reminding yourself of some person or meaning
- _____ venting your emotions
- _____ not dealing with the situation
- _____ interacting with friends or family

- Has your infant been diagnosed with any chronic medical condition? If so, what is it?
- Did your baby leave the hospital with any special equipment or specific instructions?
- Does your baby take any medications?
- Since coming home, has your baby been ill in any way? With what?
- How well do you feel like you are falling into a “normal” caretaking routine?

0.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
 Not well at all very well

- How easy has it been for you to form a bond with your infant?

0.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
 very hard very easy

Below are some statements about your child's health. For each of them, check whether each statement is definitely true, mostly true, mostly false or definitely false.

1. In general, my baby seems less healthy than other children of the same age.

1	2	3	4
Definitely true	Mostly true	Mostly false	Definitely false

2. I often think about calling my doctor about my baby

1	2	3	4
Definitely true	Mostly true	Mostly false	Definitely false

3. When there is something going around, my baby usually catches it.

1	2	3	4
Definitely true	Mostly true	Mostly false	Definitely false

4. My baby seems to have more accidents and injuries than other children.

1	2	3	4
Definitely true	Mostly true	Mostly false	Definitely false

5. My baby usually has a healthy appetite.

1	2	3	4
Definitely true	Mostly true	Mostly false	Definitely false

6. Sometimes I get concerned that my baby doesn't look as healthy as he/she should.

1	2	3	4
Definitely true	Mostly true	Mostly false	Definitely false

7. My baby often gets stomach pains or other sorts of pains.

1	2	3	4
Definitely true	Mostly true	Mostly false	Definitely false

8. I often have to keep my baby indoors because of health reasons.

1	2	3	4
Definitely true	Mostly true	Mostly false	Definitely false

9. My baby seems to have as much energy as other children of the same age.

1	2	3	4
Definitely true	Mostly true	Mostly false	Definitely false

10. My baby gets more colds than other children I know.

1	2	3	4
Definitely true	Mostly true	Mostly false	Definitely false

11. I get concerned about circles under my baby's eyes.

1	2	3	4
Definitely true	Mostly true	Mostly false	Definitely false

12. I often check my baby at night to make sure he/she is ok.

1	2	3	4
Definitely true	Mostly true	Mostly false	Definitely false

13. I feel anxious about leaving my baby with a babysitter or at day care.

1	2	3	4
Definitely true	Mostly true	Mostly false	Definitely false

14. I am sometimes unsure about my ability to care for my baby as well as I should.

1	2	3	4
Definitely true	Mostly true	Mostly false	Definitely false

- Who was the most helpful to you during your stay in the hospital (friend, relative, health care provider)?
- If there was additional information you needed, what was it and in what form would it have been helpful?
- Were you able to visit your baby as often as you liked while in the hospital?
- Were you concerned about your baby's health at the time of discharge?
- Have you been in contact with a public health nurse, parental support group, or developmental follow-up program?
- Do you have any other thoughts about your experiences of having an infant admitted to the NICU that you would like to share?

NOTE: Health and Well-Being Behavior Scale – Revised scale (Appendix D) was re-administered during the one-month follow-up.

Vita

Surbhi Kanotra was born on February 23, 1980 in Varangaon, India and is an American citizen. At the age of seven, she and her family immigrated to the United States and settled in Germantown, Maryland. She graduated from Watkins Mill High School in Gaithersburg, Maryland in 1997. She received her Bachelor of Arts in Psychology and Biochemistry from Hood College in 2001.