DEVELOPING A CHILD HEALTH MODEL: A PROSPECTIVE STUDY OF MATERNAL HEALTH BELIEFS AND UTILIZATION OF PREVENTIVE INFANT HEALTH CARE SERVICES

by

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The purpose of this study was to investigate the relationship among expectant mothers' health beliefs, utilization of preventive health care services, and infant health status. The participants were 75 expectant mothers recruited in their third trimester of pregnancy from public and private health care provider sites. Group 1 mothers had health insurance and received prenatal care through a private obstetric clinic. Group 2 mothers received public aid and obtained prenatal services through their county health department. A Maternal Health Belief Questionnaire (MHBQ) was developed for the purposes of this study. The MHBQ assessed the mother's perceptions about: (a) the perceived vulnerability of her unborn child to health threats experienced in infancy, (b) the perceived severity of each of these health threats, (c) the perceived effectiveness of preventive prenatal and infant health care services, (d) the perceived barriers to her seeking preventive health care for her child, and (e) the perceived locus of control with regard to the health of her unborn child. The MHBQ was administered to all participants to determine if maternal health beliefs predicted mother's utilization of prenatal care (date of first prenatal visit, number of missed appointments, and number of overall

visits), preventive infant health care services (number of on-time immunizations and well-baby examinations) and infant health status at age 6-months.

Results showed that Group 1 and 2 mothers had very different health beliefs and utilization rates. Group 1 mothers had significantly higher utilization rates of prenatal and infant health care services. For this group, perceived benefits, perceived vulnerability and locus of control beliefs predicted utilization scores. For Group 2, utilization rates, particularly prenatal visits were significantly lower. The only belief factor which significantly predicted utilization of health care services was locus of control. There were no significant differences between the groups on infant health status scores. Findings are somewhat inconsistent with previous health belief model research. Reasons for this discrepancy, along with the important theoretical and practical implications of the findings are discussed.

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CHAPTER 1

INTRODUCTION

Primary prevention is a major caveat of current medical practice. Over the last 30 years health care providers increasingly have strived to educate the public about the importance of preventive health care. Kasl and Cobb (1966) defined preventive health behavior as "any activity undertaken by a person who believes himself to be healthy for the purpose of preventing disease or detecting disease in an asymptomatic stage" (p.246). More recently, prevention of accidental injury also has been included within the domain of preventive health behavior.

Numerous studies over the years have shown that preventive health care services are utilized at appallingly low rates within the United States and Canada (Stephens, 1988). Today, health care expenditures exceed $800 billion annually; health care providers believe this figure could be reduced substantially if preventive health behaviors were practiced (Lee & Estes, 1994).

Social science researchers have strived over the last 40 years to develop a cohesive theoretical framework which describes and explains why individuals fail to engage in preventive health actions. Initial studies within this field were epidemiological, focusing on the demographic

variables associated with low rates of utilization of preventive health care services. Research showed that preventive health care services are used more frequently by women, younger persons, and individuals with higher education, and persons with higher income (Herman, 1972). Studies also have shown that minority populations access preventive health care services at lower rates (Wilson & White, 1977), although these epidemiological studies may be confounded largely by education and income factors.

In the mid-1960's a group of social psychology researchers proposed a model of health behavior that included demographic variables, but more importantly, addressed the role of psychosocial variables, such as perceptions and beliefs, in guiding person's decisions to engage in preventive health behavior. This "Health Belief Model" (HBM) proposed by Rosenstock (1966) was strongly based upon cognitive-behavioral and social learning theories which emphasized the importance of reinforcement value and expectancy outcome. Within this perspective, behavior is assumed to be a function of a subjective reinforcement value and the expectation by the individual that the behavior will result in a specific outcome. When these concepts are applied to the domain of health behavior, the theory predicts that health behavior is determined by the value the individual places upon avoiding illness. Thus, the probability that a person will take preventive action is

determined by the perceived cost-benefit ratio, in which the benefits of taking preventive action are weighed against the costs. Rosenstock also included within his model the concept of "cues to action" which are signals to the individual that he or she is at increased health risk.

Since its original inception, the HBM has undergone a number of modifications. Becker and his colleagues (e.g., Becker, 1985; Becker, Drachman, & Kirscht, 1974; Becker , Kaback, Rosenstock, & Ruth, 1975; Becker, Mainman, Kirscht, Haefner & Drachman, 1977) have subjected the HBM to intense empirical scrutiny across a number of health domains and, ultimately, refined it into a cogent, well documented and accepted theory. The central assumption, that health behavior is motivated by the individual's health beliefs, has remained unchanged.

The HBM which is depicted in Figure 1 conceptualizes "health" as multidimensional. It acknowledges the role of

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Insert Figure 1 About Here

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the cognitive and social features of the individual and the interaction between these personal factors and the individual's physical and social environment in directing preventive health behaviors. The core features of the current HBM assumed to influence preventive health behaviors are: (a) perceived susceptibility to a health threat; (b)

perceived severity of the health threat, including perceived physical and social consequences; (c) perceived benefits of the recommended prevention or intervention strategy; and (d) perceived barriers (physical, psychological, financial, or otherwise) which restrict or interfere with the individual undertaking the recommended health action.

In a comprehensive and critical review of studies which utilized the HBM and examined adult medical conditions, Janz and Becker (1984) found that each of the HBM dimensions differentially contribute to the model. Perceived barriers were found to significantly contribute to an individual's health-related behaviors in 91% of the reviewed studies. Additionally, perceived susceptibility, severity, and benefits were significantly associated with health behaviors across the majority of studies (77%, 59%, and 81%, respectively).

Janz and Becker (1984) also included within their review, 24 studies which specifically examined the HBM and preventive health behaviors. They found that perceived barriers emerged as the most powerful predictor of preventive health behavior (significant findings in 100% of the reviewed studies). Perceived susceptibility and perceived benefits were associated with significant outcomes in 83% and 82% of these studies, respectively. It was concluded that each of these HBM dimensions played a direct role in an individual's decisions to engage in a variety of

preventive health behaviors, such as practicing regular self-breast examinations (Hallal, 1982), receiving immunizations against various strains of influenza (Cummings, Jette, & Brock, 1979) and attending screening clinics for specific disorders/conditions, such as Tay Sachs (Becker, Kaback, Rosenstock, & Ruth, 1975) and high blood pressure (King, 1982). In sum, the HBM has been shown to be a useful conceptual framework for understanding the role of psychosocial variables in determining adult health behavior.

Health care researchers also have investigated the role of locus of control (LOC) as a belief factor which may influence health-related behaviors. LOC is a construct initially developed from social learning theory (Rotter, 1966). It has been conceptualized as an individual's "generalized expectancy" about the degree of control that he/she has over events occurring across a number of different settings (Lefcourt, 1966). Persons with an internal LOC believe that their own actions can directly impact the outcome of events. Individuals with an external LOC perceive that their own behavior is unrelated to event outcome, rather the consequences are influenced by the forces of chance or powerful external others. Thus, within this perspective, positive or negative life experiences in control situations shape a pattern of expectancy which influences personal control attitudes.

Rotter (1966) also has described LOC as an individual personality factor, which fundamentally influences the way in which individuals interact with their environment. This influence then tends to produce outcomes consistent with personality. Individuals with a strong internal sense of control, in general, attempt to better their life conditions by controlling their own behavior and their environment. Individuals with an external sense of control, on the other hand are much more likely to be accepting of their current life situation.

In trying to understand the links between health beliefs and behaviors, it is helpful to conceptualize LOC as a construct shaped by both internal and external forces. LOC beliefs, in turn, influence health behaviors. This is entirely congruent with social learning theory, which forms the theoretical underpinnings of the HBM. Social learning theory is founded on the premises that: (a) environmental factors influence a person's beliefs and attitudes, and (b) a person's attitudes direct his/her behaviors, which in turn impact the environment. When applied to the field of health psychology, this theory predicts that health attitudes, health behaviors, and physical-social features within the environment interact continuously to affect change in the entire system.

Adult health researchers, Wallston and Wallston (1981) have developed the Multi-Dimensional Health Locus of Control

(MHLC) scale, which assesses a person's beliefs about the type and degree of control that he/she has over their own health. The MHLC is a widely accepted measure of health LOC. Previous research (Wallston & Wallston, 1978) indicated that health LOC was a multidimensional construct, consisting of three different health LOC dimensions: (a) a sense of internal personal control over health issues; (b) a belief in powerful others; and (c) a belief in fate or chance factors. These belief dimensions are believed to be distinct and independent factors, as items on health LOC scales tend to cluster around these three factors (Parcel & Meyer, 1978; Wallston & Wallston, 1981).

Researchers have shown that scores on the MHLC are correlated with health behaviors. Persons with higher internal LOC scores more frequently engaged in positive health behaviors, such as using seat belts (Williams, 1972), practicing preventive dental care (Williams, 1972), and giving up smoking (James, Woodruff, & Werner, 1965). Studies show that individuals with a strong belief in powerful others show better medical compliance to prescribed medical regimes (Roskam, cited in Wallston, Wallston, Smith & Dobbins, 1987). Since the concept of fate is considered to be beyond any person's control, many researchers have conceptualized a strong belief in fate factors as perceived noncontrol over health. To date, no studies exist that demonstrate that a strong belief in LOC fate factors predict

positive or negative health behaviors. It would be expected though, that those persons with a strong belief in chance factors would be less likely to engage in preventive or health-enhancing behaviors.

Application of Adult Research to Child Health

The field of child health recently has identified child health promotion and family influences upon child health as high priority research issues (Bruhn & Parcel, 1982). Accordingly, researchers have attempted to identify those psychosocial features of the child's environment which contribute to the child's overall health status (Gordis, Markowitz, & Lilienfeld, 1969; Morris, Hatch, & Chipman, 1966). Initial studies within this arena have focused primarily on the socio-demographic features of the family which positively or negatively impact child health (Becker & Mainman, 1975; Kirscht, Becker, & Eveland, 1976). Researchers, however, increasingly have begun to examine the motivational and attributional features of the family which inevitably contribute to the emotional and physical well-being of the child. Not surprisingly, the majority of child health research has relied upon a conceptual framework based upon adult health psychology research.

As with the adult health literature, initial studies of child health care focused on utilization rates and associated demographics. Studies consistently have demonstrated that children from low income families,

including those which receive government funded health insurance, receive less preventive health care and rarely have regular contact with the same practitioner. Starfield (1983) found that 25% of children receiving Medicaid used a hospital out-patient clinic or emergency room as their primary source of health care. Younger children, especially infants, are more likely to receive health care services than older children (Slessinger, Tessler, & Mechanic, 1976). Approximately one fourth of all pediatric emergency room visits involve children under the age of one year (Halperin, Meyers, & Alpert, 1979). Studies also have shown that family size is inversely related to utilization of child health care services (Anderson & Kasper, 1973). Caucasian families and families with well educated parents also have more contact with the medical system (Slessinger, Tessler, & Mechanic, 1976).

Researchers have examined the role of psychosocial variables in predicting utilization of pediatric health care services. In a review of the literature, Horwitz, Morgenstern, and Berkman (1985) found that stressful life events predict utilization of medical care, and that families experiencing emotional or situational stressors have higher rates of contact for their children with the medical system. Psychosocial variables also have predicted utilization of the emergency room. Feifelman et al (1990) found that for one-year-old children emergency room use was

predicted by: (a) maternal worry about the kind of illnesses a child may acquire; (b) maternal worry about the child becoming seriously ill; and (c) a perception that illness interfered with the day-to-day activities of the child.

In studies examining adherence to recommended treatments health care researchers have found that compliance to prescribed treatments in pediatric clinic populations is very poor. Typical noncompliance rates for a pediatric population range from 30-60% (Becker, Drachman, & Kirscht, 1972; Feinstein et al, 1959; Gordis, Markowitz, & Lilienfeld, 1969). Bergman and Werner's (1963) study showed that by the 9th day of a 10-day regimen of antibacterial treatment, only 18% of children were receiving penicillin.

Accordingly, researchers have examined the role of mothers' health beliefs in predicting compliance with pediatric medical regimes. Becker, Radius, and Rosenstock (1978) found that children's compliance with a prescribed asthma treatment protocol was related to a mother's beliefs about: (a) her child's vulnerability to illness in general and to asthma specifically; (b) the perceived severity of asthma; (c) the perceived effectiveness of the treatment regimen; (d) the perceived barriers (e.g., cost, administration schedule, disruption to the child's routine); and (e) her own health LOC. These variables also predicted mothers' compliance with treatment for their children's ear infection (Becker, Drachman, & Kirscht, 1974) and mothers'

compliance to a diet prescribed for their obese children (Becker, Mainman, Kirscht, Haefner, & Drachman, 1977).

Parental health beliefs have been found to predict parents taking preventive measures to avoid accidental injury in their children. In a study of bicycle safety helmet usage among children, researchers found that parental perception of threat (perceived vulnerability and severity) influenced parental attitudes about bicycle helmets, parental intention to make their children utilize bicycle helmets and the children's usage of the helmets (Witte, Stokols, Ituarte, & Schneider, 1993). These researchers also found that "cues to action" (in the form of educational information and coupons for helmets) increased parental perception of threat.

Webb, Sanson-Fisher, and Bowman (1988) found that parents' own health behaviors and health attitudes strongly predicted use of safety restraint in motor vehicles. Restraint use was higher for children if their parents wore safety belts, were nonsmokers, and engaged in other preventive health behaviors on behalf of their child. Thus, those parents who engaged in positive health behaviors were more likely to take preventive measures to protect their child. Parental attitudes predicted restraint usage as well. Perceived costs (e.g., nuisance value, installation difficulty, and financial cost) were negatively correlated with restraint usage and perceived benefits was positively

correlated with usage. LOC beliefs also predicted restraint use. Parents with a strong sense of internal LOC were more likely to use child restraints, while parents with a strong external orientation were less likely to use child restraint systems.

In examining utilization of preventive health care services, a number of researchers have focused specifically upon maternal health beliefs. In general, a mother's beliefs about the value of prevention and satisfaction with her pediatric health care provider have been found to correlate strongly with her utilization rates of preventive health care services on behalf of her child. For example, mothers with positive attitudes towards doctors are more likely to allow their children to participate in tuberculosis screening tests (Schonfield, Schmidt, & Sternfeld, 1963) and mothers who value regular dental check-ups take their children more often to the dentist (Kriesberg & Treiman, 1962). Conversely, a negative orientation towards preventive health care can deter utilization of preventive services. Morris, Hatch, and Chipman (1966) found that mothers who did not value well-child visits obtained fewer immunizations for their children.

In a study examining clinic utilization rates and mother's LOC beliefs, Becker, Nathanson, Drachman, and Kirscht (1977) found that utilization rates of medical care were correlated strongly with mothers' health attitudes.

Specifically, they reported that mothers with an active interventionist orientation (i.e., an internal LOC) were more likely to utilize preventive health care services. The belief that the child was healthy and less susceptible to illness also correlated with higher utilization rates of preventive health care services. Those mothers with a more passive and external orientation to health perceived their children to be less healthy and more susceptible to illness. These children also had fewer well-child visits and more illness and accident related visits.

These findings seem somewhat counter-intuitive because it would be expected (and the HBM predicts) that the mother who perceives her child as more susceptible would seek preventive health care services more frequently. Becker et al. (1977) explained this by concluding that those mothers who made regular preventive visits to the doctor believed that the contact with the health care provider bestowed the child with a protection of sorts from illness and injury. The researchers also concluded that the children of mothers with an active internal health locus of control had fewer acute care and accident visits because the mothers personally did more to protect their child from injury and sickness.

The research overall supports the notion that parental health attitudes and beliefs impact parental utilization of preventive health care services on behalf of their children.

A major criticism of the research is that it has been largely based upon an adult model of health. Maddux, Roberts, and Wright (1988) assert that child health issues are important in their own right and that the field of child health psychology needs to develop its own health models which acknowledge the role of important factors such as family and development.

Researchers who presented at the 1981 conference entitled "The Health Behavior of Young Children: Research Findings and Directions" have suggested that the family exerts a direct influence upon children's health behaviors and health status through: (a) parental health beliefs and behaviors which impact utilization of appropriate preventive and interventive child health services, and (b) learning experiences provided by parents, during which positive health behaviors are modeled and reinforced. In a summary of the conference, Bruhn and Parcel (1982) encouraged child health researchers to utilize learning and developmental theories to answer the following questions:

1. What familial factors influence child health behavior and health status?
2. How much variance in the child's health can be accounted for by these familial factors?
3. How do family variables influence children's health status and health behavior?

The Children's Health Belief Model

In response to these type of research questions, Bush and Ionotti (1990) have created a child health model which includes concepts from the HBM, social learning theory, and developmental theory. This model, the Children's Health Belief Model (CHBM), has guided this present research project. The CHBM views the development of children's health beliefs and behaviors within a personal and social context. This model which is depicted in Figure 2 implies initially through infancy and early childhood the parent

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Insert Figure 2 About Here

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assumes complete control over the child's health care. The parental components of the CHBM are highlighted in Figure 2. It is assumed that these parental attitudes, which have been shaped by environmental factors and the parent's prior experiences, entirely determine the degree and type of contact the infant has with health care services. As the child develops, the child adopts health beliefs that are consistent with previous experiences. The child's health beliefs and behaviors are learned and shaped by observation and direct experiences with the social and physical environment. As the child increasingly assumes control of self health care, the influence of the highlighted parental components will decrease, and the child's own perception and

beliefs will begin to play a greater role in directing personal health behaviors.

The child's health behavior and health status are presumed to be influenced by beliefs and perceptions about the perceived illness threat (perceived vulnerability and severity) along with the perceived benefit of performing the recommended health action. This is thought to be a gradual process during which the child's ability to understand illness and health concepts is dependent upon the level of cognitive development. Factors which are internal (i.e., cognitive/affective) and external (i.e., familial/social) to the child may serve to modify these health beliefs. Internal modifying factors include variables such as health LOC, self-esteem, and health knowledge. Factors external to the child, such as parental perception about illness threat and perceived benefits also are assumed to influence the child's beliefs, but to a much lesser extent. Additionally, demographic variables are assumed to play a significant, but indirect role in shaping health beliefs and attitudes.

There is empirical evidence to support the CHBM. Bush and Ionotti (1990) found the CHBM accounted for 63% of the variance in children's expected medicine use for common health problems. Child and parental beliefs about perceived vulnerability, perceived severity and perceived benefits were positively related to expected medicine use. Parental perceptions about their child's health, particularly

perceived vulnerability, contributed strongly to the variance. Additionally, health LOC which was strongly correlated with socioeconomic status (SES) was found to strongly impact all child health attitudes.

Application of the CHBM to Preventive Infant Health Care

While the CHBM has received some empirical support within the domain of child health psychology, very few comprehensive and prospective studies have emerged over the past years. It was the purpose of this research to further advance this model of child health by examining one critical developmental period during which the mother is completely responsible for accessing health care services on behalf of the child. Thus, this study examined only the parental components of the CHBM. Specifically, this project took a prospective look at the influence of maternal health beliefs upon utilization of prenatal and preventive infant health care services.

Today, a major goal of child health care providers is to increase utilization of prenatal and infant health care services. Rates of prenatal care and preventive infant health care are strongly correlated with infant mortality and morbidity rates, and statistics show that these services continue to be under-utilized despite attempts by health care providers to provide education and incentives to increase usage (National Center for Health Statistics, 1987).

Prenatal care, which is defined as pregnancy related health care services provided to a woman between conception and delivery, is strongly associated with pregnancy outcome. To date, it is the best known predictor of birth outcome following SES (Kesner, 1973). Pregnant women who receive inadequate care are at much higher risk for premature delivery, low birth weight, and infant and fetal death (Miller, Fine, & Adams-Taylor, 1989). Early prenatal care is crucial to improving pregnancy outcome. Currently, statistics suggest that only three fourths (76%) of all pregnant women receive timely prenatal care (Centers for Disease Control [CDC], 1991). Health researchers suggest that early and timely prenatal care is very cost effective. Research generated by the Office of Technology Assessment (1988) indicates that for every low birth weight averted by prenatal care, the U.S. health care system saves $14,000-$30,000. The American Academy of Pediatrics (1984) estimated that for every dollar spent on prenatal care, consumers save two to ten dollars.

Utilization of preventive infant health care services also is on the decline (Hughes, Johnson, Rosenbaum, Butler, & Simons, 1988). Studies show that these services are crucial to reducing infant mortality and disease, and that presently, both well-baby visits and immunizations are underused (CDC, 1991, 1994). Well-baby check-ups are important in the early identification of health problems and

in providing parents with important developmental and anticipatory guidance information.

Immunization programs are the single most effective preventive health measure for young children in terms of reducing mortality and morbidity risk. Childhood vaccination programs have resulted in a 98% decline in the incidence of childhood diseases such as measles, mumps, rubella, diphtheria and polio (United States Department of Health and Human Services [DHHS], 1988). Despite this, researchers estimate that 15%-45% of young children are inadequately vaccinated against major childhood diseases (CDC, 1994). These rates are even higher for babies and toddlers (Miller, Fine, & Adams-Taylor, 1989). The Centers for Disease Control (cited in DHHS, 1988) estimates that the average benefit-cost ratio across all vaccines is 10:1. For example, in the case of the polio vaccine, this translates to a savings of about $1 billion per year.

Current statistics show that the health status of American children is declining, and that available preventive child health services, such as prenatal health care, immunizations, and well-baby examinations, are underused (Hughes, Johnson, Rosenbaum, Butler, & Simons, 1988). A major goal of the U.S. Department of Health and Human Services, as cited in Healthy People 2000 (1992), is to increase utilization of prenatal health care services and preventive health care services and give higher priority to

psychosocial research investigating "factors associated with care-seeking behaviors and effective methods for improving use of services" (p. 386). To this point in time, very little systematic research within the fields of psychology or child health has been generated in this arena of health care.

An exception to this is the research generated by Tinsley and Holtgrave (1989) which investigated the role of mothers' health attitudes and their utilization of important preventive health care services. Specifically, Tinsley and Holtgrave examined the relationship between mother's health LOC beliefs and utilization of preventive infant health services. The results indicated that mothers who believed that they had control over their infant's health (i.e., an internal LOC) utilized preventive health care services more frequently and had infants with better health status. Tinsley and Holtgrave found that mother's LOC was a better overall predictor than the mother's SES. A major limitation of this study was their use of a retrospective design that looked at utilization data for the previous two years. Nonetheless, these findings are relatively important for the field of child health in terms of developing a preventive health model. Researchers have been able to modify health beliefs within a controlled setting (Haefner & Kirscht, 1970). On the one hand, parental health beliefs presumably are changeable and could be included as a major component of

a preventive health program. Socio-demographic variables, on the other hand, are much less amenable to intervention strategies.

In a related study, maternal LOC was also found to be related to compliance with a prenatal health regimen during pregnancy (Tinsley, Trupin, Owens, & Boyum, 1993). Women who perceived they had a strong sense of control (internality) over their pregnancy were more likely to engage in positive health behaviors and avoid risky health behaviors. Birth outcome, correspondingly, was correlated with compliance to the recommended prenatal health regimen.

Statement of Purpose

The purpose of this present study was to investigate those psychosocial factors which impact expectant mothers' utilization of prenatal and infant health care services. The CHBM was used as the guiding conceptual framework with focus given exclusively to the parental components of the CHBM and the child's first 6-months of life. The CHBM assumes that the primary caregiver plays an important role in directing the child's health beliefs and behavior throughout childhood. Additionally, the level and type of parental involvement in this process varies directly as a function of the child's developmental status. The younger the child, the more directly responsible the parent is for seeking and providing health care. Thus, in the case of an infant, it is expected that the primary caregiver's

perceptions about the child's health will determine utilization of health care services by the caregiver on behalf of the infant.

The Maternal Health Belief Questionnaire (MHBQ), which is a multidimensional measure strongly based upon the CHBM, was developed to assess the beliefs of expectant mothers along with following dimensions: (a) perceived susceptibility of the unborn child to pediatric health threats, (b) perceived severity of the pediatric health threats, (c) perceived benefits of preventive health actions, (d) perceived barriers to getting health care services, and (e) locus of control with respect to the infant's health. Pilot testing insured the measure had adequate test-retest reliability (r=.89, averaged across all items) and internal consistency (Cronbach's alpha=.89, averaged across all items).

Multiple regression statistics were used to determine which of these factors predicted maternal usage of preventive health services. Specifically, the model tested whether the health beliefs of women in their third trimester of pregnancy predict: (a) the timing and number of prenatal visits, (b) the number of on-time immunizations, (c) the number of on-time well-baby examinations, and (d) the overall health status of the infant at age 6-months.

Previously, researchers (Maiman, Becker, Kirscht, Haefner, & Drachman, 1977) have analyzed the inter-

relationship among the four belief factors of the HBM and found that three distinct and independent dimensions exist. Perceived benefits and barriers were found to be independent dimensions. However, the perceived severity and perceived vulnerability subscales were found to be strongly intercorrelated and it was concluded that these belief factors should be combined to form a dimension of "threat perception."

Janz and Becker (1984) found that across a wide variety of settings, measures of perceived severity were least likely (of the four HBM factors) to successfully predict positive health behaviors. However, Janz and Becker concluded that perceived severity was a very important predictor for acute visits and for specific health conditions. Because pregnancy is a specific health condition and several of the outcome measures involved "acute visit" data, perceived severity and vulnerability were included as separate subscales on the health belief questionnaire developed for this study. Zweig, Lefevre, and Kruse (1988) have examined mother's health beliefs as predictors of prenatal care attendance. Using factor analysis, these researchers found that perceived severity and vulnerability were separate factors. These findings further support the inclusion of separate vulnerability and severity measures for the purposes of this study.

Based on the previous research literature, it was hypothesized that mothers' scores on the individual sub-scales of the MHBQ would predict utilization scores and health status scores. Specifically, higher utilization of preventive services were predicted to be associated with:

1. higher susceptibility scores (i.e., the mother believes her unborn infant to be highly susceptible).
2. higher severity scores (i.e., the mother perceives the pediatric health threats to be quite serious).
3. higher benefits scores (i.e., the mother believes that preventive health actions are highly beneficial).
4. low barrier scores (i.e., the mother perceives barriers as less extreme).
5. higher "internal" scores on the locus of control measure (i.e., the mother perceives that she has a high degree of control over her infant's health).
6. higher scores on a measure of infant health status.

This study is strongly based on the CHBM which was developed largely from the adult oriented HBM. The HBM has been widely accepted as a standard organizing framework within the field of health psychology; however, criticism has been leveled at it on several different points. Because

this study contains many components of the HBM, these criticisms must be addressed.

Firstly, the validity of the HBM has been questioned because it is based on the premise that a direct causal relationship exists between beliefs and behaviors. The field of psychology has yet to uniformly demonstrate that this belief-behavior relationship exists. One step toward uncovering the nature of this relationship is through the use of prospective studies. A prospective study such as this will more clearly indicate the directionality of the relationship between attitudes and behaviors. The attitudinal measures will be recorded prior to the occurrence of the measured behaviors and should not be influenced by these, unless there are other unmeasured variables affecting both beliefs and behaviors.

A second criticism aimed at the HBM is its failure to prescribe a procedure for changing health attitudes. In defense of this, Rosenstock and Kirscht (1974, p. 472) reply, "the HBM does not presuppose or imply a strategy for change. We may assume that direct persuasion to modify beliefs is an obvious tactic, and perhaps a much broader view of belief change is necessary." Along a similar line, the model has also been faulted for its failure to include the role of environmental factors, such as the community or public policy, in shaping health beliefs. It is not the purpose of this study to evaluate various prescriptions for

attitude change or assess environmental factors directly. The scope of the proposed study is only to investigate the nature of the relationship between beliefs and behaviors within a health context. Some demographic variables will be included, primarily to allow comparisons to previous research in the area, which has seemingly ignored this important factor.

A third criticism of the HBM is related to the absence of a standardized assessment tool. Most researchers have utilized their own measures with unknown psychometric properties to assess individual's beliefs about very specific health threats/conditions. With regards to the statistical reliability and validity of the MHBQ, pilot work insured that each scale developed for the purpose of this study had adequate test-retest reliability, internal consistency and face validity. This study also used existing tools which have been shown to be reliable measures in previous research.

A fourth and final criticism of the HBM has been directed primarily at the research community's utilization of a retrospective design. A majority of research studies based upon the HBM are retrospective in nature. Assuming there is a causal relationship between beliefs and behavior, no conclusive findings regarding causality can be reached because individual's beliefs may very well be biased by past experiences. Therefore, it is crucial for researchers

within the field to utilize a prospective design in order to more clearly demonstrate that a relationship exists between health beliefs and health behaviors.

A major strength of this current study is that it utilizes a prospective approach and produces a mathematical model which quantifies the relationship between the predictor and outcome variables. The majority of previous studies examining health beliefs and behaviors have been retrospective in design. This study also stands apart from other studies because it includes both demographic and attitudinal variables within the model; few researchers have included both type of factors in their design and analyses. Additionally, the majority of previous research which has examined the relationship between health attitudes and utilization of pediatric services has examined the mother's beliefs about her own health, as opposed to the health of her child. This is an important distinction, and it is felt that the mother's beliefs about her unborn child's health are very relevant to her decision to access prenatal and infant health care services.

CHAPTER II

RESEARCH DESIGN AND METHOD

Participants

Participants were 75 expectant mothers residing in Guilford, Alamance, and Rockingham Counties in central North Carolina. To be included in this study, participants were at least 18 years of age and in their third trimester of pregnancy. Additional information about the demographic features of the participants are presented in Table 1.

Insert Table 1 About Here

The current structure of the health care system is divided into public and private sector providers, with low SES families served by public providers and middle and upper SES families served by the private sector. Because previous work has shown that SES strongly influences utilization of health care services, two groups of participants were recruited based upon health care provider site. Group 1 consisted of 30 women who had private health insurance and received prenatal health care through a private obstetric clinic. Group 2 consisted of 45 women who received public aid and obtained health care services through county health departments. An attempt was made to balance the number of

Caucasian and Afro-American participants in each group to avoid a confound between race and SES. Additionally, more Group 2 mothers were recruited to compensate for possible higher attrition rates within this group. A sample size of 30 was required for each group to achieve a power of .90 with an alpha level of .05.

Measures

Demographic Data. Demographic data were collected for all participants in this study. Information included was: mother's age, mother's level of education, and the number of children to which the mother has previously given birth. These factors all have been found to predict utilization of pediatric health care services.

The Maternal Health Belief Questionnaire. For the purpose of this study, the researcher developed the Maternal Health Belief Questionnaire. Subscales were created which correspond to the dimensions of the CHBM. Traditional HBM and CHBM measures have utilized Likert scales to assess individual's health attitudes across the different domains. The MHBQ is made of five subscales, each involving a series of questions and Likert scales that assess a mother's perceptions about her child's health and preventive health care services (See Appendix C). The MHBQ is scored by adding the scores from the individual items for each subscale to form a composite score for that respective subscale. The MHBQ included the following subscales:

1. Perceived Vulnerability. This 20-item subscale was designed to assess the mother's beliefs about her child's future health risk or vulnerability to 20 identified pediatric health threats. This list was developed with the assistance of local pediatricians and included a wide variety of health threats, such as measles, polio, colic, ear infection, and accidental poisoning. Included in this list were all the major childhood illnesses against which infants and children are vaccinated. The mother was asked to rate on a 7-point scale the perceived likelihood of her child experiencing each of these health threats within the first year of life as compared to other children the same age.

2. Perceived Severity. This 20-item subscale measured the mother's perceptions about the severity of each of the health threats included in the perceived vulnerability subscale. The mother was asked to rate severity of each of these conditions on a 7-point Likert scale.

3. Perceived Benefits. This 5-item subscale was created to assess the mother's beliefs about the effectiveness of preventive health care in terms of her child's future health status. Specifically, mothers were asked to rate along a 7-point Likert scale the perceived effectiveness of: first, second and third trimester prenatal visits, immunizations, and well-baby check-ups.

4. Perceived Barriers. This 10-item subscale assessed the extent to which the mother perceived that specific barriers interfered with her seeking health care services for her child. For the purpose of this study, "barriers" were defined as factors which may be internal or are external to the individual. Previous studies have identified a number of barriers which interfere with access to medical care (Institute of Medicine, 1985; Melnyk, 1988). These include: lack of transportation, no telephone to call for an appointment, difficulty in finding child care for other children, long waiting times at the clinic, inconvenient clinic hours, cost of services/lack of insurance, and a poor provider-consumer relationship. Accordingly, these barriers were included within this subscale. Each mother was asked to rate along a 7-point Likert scale how much each of these barriers could interfere with her seeking health care services for her child.

5. Locus of Control. The Parental Health Beliefs Scale (PHBS) developed by Tinsley and Holtgrave (1989) made up the fifth component of the MHBQ. This scale assessed the mother's perceived LOC with respect to her child's health. The PHBS is a modification of the Children's Health Locus of Control Scale (Parcel & Meyer, 1978) which initially was designed to measure children's attributions about their control over their own health. Tinsley and Holtgrave modified this scale by rewording statements to reference

parental attributions about controllability of their child's health. The PHBS is a multidimensional measure with three subscales that assess the degree to which a mother believes that control over her child's health is determined by: (a) powerful others, such as physicians and nurses; (b) "fate" or chance factors; and (c) the mother's own behavioral initiative. The PHBS consists of 20 statements presented in a Likert scale format ranging from 1 to 6. The PHBS has adequate test-retest reliability ($\underline{r}$=0.96, averaged across all items).

Once the MHBQ was developed, this researcher administered the perceived vulnerability, severity, benefits, and barriers subscales to 20 expectant mothers on two separate occasions, two weeks apart. Participants were recruited through birthing classes at a local hospital and a YMCA prenatal exercise class. Test-retest reliability across all items was calculated at .87. Because some subscales had more items than others, this overall reliability score was calculated using weighted averages across the four HBM subscales. The weighted averages were determined by the percentage of the total combined items (from the four HBM subscales) that were accounted for by each subscale. For instance, these four HBM subscales had a combined total of 55 items; therefore, the perceived vulnerability and severity scale items each accounted for 36% of the combined total. Perceived barriers items

accounted for 18% and perceived benefits accounted for 9% of the total items. These percentages were then assigned as weights for their respective subscales. So, the reliability scores from those subscales with more items (eg., perceived vulnerability and severity) were given comparatively more weight in calculating the overall test-retest reliability.

The perceived barriers subscale had the highest reliability (r=.97), while the perceived benefits subscale had the lowest (r=.68). The perceived vulnerability and severity subscales had reliability scores of .90 and .85 respectively. Internal consistency was computed for these same subscales using Cronbach's alpha equation. Internal consistency was measured at .79, .85, .92 and .94 respectively across the perceived barriers, perceived benefits, perceived vulnerability and perceived severity subscales.

Utilization of Preventive Services

Prenatal Visits. Mothers' utilization of preventive services were determined directly from medical records, so as to avoid any bias or inaccuracies which might occur with a self-report type of measure. Mothers' prenatal medical records were examined and the date of first contact, along with the dates and number of prenatal visits were recorded. These data were used to produce three measures which reflected the mother's utilization of obstetric services. These measures were: (a) the number of days pregnant at the

time of the first visit; (b) the number of overall visits, and (c) the number of missed appointments.

The number of days pregnant at the time of the first visit was recorded directly from the chart. In the case of an obvious miscalculation of the date of conception (which is based on the mother's report of the date of her last menstrual cycle) this number was recalculated based upon the fetal sonogram estimated age. The fetal sonogram is a highly reliable procedure (standard deviation of $\pm$.5 weeks) for estimating date of conception (Robinson, 1973). In the three cases which required this recalculation, the fetal sonogram estimated age was taken directly from the medical charts. The number of overall appointments was obtained by examining the mother's medical records and counting the number of appointments across the course of the pregnancy.

The calculation of missed appointments was somewhat complicated because it needed to take into account: (a) that the recommended schedule of prenatal care changes as the pregnancy progresses; (b) that some mothers would have more frequent contact with the clinic at different points in time because of concerns or complications that may arise throughout the course of the pregnancy; and (c) that there may be some conflict for the mother or provider in scheduling appointments exactly in accordance with the

guidelines, and that most providers allow some flexibility in scheduling future appointments.

Therefore, for each participant, the dates of all appointments were recorded and the number of days between each appointment was counted. An appointment was considered late or missed if the gap between appointments was beyond 150% of the time (counted in days) recommended by the guidelines for prenatal care established by the American College of Obstetrics and Gynecology. These recommendations are as follows: one visit every four weeks (28 days) until the 28th week; a visit every two weeks (14 days) until the 36th week of pregnancy; and weekly visits (every 7 days) thereafter until childbirth. So, for example, if the pregnancy was 27 weeks or less, appointments must be at least every six weeks (or 42 days). The dates of appointments and number of days between appointments were compared to this schedule. If the number of days between appointments was greater than allowed by this schedule, there was a gap in services and it was counted as a missed appointment. These criteria are identical to that utilized by Tinsley and Holtgrave (1992) for determining if appointments were "on-time."

Infant Health Care. The child's medical records from birth to age six-months served as the source for the data which showed the mother's utilization of preventive health care over the child's first six months of life.

Specifically, the child's records were examined to determine the number of on-time immunizations and well-baby examinations. The American Academy of Pediatrics recommends a series of immunizations involving 12 different vaccinations across the first six months of infancy, which are presented in Table 2. Four well-baby examinations also

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Insert Table 2 About Here

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are recommended during this same time (at ages two-weeks, two-months, four-months, and six-months). Visits and immunizations were considered on-time if they occurred within 150% of the time interval (counted in days) recommended in the guidelines set forth by the American Academy of Pediatrics. As mentioned earlier, these criteria are consistent with Tinsley and Holtgrave's (1992) previous study.

Infant Health Status. Overall health status of the child (at age 6-months) was assessed with the Pediatric Complications Scale (PCS; Litman & Parmelee, 1978). The PCS is a 22-item measure designed to quantify the presence/absence of infant health problems (see Appendix D). The scale has adequate reliability and is correlated significantly with later scores on the Gesell and Bayley developmental scales (r=0.27 and 0.22 respectively).

The PCS was completed on the basis of information from the infant's medical records in accordance with the scoring manual included in Appendix D. The PCS is checklist type of measure. The number of health problems recorded on the scale is subtracted from the total number of items to yield an overall health status score. Higher PCS scores are associated with better health status. This chart review was completed by an assistant who is a certified medical technician and has had prior training in medical terminology and 10 years experience reading and understanding medical charts.

Procedure

Women in their third trimester of pregnancy were recruited from private and public health care sites. This method of recruitment excluded women who did not seek any prenatal care. However, statistics show that approximately 95% of pregnant women have had some prenatal care by the third trimester (Hughes, Johnson, Rosenbaum, Butler, & Simons, 1988; National Center for Health Statistics, 1987). Providers at all sites had given the experimenter permission to recruit their patients for participation in the study. Participants were recruited through labor and delivery classes offered by a private obstetric practice serving women in Guilford, Alamance, and Rockingham Counties. It was estimated by practitioners within this clinic (S. Miller, personal communication, May, 1993) that

approximately 80-90% of the women served by this practice attend these classes. Participants in Group 2 were recruited at the Guilford and Alamance County Health Departments.

For Group 1, the study was presented in a group format at the beginning or end of a labor/delivery class. Group 2 participants were approached in clinic waiting areas. In both cases, the study was explained to the participants (see Appendix A for complete presentation and instructions to participants). For those interested in participating, consent was sought for participation in the study (see Appendix E for consent forms). All participants were made aware they could refuse or withdraw from the study at any time without penalty. Participants also signed consent forms for the experimenter to access their prenatal records and the infant's future health records. Consenting mothers then were asked to complete the MHBQ and a data sheet that provided personal information (e.g., age, level of education, number of children) along with obstetric and pediatric provider information. In exchange for participation in the study, mothers were given a gift pack, which included infant items and a $10 gift certificate to a local baby store, all of which had been donated by businesses in the community. Most of the mothers approached did participate in this study. In fact, only two mothers from Group 1 and four mothers from Group 2 declined.

Approximately nine months later, mothers' prenatal health care records were examined and utilization data were taken directly from the chart. Dates of all kept appointments were recorded. For those infants in the study, their child health care provider was contacted and arrangements were made to examine the infant's records for information regarding well-baby visits, and immunization status. The PCS was also completed on the basis of a chart review from birth through age six-months. All data were collected with the strictest measure of confidentiality. Each participant was assigned a code number to protect confidentiality. This code number was utilized on all data and coding sheets to identify the participant.

CHAPTER III

RESULTS

Initial analysis for between groups differences was completed using independent sample t-tests. Alpha levels for all between group comparisons were adjusted accordingly using the Bonferoni procedure. Groups 1 and 2 differed significantly in terms of the mothers' age, level of education and the number of children in the family. The mean age of the mothers in Group 1 was 27.03, while the mean age of Group 2 mothers was 22.80 (t=-3.52, p<.001). Mothers in Group 1 averaged at least one year of college education, while most mothers in Group 2 had not graduated from high school (t=6.30, p<.0001). Additionally, this was much more likely to be the first pregnancy for mothers in Group 1; Group 2 mothers were likely to have at least 1 child (t=-3.52, p<.001).

The mothers in Groups 1 and 2 also had different health beliefs across several of the domains measured by the MHBQ. These findings are presented in Table 3. Independent

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Insert Table 3 About Here

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t-tests showed significant differences between scores on the perceived benefits and perceived barriers subtests of the

MHBQ. Mothers from Groups 1 and 2 differed significantly on the measure assessing perceived benefits of prenatal and infant health care services (t=3.51, p<.001). Mothers from Group 1 more strongly valued prenatal care, well-baby visits and immunizations. Scores on the perceived vulnerability and severity subscales did not differ between the two groups; however, mothers from both Groups 1 and 2 consistently indicated that they believed their own child was less vulnerable to illness/injury compared to other children the same age.

The mothers from each groups differed greatly in their perceptions of barriers (t=-4.26, p<.0001). Mothers from Group 2 felt those barriers listed on the MHBQ could substantially impact their accessing health care more so than mothers from Group 1. Data from the barriers subscale were further analyzed to examine differences between the groups based on the different items included in this subscale. Analysis showed that groups differed significantly with regards to the following barriers: lack of transportation, no telephone in the home, cost of health care services, inability to find a babysitter, and the mother's concern that she will find out her child is sicker than she believed. Group 2 mothers scored higher on each of these items, indicating that they believed these factors could interfere with their attendance of obstetric and pediatric appointments.

On the PCBS, mothers from Group 2 scored significantly higher than Group 1 mothers on the LOC-other subscale, which assesses the degree to which the mother believes that powerful others, such as doctors or nurses, control her child's health (t=-2.67, p<.01). This means that the Group 2 mothers more strongly endorsed statements such as: "Only a doctor or nurse keeps children from getting sick."; "The only way I can make my child stay healthy is to do what other people tell me to do."; or "I can only do what the doctor tells me to do for my child." All of these statements suggest a strong reliance on others to take care of her child's health. The two groups did not differ significantly in the level of internal LOC or in their belief in fate.

Participants' utilization of prenatal and infant health care services varied significantly between Group 1 and 2. An example of this difference is reflected in the scores representing the number of days pregnant at the time of the first prenatal visit. Group 2 mothers had been pregnant much longer (M=110.38 days) than those in Group 1 (M=64.45 days) at the time of the first visit (t=-5.60, p<.0001). This means that, on the average, the mother who received prenatal care at the local health department received no prenatal care in the first trimester and did not begin receiving medical services until the 15th week of pregnancy.

Group 1 mothers, on the other hand, sought prenatal care around the ninth week of pregnancy.

The two groups also differed significantly in the number of overall visits and number of missed appointments. Group 1 mothers averaged 17.45 visits, while Group 2 mothers averaged 10.87 visits (t=6.08, p<.0001). Group 2 mothers also missed more appointments (M=2.98) than Group 1 mothers (M=.75). Thus, in terms of prenatal utilization a strong pattern emerged, wherein mothers that received public health care services began prenatal care later, had fewer prenatal visits across the course of the pregnancy and more frequently missed important scheduled prenatal appointments.

In terms of the outcome variables, there was no significant difference between the groups on the Pediatric Complications Scale which was a measure of infant health at 6-months. The two groups showed no differences in the number of on-time well-baby visits. Examination of the statistics indicate that, on the average, mothers from both groups missed at least one of the four recommended well-baby visits.

Vaccination data did show significant differences between the two groups, with infants in Group 1 receiving significantly more on-time vaccinations than infants in Group 2. Infants in Group 1 received an average of 10.5 (out of 12) vaccinations in the first six months, while those in Group 2 received an average of 8.35 vaccinations

(t=3.02, p<.004). These data are striking because it suggests that at six-months of age, infants in Group 1, on the average, had missed 1.5 vaccinations. Infants in Group 2 fared even poorer, missing almost four vaccinations.

Correlational Statistics

Correlational analyses were conducted to determine relationships between the predictor variables (including demographic and attitudinal variables) and the outcome variables. Because preliminary analysis showed significant differences between groups on a number of the predictor and outcome variables, separate analyses were computed for Group 1 and Group 2.

Group 1. Correlational statistics presented in Table 4 showed that for Group 1, the demographic variables did not

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Insert Table 4 About Here

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significantly correlate with any of the attitudinal variables. The only attitudinal variables significantly intercorrelated were LOC-luck and LOC-self, which were strongly negatively correlated (r=-.55, p<.01). For this group, mothers with a strong sense of internal LOC were more likely to reject the idea that fate or bad luck impacted their child's health status.

For Group 1, a number of predictor variables were correlated significantly with the outcome variables.

Prenatal utilization scores correlated significantly with perceived severity scores and with LOC scores as seen in Table 5. The number of days pregnant at the time of the

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Insert Table 5 About Here

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first prenatal visit and perceived severity were strongly and negatively correlated (r=-.47, p<.01). Days pregnant was negatively correlated with LOC-self scores (r=-.42, p<.05) and positively correlated with LOC-powerful others scores (r=.38, p<.05). The only subscale from the MHBQ which significantly correlated with number of missed prenatal appointments was LOC-self (r=-.44, p<.01), indicating that those mothers with a strong sense of personal control over their child's health had fewer missed prenatal appointments. Utilization of preventive infant health services was correlated with several of the predictor variables. LOC-fate scores were strongly negatively correlated with the number of on-time well-baby visits (r=-.50, p<.01) which suggests that those mothers with a strong belief in fate missed more appointments. Mother's level of education was positively correlated with the number of on-time vaccinations (r=.40, p<.05). Perceived benefits and perceived vulnerability were also associated with the number of on-time vaccinations (r=.46, p<.01 and r=-.36, p<.05, respectively).

Group 2. Demographic variables, mother's age, race and family size were significantly correlated with scores on the MHBQ. These figures are presented in Table 6. LOC-self scores were negatively correlated with mother's age (r=-.41, p<.01) and family size (r=-.31, p<.05). Thus, mothers who

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Insert Table 6 About Here

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were older and had larger families felt that they had less personal control over their child's health. Race was found to be significantly correlated with LOC-other scores (r=.34, p<.05) and perceived benefits scores (r=-.35, p<.05). This meant that Afro-American mothers within this group felt that preventive health care services were less important. These mothers also had a stronger belief that their baby's health was controlled by powerful others, such as doctors and nurses.

As shown in Table 6, the attitudinal variables LOC-fate and LOC-other were significantly intercorrelated (r=.48, p<.01). Thus those mothers with a strong belief in chance or fate also had a strong belief in powerful others as controlling forces over their child's health. LOC-other scores were significantly correlated with perceived barriers scores (r=.37, p<.01) suggesting that those mothers with a strong belief in the power of others perceived those barriers listed on the MHBQ as more extreme.

LOC-self scores for Group 2 mothers were significantly intercorrelated with perceived vulnerability, perceived benefits, and perceived barriers scores. Mothers with a strong sense of internal control over their child's health believed that their unborn child was less vulnerable to health threats and that the barriers were less extreme. They also endorsed a strong belief in the benefits of prenatal care and infant health care services. These findings, in particular, point to the important role of locus of control, which seems to be entwined among the health attitudes of Group 2 mothers.

For Group 2, LOC-luck scores and family size were the only predictor variables to correlate significantly with the outcome measures. As seen in Table 7, a strong belief in fate was positively correlated with the number of visits mothers made to their obstetric clinic (r=.34, p<.05).

Insert Table 7 About Here

This same factor also was significantly correlated with the number of missed prenatal appointments (r=.29, p<.05). LOC-fate was significantly and negatively correlated with the number of on-time well-baby visits (r=-.30, p<.05). Family size also was significantly correlated with the number of missed prenatal appointments (r=.33, p<.05) and the total number of prenatal visits (r=-.30, p<.05).

Multiple Regression Analysis

Multiple regression analyses were performed to determine which demographic variables and belief components of the MHBQ contribute to utilization of preventive health services and infant health status, and how much variance could be accounted for with this set of variables. A step-wise regression procedure was used to determine which combination of variables best predicted utilization of preventive health services and overall infant health status. All demographic and MHBQ scores were entered as possible predictors to be included in the equation. Separate models were created for each of the utilization measures (e.g., days pregnant, number of prenatal visits, number of missed prenatal visits, number of on-time well-baby visits, and number of on-time vaccinations). Thus, five separate models were created for each Group. A summary of these analyses is presented in Table 8.

Insert Table 8 About Here

Group 1. For Group 1, multiple regression analysis showed that perceived severity ($F[1,28]=7.63$, $p<.01$) and LOC-self scores ($F[2,27]=6.75$, $p<.01$) made a significant contribution to the prediction of the number of days pregnant at the time of the first prenatal visit (R-Square=.34, $p<.01$). Thus, higher severity scores and higher

LOC-self scores predicted earlier contact with a prenatal care provider. A strong belief in LOC-self also predicted the fewer missed prenatal appointments (R-Square=.19; $F[1,28]=6.12$, $p<.05$). None of the attitudinal or demographic variables significantly predicted number of prenatal visits.

With regard to the infant health care outcome measures, the number of on-time immunizations was predicted by perceived benefits ($F[1,28]=6.94$, $p<.05$) and mother's level of education ($F[1,28]=5.76$, $p<.05$). These two factors combine to create an R-Square that accounted for over one third of the variance (R-Square=.36, $p<01$). LOC-fate scores strongly predicted the number of on-time well-baby visits (R-Square=.25; $F[1,28]=8.50$, $p<.01$). Those mothers with a stronger belief in fate were likely to miss more well-baby appointments. None of the variables contributed to the PCS scores for Group 1.

Group 2. For Group 2 mothers, LOC-fate was a significant predictor of the number of prenatal visits (R-Square=.13; $F[1,43]=5.99$, $p<.05$). Number of missed prenatal appointments was best predicted by a combination of demographic and attitude factors. Family size, mother's age, and LOC-self scores were all included in the model, combining to account for 28% of the variance in predicting prenatal appointment attendance for this group (R-Square=.28; $F[3,41]=5.02$, $p<.01$). None of the predictor

variables significantly contributed to the other prenatal measures. When the predictor variables were entered into the outcome model for utilization of infant health care, LOC-fate scores predicted the number of on-time well-baby visits (R-Square=.09; $F[1,43]=4.16$, $p<.05$). None of the predictor variables significantly contributed to immunization scores or PCS scores for Group 2.

Post-Hoc Analyses

The results of this study show that Groups 1 and 2 differ with regard to demographics, health beliefs and utilization rates. The CHBM and its components are supported somewhat by the data from Group 1 with perceived benefits, perceived severity, perceived vulnerability and LOC attitudes predicting a number of the outcome measures. For Group 2, the findings are less robust in terms of supporting the CHBM. For this group, the only attitudinal factor which significantly predicted utilization of health care services was LOC. None of the factors from the traditional HBM were included in the regression models for the outcome measures for Group 2.

These analyses were not consistent with previous research. The fact that perceived barriers failed to predict any of the outcome variables was very surprising, as was the relatively small impact of perceived benefits. Janz and Becker's (1984) review of the HBM literature found these two HBM dimensions to be the most powerful predictors of

health behaviors. In an attempt to better understand and explore this study's findings, the data were subjected to post-hoc analyses.

The data sets from Groups 1 and 2 were collapsed into one set of data. Combining the groups served to increase the sample size to 75, thus increasing statistical power. When these combined data were subjected to correlational analysis, the findings were in line with previous research within the field. Of particular interest was the relationship between the belief variables and the utilization scores. These results are presented in Table 9. Perceived benefits was significantly correlated with the

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Insert Table 9 About Here

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number of prenatal visits (r=.26, p<.05) and number of missed appointments (r=-.30, p<.01). Correlations between perceived benefits and the number of prenatal visits and number of on-time well-baby visits approached significance. Perceived barriers correlated significantly with a number of the outcome measures. It was positively and significantly correlated with the days pregnant (r=.30, p<.01) and the number of missed appointment (r=.26, p<.05). Perceived barriers also was strongly and negatively correlated with number of prenatal visits, number of on-time well-baby visits and number of on-time immunizations. Thus when the

data are combined, the results are very consistent with previous research within the field. However it should be cautioned that these correlations are likely confounded given the large degree of differences between the two groups' demographic, belief, and utilization scores.

The models produced by the stepwise multiple regression procedures were fairly limited. As a rule, very few of the variables were selected for the final models which predicted the utilization scores. In order to gain a better understanding of how each of the factors contribute to the models, additional regression procedures were done in which all demographic measures and belief measures were entered into the model equations for each of the utilization outcome measures. This forced entry multiple regression procedure was completed for Groups 1 and 2 separately, and Groups 1 and 2 combined. The standardized beta weights, multiple R, and R-Square are presented for each outcome measure in Figures 3-7. The results shown in Figure 3 indicate that

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Insert Figure 3 About Here

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none of the variables alone significantly predict the number of days pregnant at the time of the first prenatal visit for Group 1 mothers. However in combination, these variables are able to show some predictability, accounting for over 44% of the observed variance. Perceived severity and LOC-

Self have the largest beta weights; this is consistent with the model produced by the stepwise multiple regression procedure for this same measure. For Group 2, mother's age (beta=-.51, $p<.01$) emerges as a significant contributor to the model. In looking at the combined data, which has been collapsed across the groups, family size (beta=.38, $p<.01$) and mother's age (beta=.32, $p<.01$) make significant contributions to the model.

When the data were analyzed separately for Groups 1 and 2 to predict the number of prenatal appointments, none of the variables reached significance. These findings are presented in Figure 4. When the data from the two groups

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Insert Figure 4 About Here

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were combined, however, number of children (beta=.30, $p<.01$) and perceived vulnerability (beta=.29, $p<.01$) made significant contributions to the model. For this combined group, the overall R-Square is .47 which means that almost half of the variability is accounted by these factors.

None of the demographic or belief variables made a significant contribution to the prediction of missed prenatal appointments. The data which are presented in Figure 5 do show that when the Group 1 and 2 are combined

Insert Figure 5 About Here

a single regression model, family size (beta=.30, $p<.01$) and perceived vulnerability (beta=-.29, $p<.05$) are significant predictors.

For Group 1 and 2, LOC-fate is heavily weighted in each of the regression equations predicting the number of on-time well-baby examinations. Figure 6 shows these findings.

Insert Figure 6 About Here

When the data are collapsed into one group, mother's age (beta=.30, $p<.30$) and LOC-Fate (beta=-.45. $p<.01$) are significant contributors to the model.

In examining the models predicting the number of on-time vaccinations (seen in Figure 7), perceived benefits is

Insert Figure 7 About Here

very heavily weighted (beta=.57, $p<.01$) in the equation for Group 1. None of the variables significantly contributed to the model for Group 2 mothers or the combined Groups' model.

These data highlight the complexities involved in developing models that predict the mothers' utilization of health care services. These findings are somewhat

consistent with the stepwise regression analysis. As a rule, the belief factors were more heavily weighted in the regression models for Group 1 mothers. Demographic variables, on the other hand were most likely to make significant contributions to the models for Group 2 mothers. Using a forced entry method, very few of the variables independently made significant contributions to the model; however, when combined the variables do account for a sizeable amount of the variability in the dependent measures. Nonetheless, when all 11 variables are entered into the model equation, interpretability of the model becomes a problem.

CHAPTER IV

GENERAL DISCUSSION

The presented findings with regard to demographic and utilization data are in line with previous research which shows that prenatal care and preventive infant care services are underutilized by lower income mothers (Miller, Fine, & Adams-Taylor, 1989). The original proposed research hypotheses, however, were not supported universally by the data. The HBM variables, perceived vulnerability, perceived severity, perceived benefits, and perceived barriers did not consistently predict utilization of health care services. Health LOC beliefs, however, did significantly predict Group 1 and Group 2 mothers in terms of their utilization of preventive health care services.

The failure of the traditional HBM measures to predict utilization of preventive health care services was troubling because the HBM is a well documented theoretical framework that health psychology researchers have used for many years. Upon careful examination of the data from the current study, it was observed that when the data from Groups 1 and 2 were combined to form a single data set, the HBM was strongly supported. The results from these data were entirely consistent with nearly all previous HBM research.

This is possible because of the nature of regression statistics. When visualizing the relationship between two variables, a scatterplot can be made with a predictor variable along one axis and the outcome variable along the other axis. As an example, predictor and outcome data from Groups 1 and 2 were plotted separately in Figure 8. We can

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Insert Figure 8 About Here

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see that this produces a configuration of points with very little linear relationship between the two variables. Thus it would be difficult to regress a line through either configuration and correlations would be relatively small.

However, if both data sets are combined and plotted on the same axis, as seen in Figure 9, two distinct sets of

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Insert Figure 9 About Here

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will emerge (representing Groups 1 and 2). This is due to the large group differences on both dimensions. It is now possible to regress a line through these two data sets, yielding a significant, though confounded, correlation. Combining the two data sets (which show minimal or no correlation within each data set) into a single regression model produces a confounded correlation between the two variables.

Combining the data, however, may add to the predictability of the independent variables. Utilizing separate groups can result in truncated variable ranges for each group, which may decrease the overall predictability of the model. Combining the data groups also increases statistical power. However, given the degree of differences previously displayed between the two groups with regards to the predictor and outcome variables, it is difficult to properly interpret these findings. It appears obvious that research in this area should clearly address SES differences and control for this by selecting appropriate design and statistical procedures which minimize or eliminate this type of problem.

In a review of previous HBM studies, design and procedure were examined closely to determine if prior studies have accounted or controlled for SES factors. In Janz and Becker's (1984) extensive review of the HBM literature, none of the reviewed studies which included a broad range of SES participants analyzed results separately on the basis of SES. In addition no studies can be found since this review which have studied and compared lower and higher SES groups with respect to health beliefs and preventive health behaviors. In light of the findings in this paper, this may be a serious oversight in much of the previous research in this area.

It should be noted that a number of studies have examined very specific health behaviors, such as receiving flu vaccinations (Cummings, Jette, & Brock, 1979), monitoring blood pressure (King, 1982), and practicing self-breast examinations (Hallal, 1982). These type of behaviors are most relevant to a certain segment of the adult population. Frequently, the sample used was quite restricted in terms of age and related SES factors, and this largely limits the generalizability of the findings. Additionally, the majority of the HBM studies have been retrospective in nature.

Although the findings from this study are not in direct synchrony with the majority of HBM research, the results are consistent with several well-designed prospective studies examining the link between mothers' health beliefs and their utilization of health care services on behalf of their child. In an important prospective study, Becker, Nathonson, Drachman, and Kirscht (1977) examined the role of mother's health beliefs and pediatric clinic visits in a group of low SES mothers. These researchers found that a strong sense of internal LOC predicted utilization of preventive services, while a strong external belief was associated with more frequent acute care visits. These researchers assert:

> The mother who seeks preventive services for her child has an active controlling orientation towards her own

> and her child's health. Conversely, the mother whose child appears frequently for acute care in the accident room is fatalistic in her approach to disease and has not been effective in controlling its occurrence in herself or her child and believes that doctors know what to do when a problem arises (p. 133).

These conclusions are germane to this study because they describe in part the strong internal LOC beliefs of the mothers in Group 1 and the more externally oriented LOC beliefs of Group 2 mothers.

A major trend emerging in these data was the importance of these LOC beliefs. In trying to understand the role of LOC beliefs in predicting utilization of infant health care services, it is important to note that the mothers from the two groups had very different LOC beliefs from the outset, and these beliefs were the most consistent predictors of utilization scores.

Researchers (Battle & Rotter, 1963) who initially studied LOC beliefs found significant social class differences with regard to internal versus external LOC beliefs. These early studies indicated that internal LOC was positively and significantly correlated with SES (Franklin, cited in Rotter, 1966; Lefcourt & Ladwig, 1965). Rotter and Mulry (1965) found that internal LOC is positively and significantly correlated with achievement motivation. Thus, it has been argued (Allison, 1991) that a strong sense of internal control promotes a proactive behavioral approach to dealing with life circumstances.

Combined with a high motivation for achievement this would result in more personal successes and, ultimately, a higher standard of living.

The concepts of powerlessness and alienation may be closely tied to LOC beliefs. Those individuals who at the bottom of the power hierarchy (i.e., lower SES) feel isolated and without control over their destinies. Rotter (1966, p.24) hypothesized that "perception of limited material opportunity and powerful external forces is one variable making for an external attitude." It is also possible that lesser social stature engenders a sense of powerlessness, and that people's perceptions about their lack of control over circumstances may closely mirror reality.

It is not surprising that the two groups of participants who live in different social and physical environments would exhibit different patterns of health behaviors. The research findings and the theory predict that persons with higher social standing tend to have a stronger belief (real or imagined) that they have personal control over life events. Persons with an internal LOC believe that they have control over a number of life domains, including physical health status. Behaviorally, this belief is translated by taking a proactive approach to positive health. This might include behaviors such as exercising and eating a healthy diet, or more self-

protective actions such as using safely belts or utilizing preventive health care services. Conversely, individuals of lower SES are more likely to have an external orientation towards life and self. This feeling of lack of control impacts health beliefs and decisions about lifestyle choices and the value of preventive measures such as accessing preventive medical care services.

The mothers from the two groups had very different health beliefs at the onset of this study. Group 1 mothers more consistently arranged for and followed through with prenatal visits, well-baby visits and immunizations than did mothers from Group 2. This finding would be expected given the higher LOC-self scores of Group 1, since an internal LOC is more often associated with health promoting behaviors (Ajzen, 1985; Langlie, 1977). The two groups also differed with regard to their perceptions of barriers to receiving health care. Mothers from Group 2 believed that barriers (such as no phone, no transportation, cost of services, and lack of child care) were more likely to interfere with their accessing prenatal and infant health care.

The belief that these external factors can interfere with access to health care illustrates the strong external orientation of the LOC beliefs of low SES mothers. It is also a prime example of the impact of environmental reality on attitudes. For instance, a mother with no automobile would most likely rate "lack of transportation" as an

important barrier. Although some mothers will overcome actual barriers if the desire to is strong enough, many mothers who are not familiar or comfortable with the health care system may use barriers, even minor ones, as excuses not to seek health care. The interaction between actual and perceived barriers is therefore an area for possible future research.

In looking at the stepwise multiple regression analyses, different predictive models emerged for Groups 1 and 2. Attitudinal variables seemed to play a much bigger role in the prediction of outcome variables for Group 1. For example, timing of the first prenatal visit was predicted by perceived severity scores and LOC-self scores. These two belief factors combined to account for over one-third of the variability on this outcome measure.

The impact of demographic variables upon utilization rates varied as a function of groups membership and outcome measures. For example, none of the demographic factors successfully predicted the first prenatal visit for either group. However, in predicting the number of missed appointments for Group 2, demographic variables, mother's age and number of children, in conjunction with LOC strongly contributed to the model. Number of children and LOC-Self scores were weighted negatively, while mother's age was weighted positively.

Prior research has shown family size to be a barrier to appointment attendance (Herman, 1972). With a larger family, it may be more difficult to arrange for child care. If child care is not available, it is even more difficult for the mother to coordinate children's schedules and transportation to the health care site. As stated earlier, Group 2 mothers had rated the lack of a baby sitter as a major barrier to getting health care, and this would seem, in part, to be reflected in this model. For the purposes of this study, data were collected about the number of children to which the mother had given birth, as opposed to actual family size. In most instances it could be assumed that these two numbers were very close or equal.

The regression model suggests that for low income mothers, demographic and attitudinal variables are important in predicting the number of missed prenatal appointments. Demographic variables, mother's age and family size, did contribute more to the model than the other attitudinal factor, LOC-self. This, however, does not negative the role of attitudes. Those mothers with a stronger sense of internal control did miss fewer appointments. Thus, LOC-self may in part moderate the negative impact of demographic factors which inhibit appointment keeping behavior. As explained previously, many barriers may be overcome if attitudes to do so are strong enough.

In examining the data for Group 2 mothers, LOC-self scores are significantly correlated with each of the other measured health beliefs. The degree of intercorrelation is so strong, that any statistical effect these belief scores may exert on this outcome measure is likely canceled once LOC-self scores are included in the regression model.

The overall pattern of results suggests that LOC beliefs exert somewhat different effects upon the model equations for Groups 1 and 2. As a rule, for Group 1, higher LOC-self scores produced a positive effect in terms of mothers' utilization of prenatal health care services. The model essentially states that a strong sense of internal control predicts earlier contact with the obstetric clinic and fewer missed prenatal appointments. It is not surprising that mothers who strongly believe that they have control over their child's health would more proactively utilize important health care services on a consistent basis. For mothers in Group 2, the effect is in the same direction and approaches significance.

Other researchers have also found the LOC beliefs correlate with adherence to prenatal health guidelines (Tinsley, Trupin, Owens, & Boyman, 1993). For this reason, it was hypothesized that mothers with an internal sense of LOC would have higher utilization of prenatal and infant health care services. This hypothesis is supported, in part, by these findings.

The strong effect of LOC-fate was not predicted initially. Mothers' rejection or acceptance of this belief strongly predicted the number of prenatal visits and the number of missed prenatal appointments for Group 2. Additionally, the correlation between this factor and the number of days pregnant at the time of the first prenatal visit approached significance for this same group of women. It is unclear why this relationship exists, although one could hypothesize that mothers with a strong health LOC belief in fate may be less likely to engage in health promoting behaviors during pregnancy. This could result in more complications during the pregnancy as well as more frequent contact with the doctor. However, the validity of this supposition is unknown, since data collection for this study did not involve information about the reasons for additional prenatal appointments.

LOC-fate scores also predicted the number of on-time well-baby visits for Groups 1 and 2. Mothers with a strong belief in fate had fewer on-time well-baby visits, while mothers who rejected this belief were more likely to attend these important appointments. The data showed convincingly that a strong belief in chance or fate as a controlling force over the unborn child's health negatively impacts mothers' utilization of important prenatal and infant preventive health care services. Seemingly, those mothers who believe that their baby's health is determined by chance

factors allow "fate" to have a greater impact by taking a less active role in seeking preventive health care. Consequently, it would be predicted that these mothers and their children have less contact with the medical system at primary care sites, but more frequent utilization of walk-in clinics and emergency rooms for urgent medical care.

Other studies have found that parental LOC beliefs predict positive health behaviors such as usage of child restraint systems (Webb, Sanson-Fisher, & Bowman, 1988), better compliance with prescribed treatment (Becker, Drachman & Kirscht, 1974) and more frequent pediatric clinic utilization (Becker, Nathonson, Drachman, & Kirscht, 1977). However, all of these studies used very limited measures of LOC consisting of 2-3 questions.

The LOC measure in this study was a multifactorial measure that assessed different dimensions of LOC beliefs. In addition, unlike previous studies, mothers were asked about the degree of control they believed they had over their <u>child's</u> health, as opposed to their own. The impact of assessing these secondary belief systems is unclear, as no previous research has been done to compare self-vs-child health beliefs for a parent. It may be argued that parents have very different perceptions for their children's health than for their own due in part to differences in the personal health bias identified in previous research (Weinstein, 1987). This phenomenon described as the

"optimistic bias" is the tendency for persons to consistently underestimate their susceptibility to health threats. This bias is pervasive across a variety of populations and a variety of health threats.

Mothers in both Groups demonstrated the optimistic bias indicating that they believed their child comparatively was less vulnerable to illness/injury than other same age children. To this point, it is unknown if this bias affects a mothers' beliefs about the health of her child. For example, if this bias is not in effect with respect to the child, a mother may believe the child is more susceptible than herself to sickness or injury, and may attribute this susceptibility to outside forces (i.e., luck or powerful others). This may very well present us with results different than those found in studies which have measured only personal health situations.

Data from this study also suggested that higher usage of preventive health care services was associated with a belief that the child was less vulnerable to health threats. This finding is contradictory to the HBM, which suggests that people undertake preventive health care behaviors because of a sense of increased vulnerability. It is hypothesized that the mothers in this study believed that their unborn child would be less vulnerable to illness/injury because the mothers were currently engaging in positive health behaviors (eg., utilizing prenatal care

services) and/or planning to utilize preventive health care services in the future.

As a rule, traditional health belief factors assessed by the MHBQ did not predict maternal utilization of health care services. Perceived benefits was the only HBM variable to be included in a model equation. The number of on-time immunizations for Group 1 was predicted by perceived benefits and mother's education. This finding is in line with previous research on the effects of perceived benefits and education on health behavior.

Perceived benefits has been found to predict utilization of preventive health care services. In a review of the HBM research, Janz and Becker (1984) found that perceived benefits was the strongest finding in studies examining maternal utilization of pediatric services. These same researchers also found that for adults, perceived benefits were significantly correlated with preventive health behavior in 81% of the studies reviewed.

Other researchers also have identified a correlation between parental level of education and utilization of pediatric health care services (Horwitz, Morgenstern, & Berkman, 1985; Morris, Hatch, & Chipman, 1966). Chen and Ladd (1990) concluded that level of education and income produce independent, but significant effects upon the practice of preventive health behaviors.

The combination of perceived benefits and mothers' education in the multivariate equation is interesting since it combines an attitudinal variable and a demographic variable. Together, these allowed prediction of over one-third of the variability in the equation. In this case, the inclusion of both demographic and attitudinal measures and the methodological application of multiple regression to predict health behavior appears to allow for fairly strong prediction. Since no other research in this area has combined these measures and these statistical techniques, this may be another area for future research direction, possibly using more sensitive measures, and a more restricted subject pool to exhibit stronger predictability.

Having discussed the two groups with regard to differences in LOC, there were also very important differences between the groups' utilization behaviors. A finding consistent with prior research was that mothers receiving public health care (Group 2), on the average, received no prenatal care in the first trimester. This is important because the first trimester is deemed to be a critical time in terms of the development of the fetus. First trimester visits to the obstetric clinic are considered to be essential in terms of promoting maternal and fetal health. During these visits mothers are educated about the importance of proper nutrition, exercise, and other positive health behavior such as avoiding exposure to

potentially harmful agents (eg., nicotine, alcohol, street drugs and medications). This in conjunction with education about the developing fetus and monitoring of the pregnancy are the primary components of basic prenatal care, which has as its goal, a healthy pregnancy, and ultimately, a health baby.

Group 2 mothers were much more likely to miss these services than Group 1 mothers. It is unclear if Group 2 mothers began their care later because they recognized they were pregnant at a later date than Group 1 mothers, or if they knew they were pregnant and simply did not seek first trimester prenatal care. It also is possible that Group 1 mothers had earlier contact with their obstetrician because they were more conscientious in tracking their menstrual cycles and recognized the pregnancy earlier. It was more likely to be the first pregnancy for Group 1 mothers and they may have sought early prenatal care to confirm their suspected diagnosis. The majority of Group 2 mothers, on the other hand, had at least one child and may have been more comfortable self-diagnosing the pregnancy. Additionally, they may have felt that they had received enough prenatal education during their first pregnancy and felt there was no need to repeat this.

These trends of different rates of utilization of prenatal care continued throughout the pregnancies of the participants. Group 1 mothers made more visits overall and

missed significantly fewer scheduled appointments than Group 2 mothers. The high number of gaps in service for Group 2 mothers is troubling because regular scheduled contact with prenatal care providers is the best known prevention measure for decreasing the incidence of low birth weight, which is a major complicating factor among low SES women (Gortmaker, 1979). Low birth weight can seriously compromise the health of the newborn. Expectant women who receive inadequate health care are also at much higher risk for premature delivery, fetal and infant death, as well as maternal death (Miller, Fine, & Adams-Taylor, 1989).

Both well-baby examinations and immunizations are considered to be crucial components of primary care services for infants. Immunizations protect the infant from a number of contagious and even lethal diseases. Well-baby visits serve to decrease infant mortality and morbidity through early identification of possible health problems and education about development and the changing needs of the infant.

For the purposes of this study, utilization of infant health care services was operationalized by the number of on-time well-baby visits and the number of on-time immunizations occurring during the first six-months of life. Infants in both groups missed important well-baby examinations and failed to receive vaccinations in a timely manner. Infants in Group 2 fared poorer, receiving only

about two-thirds of their recommended immunizations by the age of six-months. These findings describe a pattern of utilization, that while somewhat disturbing, is consistent with previous findings (CDC, 1994).

At many provider sites today, immunizations and well-baby examinations are completed during the same visit. For the purposes of this study, the majority of infants received their immunizations and well-baby visits at separate sites. Within both Guilford and Alamance Counties, vaccinations are provided at minimal or no cost through the county health departments. A large number of children from both groups received vaccinations through the health departments and well-baby examinations through their pediatric provider. It would seen that a free immunization program offered through the county health department would be beneficial to all families because it eliminates a financial barrier (i.e., the cost of immunizations). However, it also creates a split in services, which can be a different type of barrier for the mothers, because it is more difficult to keep track of and attend appointments at two different sites. It is possible that this split in services partially accounts for the underutilization of infant health care services in both groups.

It was anticipated that overall health status would be predicted by utilization rates for both groups; however, scores on the PCS did not correlate significantly with any

of the demographic, attitudinal, or utilization measures. Because collection of data for the PCS involved a review of medical charts and is somewhat complicated, it is possible that coding errors could be made in the completion of the PCS data. The data all were collected by the same person; ideally two individuals should complete the scales so that inter-rater reliability could be calculated. All data were collected in accordance with the procedure dictated by Littman and Parmelee (1978), nonetheless it is possible that use of a sole rater may have introduced some type of rater bias. Tinsley and Holtgrave (1992) used this same scale and found its scores to be significantly correlated with utilization scores. While their findings seem to be contradictory to this study, the reasons for this inconsistency become clear upon comparison of procedural differences between the two studies.

Since the PCS assesses for the presence of a number of developmental problems, as well as the occurrence of numerous possible illnesses and injuries, it is reasonable to assume that the younger the child is, the less the probability is that the child will experience health difficulty. Scores on the PCS would vary significantly as a function of age, time, and maturation factors, such as mobility. The present research employed a very homogeneous subject sample (i.e., only six-month-old infants). Tinsley and Holtgrave (1992) included child participants ranging in

age from one-week to 20-months. While a six-month-old almost always lacks mobility and is generally crib-bound, a 20-month-old is normally very mobile, allowing for increased access to possible injurious situations, such as falls, burns, or accidental poisoning. In addition, a 20-month-old is likely to have more social contact with others which allows for more exposure to communicable illnesses. This is especially true if the child attends day care or any activity which increases contact with groups of other children.

Examination of the present research data showed that for both Group 1 and 2 infants, there was very low variability among PCS scores. Then range and variability of scores was so small, that the scale had most no predictive utility. It is likely that the variability was minimized because the infants were all the same young age (six-months) allowing too little time for the children to contract illnesses or experience injury. It would appear that the PCS scores sampled by Tinsley and Holtgrave (1992) were less homogeneous and more variable than those used in this study. Their inclusion of a wider age range of participants, particularly older infants, undoubtedly increased the range and predictability of scores on the PCS.

It also should be noted that the PCS is a gross measure of infant health that assesses only for the occurrence of health and developmental problems; it does not account for

the frequency with which certain health problems occur. For example, an infant who received treatment for ear infections five separate times would score the same as an infant who was treated only once. The PCS only accounts for the presence/absence of developmental and health difficulties. It is possible that a more sensitive measure of health status would be more predictive and therefore more useful in future research.

The CHBM is the theoretical model upon which this study is based. This model as described previously is a combination of the HBM and developmental and social learning theories. The CHBM emphasizes the role of the environmental, familial, and cognitive factors which direct development of health beliefs. This model hypothesizes that the social environment shapes parental health beliefs. Parental health beliefs along with other external factors interact with developmental factors to shape the child's health beliefs, which in turn, direct health behavior. In the case of an infant, it is presumed that the parent exerts total control over the child's health care. This model states that the parent's health beliefs have been shaped by their past experiences and social environment, and these beliefs ultimately influence health behaviors (i.e., the utilization of preventive health care services).

This model's predictions are in line with the findings of this study. Previous research with the CHBM (Bush &

Ionotti, 1990) using PATH analysis showed that SES exerted a very strong effect on mother's health beliefs regarding perceived benefits and perceive vulnerability. SES also strongly impacted health LOC beliefs, which in turn, were strongly correlated with perceptions about the child's vulnerability, the severity of illness, and the benefits of medication. These beliefs then predicted behavioral compliance with a prescribed medication regime.

While this current study examined a much different type of health behavior and was not subject to PATH analysis, the general findings are consistent. SES appears to exert a strong effect upon health beliefs in both studies. LOC beliefs emerged more frequently than any of the other attitudinal variables as a significant predictor of outcome for this study. Bush and Ionotti (1990) assessed LOC beliefs along a unidimensional scale (interval versus external). This study, however, used a multidimensional LOC scale. Their CHBM hypothesizes that LOC beliefs exert a direct effect upon other important health beliefs which in turn predict health behaviors. For Group 2 mothers, LOC-self beliefs were strongly correlated with other HBM factors (perceived benefits, vulnerability, and barriers), although these HBM variables were not directly associated with health behaviors as the CHBM would predict.

Nonetheless, this study does provide additional verification and support for the CHBM. SES and its related

factors clearly exert a very strong influence upon the health beliefs of the mothers included in this study. The participants in this study were apriori divided into groups on the basis of health care provider site, essentially dividing the two groups on the basis of SES. Strong and significant differences emerged between the groups' utilization and attitude scores. Within this study it is believed that SES exerts important effects on health attitudes, particularly LOC beliefs. LOC beliefs in turn were strongly intercorrelated with other health beliefs that typically have been included in the traditional HBM. Health behavior (i.e., utilization of preventive health care services) was believed to be influenced by health beliefs, particularly LOC beliefs. Therefore it is theorized that in this case SES exerts a strong, but indirect, effect on health behavior via its impact upon health beliefs.

Gaining an understanding of the cognitive or attitudinal factors which impact health behaviors is important because beliefs are more amenable to change than are most demographic features, such as age or race. Presumably, if maternal health LOC beliefs can be modified, utilization rates of preventive health care services can be increased, resulting in improved child health status. The models upon which this study is based have as a core feature the assumption that health attitudes can be modified to produce changes in health-promoting behaviors.

This study is especially important to the field of child health psychology in that it examined the relationship between parental health beliefs, with respect to the health of their child, and parental utilization of health care services on behalf of an otherwise helpless infant. There has been very little research directed at the psychological aspects of this very critical time in developmental health. To date, there are no known prospective studies examining parental health beliefs about their child as predictors of parental utilization of preventive health care. Thus, this project represents an important first step in establishing linkage between parental beliefs concerning the health of the child and utilization of preventive health care services on behalf of the child.

Most prior research has focused only upon the demographic factors of the child's environment which predict utilization rates. Demographics may be a necessary starting point and a focus of research for epidemiologists and sociologists; a major strength of this study was that demographic factors, race and SES were controlled. It is, however, more fundamental to the field of psychology to investigate the nature of the relationship between parental attitudes and behavior during this unique and critical time in the child's development.

On a more practical level, this study has provided more information about the psychological variables which

interfere with or enhance mothers' utilization of important prenatal and preventive infant health care services. Because the infant relies completely upon the parent for health care, appropriate strategies for increasing preventive health behavior must be targeted at the primary caretakers. These findings in conjunction with the CHBM strongly suggest that LOC beliefs direct the mother's utilization of health care services more than previously thought. In addition, these beliefs may be differentially distributed across populations and, in this case, SES levels. Clearly many factors that are not yet identified may impact mothers' utilization of prenatal and infant health care. By gaining a better understanding of the relationship between beliefs and behaviors, proper modification of health beliefs could positively impact utilization of these preventive health care services.

This study, which is an initial attempt to quantify the relationship between expectant mothers' health beliefs and health behaviors, has several limitations. First, it is a correlational study; no causality can be determined on the basis of correlational and regression statistics. Second, it is possible that the selection procedure (e.g., a convenience sample) limits the generalizability of the study. Additionally, all Group 1 mothers were recruited from the same site. It is unknown if there are features unique to this provider site or the women who seek obstetric

services at this site that may in some way impact the mother's health beliefs and/or behaviors. This may also limit the generalizability of the Group 1 findings. Finally, the method of recruitment excluded those women who did not seek any prenatal care during the third trimester or those women who received no prenatal care at all. Because of the negative health consequences for these mothers and their infants, ideally, future research should attempt to target this of group of women.

When applied, the results of this study suggest that future prevention efforts should assess maternal LOC beliefs, particularly with regards to internality and fate. Specifically, these findings support the notion that high level of internality with respect to the child's health leads to better utilization of important health care services. Conversely, a strong belief that fate controls the child's health has a negative or inhibiting effect on utilization of services. Thus, a successful prevention program would strive to increase the mother's internality and decrease the degree to which she believes that chance factors influence her infant's health.

Previous LOC research has suggested that health education and prevention programs can be tailored effectively, based upon the individual's LOC beliefs (Wallston & Wallston, 1978). In the case of Group 1 mothers, for whom LOC-self scores were more predictive, a

preventive program would strive to further promote an internal sense of control. Such a program would work to empower the mother further by encouraging her to make and carry out decisions about her child's health. For an expectant mother, strong emphasis would be given to assisting her in developing personal responsibility for her own health and the health of the developing fetus. Ideally, a preventive program would include both a prenatal and postnatal component to assist with the transition between pregnancy and parenthood. The mother's belief in luck or fate as a controlling force over her infant's health would be minimized by promoting a strong sense of confidence and effectiveness in making and carrying out important health care decisions on behalf of her child.

For those mothers, such as those in Group 2, who have a strong external belief in powerful others, preventive programs would emphasize the important contribution that others can make with regard to their child's health. Didactic instruction could be given about the role of powerful others, such as doctors, nurses, and individuals within their social networks, in influencing and possibly determining the health status of their infants. Preventive programs within this orientation would also focus on the important role of social supports and necessity of compliance with prescribed interventions. This would serve to increase the perception of control by powerful others,

but also diminish a belief in fate. A belief that health outcome is controlled by powerful others is preferable to a belief that fate determines future health.

This study represents an important first step in uncovering the role of health beliefs in predicting expectant mothers' use of prenatal and infant health care services. Future research should focus on specific populations, such as the low SES mothers in this study, who underutilize important health care services. This group consistently begins prenatal care at a later date, misses prenatal appointments, and fails to follow through with important infant health care, such as vaccinations and well-baby visits.

Further development of a detailed theoretical model specific to this situation is necessary for improving utilization of preventive health care services. Towards this end, it will be very important to study the longitudinal course of maternal and child health beliefs and behaviors, particularly from conception and pregnancy through infancy and childhood, and possibly even into adolescence. Future advancement of the CHBM ultimately depends on tracking the development of child health beliefs and behaviors in relation to parental beliefs and behaviors. Eventually, it should be possible for child health care researchers to develop specific interventions which effectively improve utilization of preventive health

services by those populations most at risk for underutilization.

Other directions this research may take include investigation into questions such as:

1. Are individual optimistic biases, generally accepted in health psychology with respect to self-perceptions, transferred to the child by the parent?
2. Does the quality of the parent-child relationship influence the health care the child receives?
3. Are the health beliefs of an involved father influential in the health care received by the child?
4. Are there significant changes in a mother's attitudes as the child develops and experiences illnesses and injuries, and how might this impact health care utilization for subsequent children?

This study represents a first attempt to establish linkage between maternal health beliefs and utilization of preventive health care services. Understanding why mothers fail to use crucial preventive health care services such as timely prenatal visits, well-baby visits, and immunizations is one of the most important areas of child health psychology research today. Although not directly demonstrated, the pattern of underutilization detailed in this study, without a doubt, negatively impacts infant and child health status throughout the United States. It is

believed that eventually, the practical information contained within this study will contribute to the development of intervention programs which will successfully modify the health beliefs of expectant mothers, and ultimately improve utilization of preventive health care services and the future health status of infants and children.

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APPENDIX A

THE HEALTH BELIEF MODEL

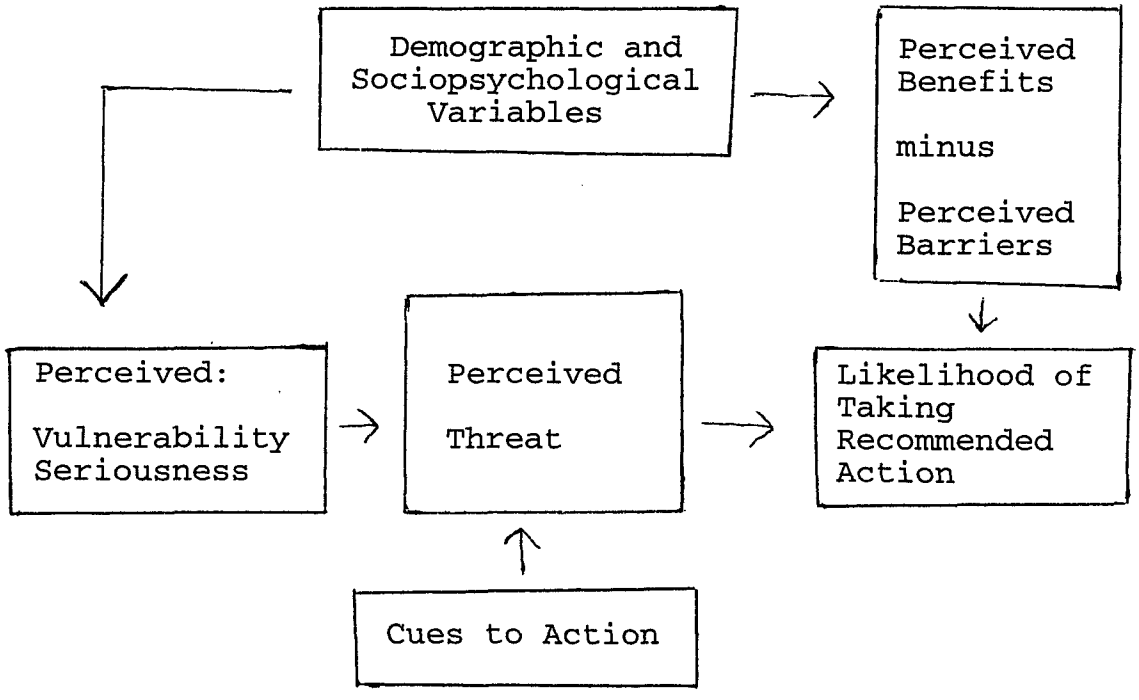

Figure 1. The Adult HBM as Conceptualized by Janz and Becker (1984)

CHILDREN'S HEALTH BELIEF MODEL

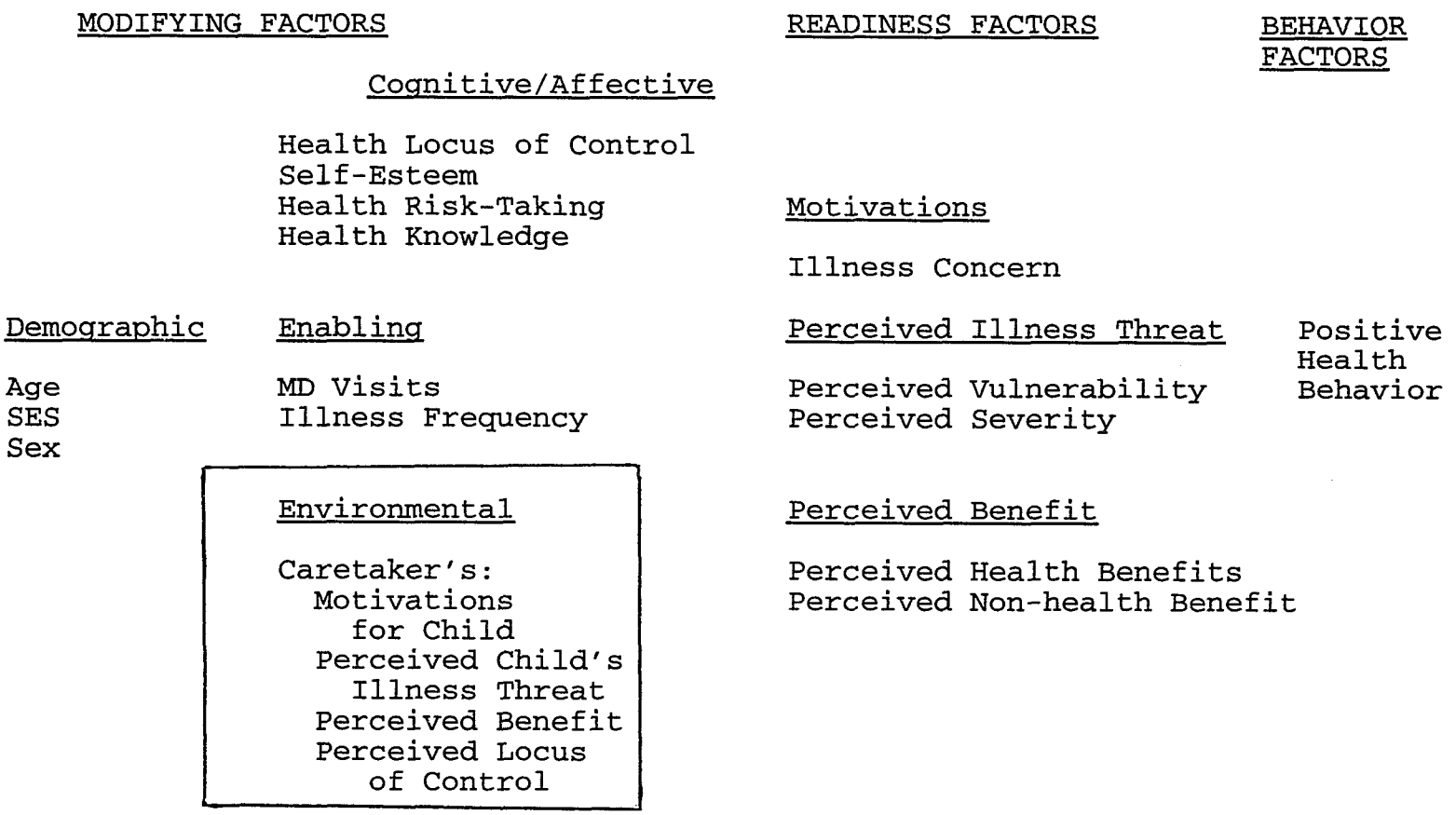

Figure 2. Bush and Ionotti's (1992) Child Health Belief Model

DEMOGRAPHIC

Race
Group 1: Beta=-.05
Group 2: Beta=.08
Combined: Beta=.08

Mother's Age
Group 1: Beta=-.09
Group 2: Beta=-.51*
Combined: Beta=-.38**

Mother's ED
Group 1: Beta=-.11
Group 2: Beta=.08
Combined: Beta=-.03

 # Children
Group 1: Beta=.18
Group 2: Beta=.35
Combined: Beta=.32**

*p<.05
**p<.01

HEALTH BELIEFS

LOC-Self
Group 1: Beta=-.18
Group 2: Beta=-.19
Combined: Beta=-.11

LOC-Powerful Others
Group 1: Beta=.09
Group 2: Beta=-.01
Combined: Beta=.02

LOC-Fate
Group 1: Beta=.14
Group 2: Beta=.19
Combined: Beta=.17

Perceived Vulnerability
Group 1: Beta=-.18
Group 2: Beta=-.24
Combined: Beta=-.19

Perceived Severity
Group 1: Beta=-.36
Group 2: Beta=.12
Combined: Beta=.03

Perceived Benefits
Group 1: Beta=.04
Group 2: Beta=.10
Combined: Beta=.03

Perceived Barriers
Group 1: Beta=-.08
Group 2: Beta=.31
Combined: Beta=.27

HEALTH BEHAVIOR
Number of Days Pregnant at First Prenatal Visit
Group 1: Multiple R=.67
R-Square=.44
Group 2: Multiple R=.57
R-Square=.32
Combined: Multiple R=.65
R-Square=.43

Figure 3. Forced Entry Multiple Regression Models with Days Pregnant at First Prenatal Visit as the Dependent Variable.

DEMOGRAPHIC

Race
Group 1: Beta=-.10
Group 2: Beta=-.13
Combined: Beta=-.18

Mother's Age
Group 1: Beta=-.35
Group 2: Beta=.47*
Combined: Beta=.15

Mother's ED
Group 1: Beta=-.02
Group 2: Beta=.17
Combined: Beta=.26*

 # Children
Group 1: Beta=.30
Group 2: Beta=-.53**
Combined: Beta=-.23

*p<.05
**p<.01

HEALTH BELIEFS

LOC-Self
Group 1: Beta=.26
Group 2: Beta=.09
Combined: Beta=-.09

LOC-Powerful Others
Group 1: Beta=.-.01
Group 2: Beta=-.23
Combined: Beta=-.05

LOC-Fate
Group 1: Beta=.29
Group 2: Beta=.36
Combined: Beta=.19

Perceived Vulnerability
Group 1: Beta=.17
Group 2: Beta=.21
Combined: Beta=.14

Perceived Severity
Group 1: Beta=.16
Group 2: Beta=.04
Combined: Beta=.07

Perceived Benefits
Group 1: Beta=.29
Group 2: Beta=.01
Combined: Beta=.11

Perceived Barriers
Group 1: Beta=-.16
Group 2: Beta=-.02
Combined: Beta=-.14

HEALTH BEHAVIOR

Number of Prenatal Visits
Group 1: Multiple R=.45
R-Square=.20
Group 2: Multiple R=.70
R-Square=.50
Combined: Multiple R=.61
R-Square=.38

Figure 4. Forced Entry Multiple Regression Models with Number of Prenatal Visits as the Dependent Variable.

DEMOGRAPHIC

Race
Group 1: Beta=-.14
Group 2: Beta=.01
Combined: Beta=.02

Mother's Age
Group 1: Beta=.12
Group 2: Beta=-.31
Combined: Beta=-.24

Mother's ED
Group 1: Beta=.10
Group 2: Beta=-.07
Combined: Beta=-.12

 # Children
Group 1: Beta=-.03
Group 2: Beta=.35
Combined: Beta=.30**

*p<.05
**p<.01

HEALTH BELIEFS

LOC-Self
Group 1: Beta=-.43
Group 2: Beta=-.21
Combined: Beta=-.17

LOC-Powerful Others
Group 1: Beta=.20
Group 2: Beta=.01
Combined: Beta=.01

LOC-Fate
Group 1: Beta=.01
Group 2: Beta=.30
Combined: Beta=.20

Perceived Vulnerability
Group 1: Beta=-.29
Group 2: Beta=-.33
Combined: Beta=-.29*

Perceived Severity
Group 1: Beta=.05
Group 2: Beta=.14
Combined: Beta=.11

Perceived Benefits
Group 1: Beta=-.04
Group 2: Beta=-.06
Combined: Beta=-.09

Perceived Barriers
Group 1: Beta=-.11
Group 2: Beta=.27
Combined: Beta=.24

HEALTH BEHAVIOR
Number of Missed Prenatal Appointments
Group 1: Multiple R=.61
R-Square=.37
Group 2: Multiple R=.62
R-Square=.38
Combined: Multiple R=.68
R-Square=.47

Figure 5. Forced Entry Multiple Regression Models with Number of Missed Prenatal Appointments as the Dependent Variable.

DEMOGRAPHIC

Race
Group 1: Beta=.09
Group 2: Beta=-.04
Combined: Beta=-.02

Mother's Age
Group 1: Beta=.05
Group 2: Beta=.37
Combined: Beta=.30*

Mother's ED
Group 1: Beta=.11
Group 2: Beta=-.25
Combined: Beta=-.17

 # Children
Group 1: Beta=-.27
Group 2: Beta=-.13
Combined: Beta=-.16

*p<.05
**p<.01

HEALTH BELIEFS

LOC-Self
Group 1: Beta=-.17
Group 2: Beta=-.01
Combined: Beta=-.06

LOC-Powerful Others
Group 1: Beta=-.03
Group 2: Beta=.35
Combined: Beta=.25

LOC-Fate
Group 1: Beta=-.51
Group 2: Beta=-.54**
Combined: Beta=-.45**

Perceived Vulnerability
Group 1: Beta=.14
Group 2: Beta=-.12
Combined: Beta=-.01

Perceived Severity
Group 1: Beta=-.09
Group 2: Beta=-.21
Combined: Beta=-.19

Perceived Benefits
Group 1: Beta=.10
Group 2: Beta=.17
Combined: Beta=.15

Perceived Barriers
Group 1: Beta=-.06
Group 2: Beta=-.05
Combined: Beta=-.14

HEALTH BEHAVIOR
Number of On-Time Well-Baby Visits
Group 1: Multiple R=.60
R-Square=.36
Group 2: Multiple R=.55
R-Square=.30
Combined: Multiple R=.51
R-Square=.26

Figure 6. Forced Entry Multiple Regression Models with Number of On-Time Well-Baby Visits as the Dependent Variable.

DEMOGRAPHIC

Race
Group 1: Beta=-.14
Group 2: Beta=-.07
Combined: Beta=-.06

Mother's Age
Group 1: Beta=-.12
Group 2: Beta=.29
Combined: Beta=.23

Mother's ED
Group 1: Beta=.35
Group 2: Beta=.06
Combined: Beta=.15

 # Children
Group 1: Beta=-.32
Group 2: Beta=-.18
Combined: Beta=-.20

*p<.05
**p<.01

HEALTH BELIEFS

LOC-Self
Group 1: Beta=.16
Group 2: Beta=.09
Combined: Beta=-.02

LOC-Powerful Others
Group 1: Beta=-.04
Group 2: Beta=.06
Combined: Beta=.02

LOC-Fate
Group 1: Beta=.04
Group 2: Beta=-.03
Combined: Beta=-.04

Perceived Vulnerability
Group 1: Beta=-.18
Group 2: Beta=.19
Combined: Beta=-.03

Perceived Severity
Group 1: Beta=.12
Group 2: Beta=.18
Combined: Beta=.18

Perceived Benefits
Group 1: Beta=.57**
Group 2: Beta=-.11
Combined: Beta=.02

Perceived Barriers
Group 1: Beta=-.15
Group 2: Beta=-.29
Combined: Beta=-.13

HEALTH BEHAVIOR
Number of On-Time Immunizations
Group 1: Multiple R=.73
R-Square=.53
Group 2: Multiple R=.36
R-Square=.13
Combined: Multiple R=.45
R-Square=.20

Figure 7. Forced Entry Multiple Regression Models with Number of On-Time Immunizations as the Dependent Variable.

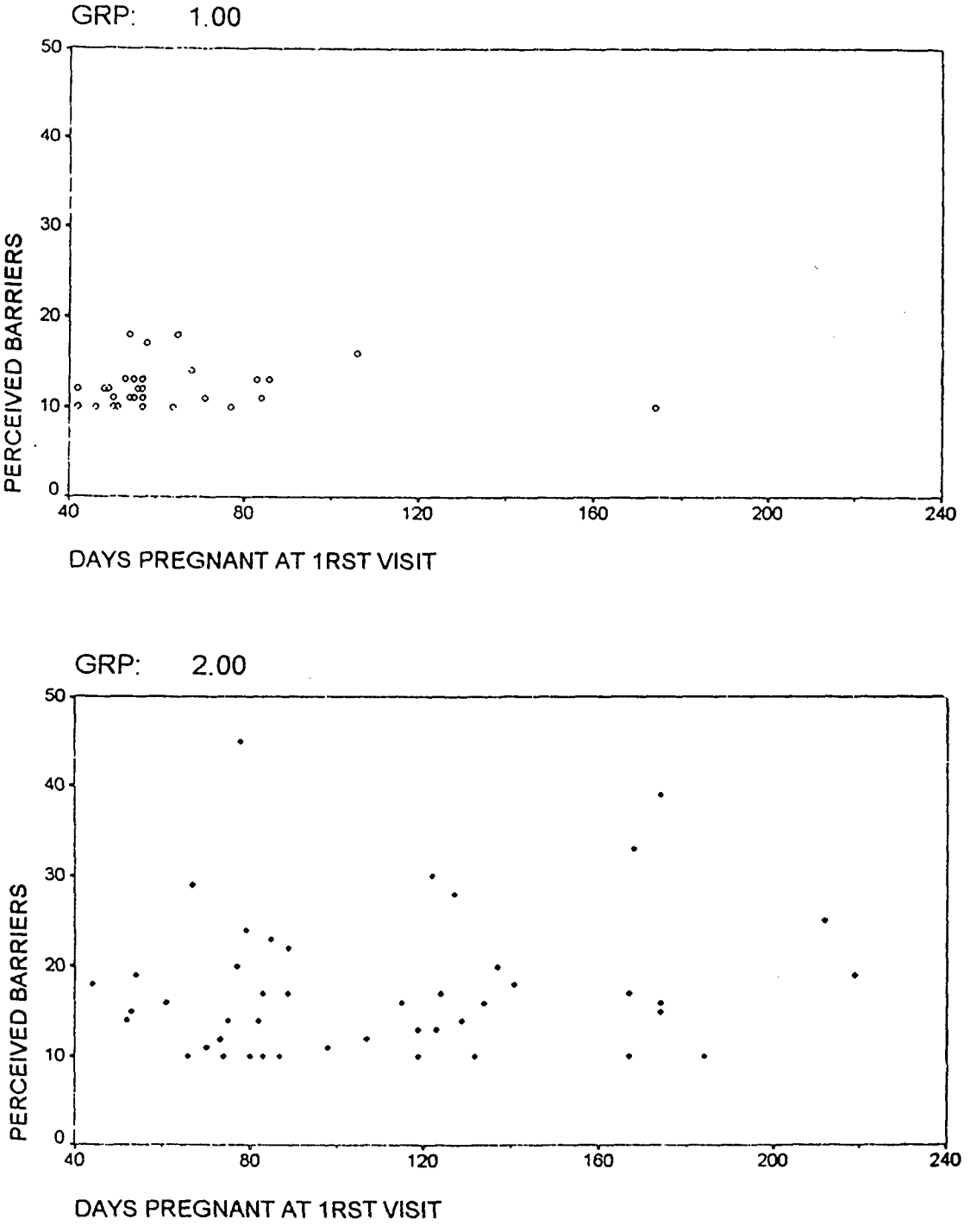

Figure 8. The Relationship Between Health Belief and Utilization Scores for Group 1 and Group 2.

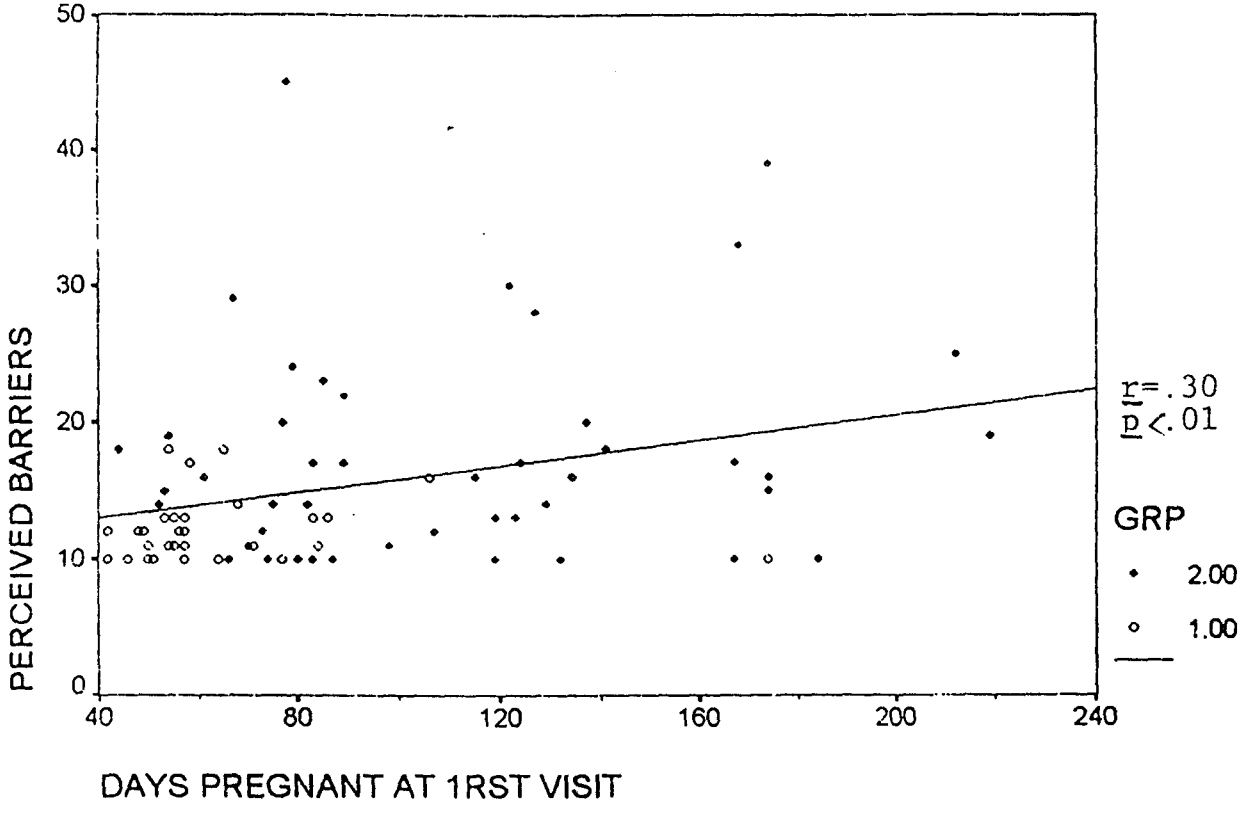

Figure 9. The Relationship Between Health Belief and Utilization Scores from Groups 1 and 2 When Data Are Combined.

APPENDIX B

Table 1

Demographic Characteristics of Mothers by Group

Group 1

	Mean	SD	Range
AGE	27.03	5.22	18-37
ED(YRS)	13.10	.90	12-15
# KIDS	.21	.49	0-2

RACE	
Afro-American	12
Caucasian	18
	n=30

Group 2

	Mean	SD	Range
AGE	22.80	5.32	18-37
ED(YRS)	11.33	1.49	8-14
# KIDS	.91	1.18	0-4

RACE	
Afro-American	19
Asian	1
Caucasian	25
	n=45

Table 2

Immunization Schedule from Birth through Age Six-Months

	Hepatitis B	DTP	Polio	Hib
Birth	X			
2-Months	X	X	X	X
4-Months		X	X	X
6-Months	X	X	X	X

Table 3

Differences Between Groups on Outcome and Belief Scores

Outcome Measure		Mean	SD	t-statistic
First Visit	Group 1	64.45	25.67	t=-5.60
	Group 2	110.38	44.77	p<.0001
# Prenatal Visits	Group 1	17.45	5.34	t=6.08
	Group 2	10.87	2.92	p<.0001
Missed Appntmnts	Group 1	.75	1.38	t=-5.48
	Group 2	2.98	2.09	p<.0001
On-Time VAX	Group 1	10.50	2.20	t=3.02
	Group 2	8.35	3.32	P<.004
On-Time WBV	Group 1	3.14	.97	t=1.53
	Group 2	2.73	1.21	p<.13
PCS Scores	Group 1	21.18	.82	t=.84
	Group 2	21.00	.91	p<.40

Belief Measure		Mean	SD	t-statistic
Perceived Vulnerable	Group 1	63.38	12.74	t=.34
	Group 2	62.09	17.91	p<.74
Perceived Severity	Group 1	93.81	11.76	t=.13
	Group 2	93.16	25.74	p<.88
Perceived Barriers	Group 1	12.21	2.38	t=-4.26
	Group 2	17.60	7.96	p<.0001
Perceived Benefits	Group 1	34.03	1.35	t=3.51
	Group 2	31.64	4.25	p<.001
LOC-Self	Group 1	36.34	4.19	t=1.29
	Group 2	34.84	5.83	p<.20
LOC-Others	Group 1	18.52	3.89	t=-2.67
	Group 2	21.93	7.10	p<.01
LOC-Fate	Group 1	9.55	3.70	t=-.46
	Group 2	10.11	5.84	p<.65

Table 4

Intercorrelation Between Demographic and Health Belief Scores for Group 1 Mothers

	LOC Fate	LOC Other	LOC Self	Sev	Vul	Ben	Bar	Age	Ed	#Kids
Fate	---									
Other	.22	---								
Self	-.55**	-.30	---							
Sev	-.06	.36	-.16	---						
Vul	.07	-.19	-.01	.05	---					
Ben	-.20	.01	-.07	.12	-.30	---				
Bar	.32	.13	-.19	-.08	.08	.22	---			
Age	-.02	-.27	.29	.17	.07	.17	-.12	---		
Ed	.07	-.23	.24	-.18	-.23	.03	-.13	.48**	---	
#Kids	.09	.05	-.16	.19	-.15	.26	.05	.35	.03	---
Race	-.30	.07	.24	-.23	-.28	.20	-.14	-.05	.12	-.12

*p<.05
**p<.01

Table 5

Intercorrelation Between Predictor and Outcome Scores for Group 1 Mothers

	1rst Visit	#Total Visits	#Missed Appntmnts	WBV	VAX	PCS
LOC-Fate	.22	.11	.26	-.50**	-.19	-.07
LOC-Other	.38*	.09	.31	-.20	-.09	-.04
LOC-Self	-.42*	-.09	-.44*	.24	.20	-.02
Severity	-.47**	.18	.22	-.10	.04	-.33
Vulnerability	-.19	.07	-.30	.06	-.36*	.04
Benefit	.13	.14	.04	.11	.46**	-.07
Barriers	.01	.02	-.03	-.20	-.11	-.06
Age	-.09	-.07	-.03	-.01	.13	-.04
Ed	-.21	-.14	.03	.06	.40*	-.04
#Kids	.30	.25	.13	-.30	-.17	-.37*
Race	-.17	-.15	-.15	.25	.13	.28

*p<.05
**p<.01

Table 6

Intercorrelation Between Demographic and Health Belief Scores for Group 2 Mothers

	LOC Fate	LOC Other	LOC Self	Sev	Vul	Ben	Bar	Age	Ed	#Kids
Fate	---									
Other	.48**	---								
Self	-.04	-.21	---							
Sev	.14	.19	-.02	---						
Vul	.03	.22	-.29*	.10	---					
Ben	-.13	-.19	.54**	-.08	-.02	---				
Bar	.20	.37**	-.37**	.14	.61**	-.20	---			
Age	.26	.01	-.41**	.05	.06	-.14	-.12	---		
Ed	-.15	-.10	.01	-.18	-.09	-.11	.05	.21	---	
#Kids	-.04	-.10	-.31*	.11	-.13	-.17	-.01	.57**	.05	---
Race	.15	.34*	-.24	-.05	.04	-.35*	.27	.10	.22	-.07

*p<.05
**p<.01

Table 7

Intercorrelation Between Predictor and Outcome Scores for Group 2 Mothers

	1rst Visit	#Total Visits	#Missed Appntmnts	WBV	VAX	PCS
LOC-Fate	.26	.34*	.29*	-.30*	.05	-.07
LOC-Other	.01	-.02	-.04	.01	-.01	-.15
LOC-Self	-.14	.12	-.26	-.02	.03	.06
Severity	.08	.03	.12	-.20	.20	-.27
Vulnerability	-.06	.19	-.14	-.05	.04	.04
Benefit	-.07	.07	-.19	.18	.01	.01
Barriers	.15	.06	.10	-.14	-.11	-.21
Age	-.24	.23	-.07	.05	.16	-.21
Ed	.04	.15	-.04	-.11	.04	-.16
#Kids	.15	-.30*	.33*	.02	-.01	-.07
Race	.10	-.08	.05	-.06	-.07	-.05

*p<.05
**p<.01

Table 8

Multiple Regression Statistics Groups 1 and 2

NUMBER OF DAYS PREGNANT AT FIRST PRENATAL VISIT

Group 1	Beta	MR	R2	F	sig F
1. Severity	-.41	.47	.22	7.63	p<.01
2. LOC-Self	-.36	.58	.34	7.74	p<.004

Group 2
No variables entered into the regression equation.

NUMBER OF PRENATAL VISITS

Group 1
No variables entered into the regression equation.

Group 2	Beta	MR	R2	F	sig F
1. LOC-Fate	.36	.36	.13	6.00	p<.02

NUMBER OF MISSED PRENATAL APPOINTMENTS

Group 1	Beta	MR	R2	F	sig F
1. LOC-Self	-.44	.44	.19	6.12	p<.02

Group 2					
1. # Kids	.50	.31	.10	4.49	p<.04
2. Age	-.50	.45	.20	5.08	p<.01
3. LOC-Self	-.31	.53	.28	5.02	p<.005

NUMBER OF ON-TIME WELL-BABY VISITS

Group 1.	Beta	MR	R2	F	sig F
1. LOC-Fate	-.50	.50	.25	8.50	p<.007

Group 2					
1. LOC-Fate	-.30	.30	.09	4.16	p<.05

NUMBER OF ON-TIME IMMUNIZATIONS

Group 1	Beta	MR	R2	F	sig F
1. Benefits	.45	.45	.21	6.94	p<.014
2. Ed	.38	.60	.36	6.99	p<.004

Group 2
No variables entered into the regression equation.

Table 9

Intercorrelation Between Belief and Outcome Scores for Groups 1 and 2 Combined

	1rst Visit	#Total Visits	#Missed Appntmnts	WBV	VAX	PCS
LOC-Fate	.12	.13	.13	-.35**	-.02	-.04
LOC-Other	.20+	-.15	.15	-.08	-.10	-.15
LOC-Self	-.24*	.10	-.32**	.07	.10	.05
Severity	.11	.06	.11	-.18	.17	-.27*
Vulnerability	-.09	.12	-.18	-.01	-.04	.04
Benefit	-.21+	.26*	-.30**	.21+	.16	.02
Barriers	.30**	-.22+	.26*	-.20+	-.22+	-.18

+p<.10
*p<.05
**p<.01

APPENDIX C

MATERNAL HEALTH BELIEF QUESTIONNAIRE

We are interested in expectant mother's beliefs about different kinds of infant health problems. We have listed a number of different kinds of problems babies may experience during the first year of life. We would like for you to circle the number on the scale which best reflects your beliefs.

1. Compared to other infants, the chance of my baby getting <u>the measles</u> is:

1	2	3	4	5	6	7
much below average	below average	slightly below average	average	slightly above average	above average	much above average

If an infant were to get the <u>measles</u>, how serious a health problem would it be?

1	2	3	4	5	6	7
not serious	slightly serious	somewhat serious	moderately serious	pretty serious	very serious	extremely serious

2. Compared to other infants, the chance of my baby getting <u>polio</u> is:

1	2	3	4	5	6	7
much below average	below average	slightly below average	average	slightly above average	above average	much above average

If an infant were to get <u>polio</u>, how serious a health problem would it be?

1	2	3	4	5	6	7
not serious	slightly serious	somewhat serious	moderately serious	pretty serious	very serious	extremely serious

3. Compared to other infants, the chance of my baby getting <u>whooping cough</u> is:

1	2	3	4	5	6	7
much below average	below average	slightly below average	average	slightly above average	above average	much above average

If an infant were to get the <u>whooping cough</u>, how serious a health problem would it be?

1	2	3	4	5	6	7
not serious	slightly serious	somewhat serious	moderately serious	pretty serious	very serious	extremely serious

4. Compared to other infants, the chance of my baby getting <u>a cold</u> is:

1	2	3	4	5	6	7
much below average	below average	slightly below average	average	slightly above average	above average	much above average

If an infant were to get <u>a cold</u>, how serious a health problem would it be?

1	2	3	4	5	6	7
not serious	slightly serious	somewhat serious	moderately serious	pretty serious	very serious	extremely serious

5. Compared to other infants, the chance of my baby getting <u>the flu</u> is:

1	2	3	4	5	6	7
much below average	below average	slightly below average	average	slightly above average	above average	much above average

If an infant were to get <u>the flu</u>, how serious a health problem would it be?

1	2	3	4	5	6	7
not serious	slightly serious	somewhat serious	moderately serious	pretty serious	very serious	extremely serious

6. Compared to other infants, the chance of my baby getting <u>diphtheria</u> is:

1	2	3	4	5	6	7
much below average	below average	slightly below average	average	slightly above average	above average	much above average

If an infant were to get <u>diphtheria</u>, how serious a health problem would it be?

1	2	3	4	5	6	7
not serious	slightly serious	somewhat serious	moderately serious	pretty serious	very serious	extremely serious

7. Compared to other infants, the chance of my baby getting <u>an ear infection</u> is:

1	2	3	4	5	6	7
much below average	below average	slightly below average	average	slightly above average	above average	much above average

If an infant were to get an ear infection, how serious a health problem would it be?

1	2	3	4	5	6	7
not serious	slightly serious	somewhat serious	moderately serious	pretty serious	very serious	extremely serious

8. Compared to other infants, the chance of my baby accidentally swallowing poison is:

1	2	3	4	5	6	7
much below average	below average	slightly below average	average	slightly above average	above average	much above average

If an infant were to accidentally swallow poison, how serious a health problem would it be?

1	2	3	4	5	6	7
not serious	slightly serious	somewhat serious	moderately serious	pretty serious	very serious	extremely serious

9. Compared to other infants, the chance of my baby getting asthma is:

1	2	3	4	5	6	7
much below average	below average	slightly below average	average	slightly above average	above average	much above average

If an infant were to get asthma, how serious a health problem would it be?

1	2	3	4	5	6	7
not serious	slightly serious	somewhat serious	moderately serious	pretty serious	very serious	extremely serious

10. Compared to other infants, the chance of my baby getting bronchitis is:

1	2	3	4	5	6	7
much below average	below average	slightly below average	average	slightly above average	above average	much above average

If an infant were to get bronchitis, how serious a health problem would it be?

1	2	3	4	5	6	7
not serious	slightly serious	somewhat serious	moderately serious	pretty serious	very serious	extremely serious

11. Compared to other infants, the chance of my baby having a low birth weight is:

1	2	3	4	5	6	7
much below average	below average	slightly below average	average	slightly above average	above average	much above average

If an infant were to have a low birth weight, how serious a health problem would it be?

1	2	3	4	5	6	7
not serious	slightly serious	somewhat serious	moderately serious	pretty serious	very serious	extremely serious

12. Compared to other infants, the chance of my baby getting meningitis is:

1	2	3	4	5	6	7
much below average	below average	slightly below average	average	slightly above average	above average	much above average

If an infant were to get meningitis, how serious a health problem would it be?

1	2	3	4	5	6	7
not serious	slightly serious	somewhat serious	moderately serious	pretty serious	very serious	extremely serious

13. Compared to other infants, the chance of my baby having a birth defect is:

1	2	3	4	5	6	7
much below average	below average	slightly below average	average	slightly above average	above average	much above average

If an infant were to have a birth defect, how serious a health problem would it be?

1	2	3	4	5	6	7
not serious	slightly serious	somewhat serious	moderately serious	pretty serious	very serious	extremely serious

14. Compared to other infants, the chance of my baby having heart trouble is:

1	2	3	4	5	6	7
much below average	below average	slightly below average	average	slightly above average	above average	much above average

If an infant were to have heart trouble, how serious a health problem would it be?

1	2	3	4	5	6	7
not serious	slightly serious	somewhat serious	moderately serious	pretty serious	very serious	extremely serious

15. Compared to other infants, the chance of my baby being injured in a car accident is:

1	2	3	4	5	6	7
much below average	below average	slightly below average	average	slightly above average	above average	much above average

If an infant were injured in a car accident, how serious a health problem would it be?

1	2	3	4	5	6	7
not serious	slightly serious	somewhat serious	moderately serious	pretty serious	very serious	extremely serious

16. Compared to other infants, the chance of my baby getting diarrhea is:

1	2	3	4	5	6	7
much below average	below average	slightly below average	average	slightly above average	above average	much above average

If an infant were to get diarrhea, how serious a health problem would it be?

1	2	3	4	5	6	7
not serious	slightly serious	somewhat serious	moderately serious	pretty serious	very serious	extremely serious

17. Compared to other infants, the chance of my baby having anemia is:

1	2	3	4	5	6	7
much below average	below average	slightly below average	average	slightly above average	above average	much above average

If an infant had anemia, how serious a health problem would it be?

1	2	3	4	5	6	7
not serious	slightly serious	somewhat serious	moderately serious	pretty serious	very serious	extremely serious

18. Compared to other infants, the chance of my baby getting chicken pox is:

1	2	3	4	5	6	7
much below average	below average	slightly below average	average	slightly above average	above average	much above average

If an infant were to get chicken pox, how serious a health problem would it be?

1	2	3	4	5	6	7
not serious	slightly serious	somewhat serious	moderately serious	pretty serious	very serious	extremely serious

19. Compared to other infants, the chance of my baby getting hepatitis is:

1	2	3	4	5	6	7
much below average	below average	slightly below average	average	slightly above average	above average	much above average

If an infant were to get hepatitis, how serious a health problem would it be?

1	2	3	4	5	6	7
not serious	slightly serious	somewhat serious	moderately serious	pretty serious	very serious	extremely serious

20. Compared to other infants, the chance of my baby getting the colic is:

1	2	3	4	5	6	7
much below average	below average	slightly below average	average	slightly above average	above average	much above average

If an infant were to get the colic, how serious a health problem would it be?

1	2	3	4	5	6	7
not serious	slightly serious	somewhat serious	moderately serious	pretty serious	very serious	extremely serious

On a Scale of 1 to 7, please rate how important you believe each of these things are to the overall health of your child.

1. Seeing a nurse or doctor in the first 3 months of pregnancy for scheduled prenatal appointments.

1	2	3	4	5	6	7
not important at all	minimally important	somewhat important	important	fairly important	very important	extremely important

2. Making sure my baby gets all recommended immunizations.

1	2	3	4	5	6	7
not important at all	minimally important	somewhat important	important	fairly important	very important	extremely important

3. Seeing a nurse of doctor in the second 3 months of pregnancy for scheduled prenatal appointments.

1	2	3	4	5	6	7
not important at all	minimally important	somewhat important	important	fairly important	very important	extremely important

4. Taking my baby to the doctor for scheduled well-baby examinations.

1	2	3	4	5	6	7
not important at all	minimally important	somewhat important	important	fairly important	very important	extremely important

5. Seeing a nurse of doctor in the last 3 months of pregnancy for scheduled prenatal appointments.

1	2	3	4	5	6	7
not important at all	minimally important	somewhat important	important	fairly important	very important	extremely important

There are many reasons why a mother may have difficulties taking her baby to see a doctor. For each of the following statements, please rate how much each would interfere with your getting health care services for your child in the future.

1. I do not have transportation to the doctor.

1	2	3	4	5	6	7
never a problem	rarely	occasionally	sometimes a problem	frequently	most times	always a problem

2. I do not have a telephone to call and make appointments.

1	2	3	4	5	6	7
never a problem	rarely	occasionally	sometimes a problem	frequently	most times	always a problem

3. Clinic hours are not convenient for me, or interfere with work schedule.

1	2	3	4	5	6	7
never a problem	rarely	occasionally	sometimes a problem	frequently	most times	always a problem

4. I do not have the money; care costs too much; or I have no health insurance.

1	2	3	4	5	6	7
never a problem	rarely	occasionally	sometimes a problem	frequently	most times	always a problem

5. It takes too much time to be seen; I have to wait too long.

1	2	3	4	5	6	7
never a problem	rarely	occasionally	sometimes a problem	frequently	most times	always a problem

6. I dislike the nurses or doctors in the clinic.

1	2	3	4	5	6	7
never a problem	rarely	occasionally	sometimes a problem	frequently	most times	always a problem

7. I can't find someone to babysit my other children.

1	2	3	4	5	6	7
never a problem	rarely	occasionally	sometimes a problem	frequently	most times	always a problem

8. I'm afraid the doctor or nurse will criticize or be angry with me because I haven't followed instructions or haven't taken good enough care of my child.

1	2	3	4	5	6	7
never a problem	rarely	occasionally	sometimes a problem	frequently	most times	always a problem

9. I'm not sure of when exactly I'm supposed to take my baby to see the doctor.

1	2	3	4	5	6	7
never a problem	rarely	occasionally	sometimes a problem	frequently	most times	always a problem

10. I'm afraid I'll find out my child is sicker than I thought.

1	2	3	4	5	6	7
never a problem	rarely	occasionally	sometimes a problem	frequently	most times	always a problem

Tell us how much you agree or disagree with each sentence about the health of your future child by circling the number on the scale.

1. My child's good health comes from being lucky.

1	2	3	4	5	6
Strongly Disagree					Strongly Agree

2. There is nothing I can do to keep my child from getting sick.

1	2	3	4	5	6
Strongly Disagree					Strongly Agree

3. Bad luck makes my child get sick.

1	2	3	4	5	6
Strongly Disagree					Strongly Agree

4. I can only do what the doctor tells me to do for my child.

1	2	3	4	5	6
Strongly Disagree					Strongly Agree

5. Getting sick just happens to children.

1	2	3	4	5	6
Strongly Disagree					Strongly Agree

6. Children who never get sick are just plain lucky.

1	2	3	4	5	6
Strongly Disagree					Strongly Agree

7. It is my job as a mother to keep my child from getting sick.

1	2	3	4	5	6
Strongly Disagree					Strongly Agree

8. Only a doctor or nurse keeps children from getting sick.

1	2	3	4	5	6
Strongly Disagree					Strongly Agree

9. I can make very few choices about my child's health.

1	2	3	4	5	6
Strongly Disagree					Strongly Agree

10. Accidents just happen to children.

1	2	3	4	5	6
Strongly Disagree					Strongly Agree

11. I can do many things to fight illness in my child.

1	2	3	4	5	6
Strongly Disagree					Strongly Agree

12. Only the dentist can take care of my child's teeth.

1	2	3	4	5	6
Strongly Disagree					Strongly Agree

13. The only way I can make my child stay healthy is to do what other people tell me to do.

1	2	3	4	5	6
Strongly Disagree					Strongly Agree

14. I take my child to the doctor right away if my child gets hurt.

1	2	3	4	5	6
Strongly Disagree					Strongly Agree

15. It will by my child's teachers' job to keep my child from having accidents at school.

1	2	3	4	5	6
Strongly Disagree					Strongly Agree

16. I can make many choices about my child's health.

1	2	3	4	5	6
Strongly Disagree					Strongly Agree

17. If my child feels sick, I have to wait for other people to tell me what to do.

1	2	3	4	5	6
Strongly Disagree					Strongly Agree

18. Whenever my child feels sick, I take my child to the doctor right away.

1	2	3	4	5	6
Strongly Disagree					Strongly Agree

19. There is nothing I can do to make sure my child has healthy teeth.

1	2	3	4	5	6
Strongly Disagree					Strongly Agree

20. I can do many things to prevent my child from having accidents.

1	2	3	4	5	6
Strongly Disagree					Strongly Agree

APPENDIX D

Pediatric Complications Scale

Abnormal head growth rate	Yes	No
Abnormal weight growth rate	Yes	No
Abnormal length growth rate	Yes	No
Illness	Yes	No
Injury	Yes	No
Seizure	Yes	No
Hospitalization for illness/surgery	Yes	No
Hospitalization for surgery	Yes	No
Feeding difficulty	Yes	No
Abnormal crying pattern	Yes	No
Abnormal sleeping pattern	Yes	No
Neurological Abnormality		
Eye	Yes	No
Face	Yes	No
Neck & Trunk	Yes	No
Extremity	Yes	No
Auditory deficit	Yes	No
Visual deficit	Yes	No
Anomaly		
Craniofacial	Yes	No
Cardiopulmonary	Yes	No
Abdominal	Yes	No
Genitourinary	Yes	No
Extremity	Yes	No

Number of Items 22

Number of Yes -_____

Final Score= _____

Manual for Pediatric Complications Scale

Item	Comment
1-3.Abnormal Rates of Growth	The rate of growth for weight length and head circumferences is determined by subtracting the measures at term from the values at the particular age. (Is scored as a "yes" if this difference is > 2 SDs from the mean.)
4.Illness	Occurrence in this and other items refers to the start of an illness during the time period covered by this questionnaire or the continuance of an illness that began in the preceding time period. Illness excludes all congenital anomalies and injuries and includes only those others reported to the physician (eg.,respiratory and gastrointestinal infections.)
5.Injury	Only those injuries requiring medical treatment or evaluation are given positive responses.
6.Seizure	Any tonic, clonic, or repetitive tremorous activity witnessed by the parent or physician and interpreted as a convulsion. All seizures including "febrile" are given positive responses.
7. Illness or Injury Hospitalization	This includes all hospitalizations during which surgery is not performed.
8. Surgery Hospitalization	This includes all hospitalizations during which surgery is performed.

9. Feeding Difficulty	Persistent here refers to a complaint by the mother of feeding problem on two separate scheduled well-baby clinic visits. Feeding difficulty refers to abnormalities of sucking, swallowing and regurgitation (including vomiting).
10. Crying Patterns	Abnormal crying patterns are those: 1) That are in excess of 1 1/2 hours per day at 4 months of age. 2) That fail to show some time of day discrimination by age 4-months (i.e., a long night time period with-out crying). 3) That are interpreted by the physician to be either excessive or conversely too infrequent.
11. Sleeping Pattern	Abnormal sleeping patterns are those : 1) That total more than 18 hours or less than 12 hours per day by four months of age. 2) That fail to show some time of day discrimination at the end of this period. 3) That are interpreted by the physician to be either excessive or conversely too little.
12. Neurological Abnormality of the face, eyes, neck, and extremities.	Neurological abnormality in these items refers to problems of a peripheral or central basis whether seen on a single or a number of visits; all abnormalities must be seen and confirmed by a physician.

13. Hearing Deficit	Auditory deficit is defined as any of the following: 1) All congenital anomalies and other acquired problems that disrupt the usual continuity of auditory reception: eg., Treacher-Collings Syndrome, ear canal agenesis, etc. 2) Audiometric evidence of any degree of hearing loss. 3) Detection by the mother and confirmed by the physician of hearing loss, eg., absence of response to bell ringing during developmental examination. Absence of response to speech or other vocal cues, etc.
14. Visual Deficit	Visual deficit is defined as any of the following: 1) All congenital anomalies and other acquired disorders interfering with the usual reception of visual stimuli; eg., cataract, glaucoma, RLF, etc. 2) Detection of the mother and confirmed by the physician of loss of vision to any degree; eg., during routine or developmental examination.
15. Congenital Anomalies	This includes all anomalies of the various systems listed.

APPENDIX E

Oral Presentation

My name is Kim Schmidt-Walker. I am a doctoral student at UNC-G. I am presently working on my dissertation research project which looks at expectant mothers' beliefs about the health of their unborn baby. I am interested in how these beliefs are related to how and when mothers get medical care for themselves and their babies.

(Name of Agency) has approved this project and given me permission to speak with you today to ask for your assistance in this study. I would like for you to complete a very simple questionnaire about the future health of your unborn baby. The questionnaire takes approximately 15 minutes to complete, and I will be more than happy to answer any questions you may have. I will also need your consent to contact your obstetric provider and your baby's pediatrician for information about your and your baby's health care. Specifically, I will be looking at the records for: 1.) the number of on-time prenatal visits to your obstetrician; 2.) when and what type of immunizations your baby receives from birth through 6-months; 3.) the number of well-baby visits performed by your pediatrician from birth through 6-months, and 4.) information about the overall health of your baby at 6-months of age. If you take part in

this study, you will receive a gift pack for you and your baby in thanks for your participation.

You are not obligated to participate and can withdraw at any time if you become uncomfortable and do not want to continue. This project has been approved by a committee of faculty at UNC-G and the University Institutional Review board which ensures that this research project follows all federal regulations. All information will be kept in the strictest confidentiality. You will be assigned a code number to assure that all your information is kept confidential. I will eventually need your baby's date of birth and birth name so that I can access medical records.

I believe that this is an important study in the area of infant and child health. Your participation is important to me and to other researchers. It will help us have a better understanding of how parent's health beliefs impact infants' and children's health care. Are you interested in participating?

(If the mother wants to participate, I will proceed with the information about the consent forms; if they do not wish to participate, I will politely thank them for their time.)

Consent Form Instructions

In order for you to participate in this study, I need for you to sign several consent form. This form here (show Consent to Participate form) explains that you have consented to participate in this study. Please read through this and then sign and date it. (I will ask if there are any questions, and will read form aloud to the participant if they are unable to read.)

This second form (Consent to Release-Mother) allows me to look at your prenatal medical records for information about when you were seen by your obstetrician during this pregnancy. (I will read this form aloud and instruct the participant how to complete it.)

I will also need you to complete this form (Consent to Release-Child) so that I can look at your baby's medical records. (I will read the form and explain how to complete it.)

(Following this, I will present the mother with data sheet and questionnaire packet. I will go through the data sheet with the mother, and then read aloud the instructions for the packet. Upon completion of the questionnaire, I will thank the mother for her participation and give her a gift pack.)

APPENDIX F

Consent Form

I, _____ consent to participate in the research project entitled "Developing a Child Health Model: A Prospective Study of Maternal Health Beliefs and Utilization of Preventive Infant Health Services." The study has been explained to me, and I understand that I will be asked to complete a questionnaire about my health beliefs and the future health of my unborn child, and the experimenter will examine my prenatal medical records as well as my child's medical records approximately 6 months following birth. It has been explained to me that the researcher will obtain my child's name and date of birth through public records in order to access my child's medical records in the future. I understand that the information I provide to the experimenter and the information taken from medical records will be kept completely confidential.

I understand that I have the right to withdraw from the study at any time. I understand that I will not be identified by name as a participant in this project. I understand that this project and consent forms have been approved by the University Institutional Review Board which ensures that research projects involving human subjects follow federal regulations. If I have any questions about this, I have been told to call the Office of Research Services at (919)334-5878.

_____ _____

Subject's Signature Date of Consent

_____

Witness

Consent to Release-Child's Records

I,_____ give consent for

_____ to
(agency name)
release information from my child's (_____

_____) medical records to _____

_____ and/or allow my child's medical

records at _____
(agency name)
to be examined by _____

for the purpose of a research project entitled "Developing a Child Health Model: A Prospective Study of Maternal Health Beliefs and Utilization of Preventive Infant Health Services" conducted through and approved by the University of North Carolina at Greensboro. The information which may be released included:

( )immunizations received from birth through 6-months of age
( )well-baby examinations from birth through 6-months of age
( )presence or absence of medical events from birth through 6-months of age including: physical development, illness, injury, hospitalization, behavioral difficulties, congenital anomalies, and neurological/sensory handicaps.

_____ _____
Parent's Signature Date

_____ _____
Child's Name Date of Birth

_____
Witness

Consent to Release-Mother's Records

I,_____give consent for
(patient name)
_____ to
release information from my medical records to _____
_____ and/or allow my medical records
at _____ to be
(agency name)
examined by _____
for the purpose of a research project entitled "Developing a Child Health Model: A Prospective Study of Maternal Health Beliefs and Utilization of Preventive Infant Health Services" conducted through and approved by the University of North Carolina at Greensboro. The only information to be released by the above name agency is prenatal appointment data.

_____ _____
Signature Date

_____
Witness