REPORTED NEEDS OF LOW-INCOME MOTHERS: IMPACT ON SERVICE UTILIZATION AND INTERVENTION PROGRAM OUTCOMES

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A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Psychology

2002

ABSTRACT

REPORTED NEEDS OF LOW-INCOME MOTHERS: IMPACT ON SERVICE UTILIZATION AND INTERVENTION PROGRAM OUTCOMES

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This study investigated individual differences in reported needs within a population of low-income pregnant women. Of particular interest were observed differences between the extent of concern identified by participants (reported need) and that which might have been expected by providers based on more objective characteristics of each participant's self-described situation at the outset of intervention (expected need). Path analysis was employed to test the validity of two conceptual models. One model examined factors predicting reported needs during pregnancy. The second model investigated the influence of expected and reported needs on individuals' postnatal utilization of two different home-visiting support services. Subsequent quality of parenting interactions, home environments provided, and infant mental development also were included in the second model as potential outcomes of increased service utilization. Findings indicated that a continuum of individual differences exists in need reporting behavior among pregnant low-income women. Reported needs were based on substantive expected needs, but these two constructs were not equivalent. In addition to expected needs, increased stressor responses (depressive symptoms and perceived stress) and higher levels of personal control (mastery and global self-esteem) both exerted significant direct positive

effects on reported needs. Higher levels of reported needs reflected a greater level of "readiness" for services that consisted of both a sense of necessary immediacy to cope with the concern and feelings of personal control to address the situation. This critical difference between expected and reported needs also was evidenced in subsequent client response to need. Unlike expected needs, reported needs predicted higher levels of postnatal service utilization behavior in both treatment groups. In addition to levels of reported needs, intensity of service use also was influenced by perceived program helpfulness, competing time demands stemming from maternal employment, and accessibility of services. Implications are discussed regarding family-centered care practices, adaptation of preventive interventions to help low-income women identify expected needs, and sample selection for outcome evaluations of interventions.

Dedicated in loving memory of Donna Barton

ACKNOWLEDGEMENTS

Although this dissertation only bears the name of one author, it would not have been possible without the support of numerous people. The research participants themselves graciously gave their time, their trust, and often their tears to share their stories with us. These women taught me more than they will ever know. I am grateful. Perhaps through this paper and future work, I may begin to give voice to their experiences and help the community services around them better reach and respond to others in similar situations.

Thanks also to the team of people so heartily invested in every phase of design and implementation of the Michigan Maternal Health Services Study. The data collectors on this project could write many books about "lessons learned", and yet they never wavered in their commitment to listening with their hearts and insuring that participants' experiences could be accurately translated and truly heard in the language of project data files. For this, and their tireless efforts chasing and tracking study participants with respect and creativity, I thank them. I am also indebted to the team of individuals, spearheaded by Leanne Kallemeyn, who devoted countless hours to not just accurately cleaning, but also to clarifying the meaning, of project data. Such self-motivated care and concern with every last detail gives me the utmost confidence about using our numbers to speak on behalf of our participants. Special thanks to Jason Davis as well for his efforts collecting the program service use data on which this study depends. Finally, Marcia Gebben was instrumental to the effective development and

implementation of the Michigan Maternal Health Services Study. Her dedication to continuously identifying the next essential steps, asking the tough questions, organizing a practical plan, and finding a way to methodically get those things done well was such a source of stability that it was easy to take for granted in the midst of all of the other challenges posed by the study. A heartfelt thanks for these efforts as well as for her ongoing willingness to listen, show, and share so much with me over these past years.

Immeasurable gratitude is also due to those who were formative in my professional development throughout the graduate school process. Special thanks to my advisor, Hiram Fitzgerald, for his candor and willingness to answer even the dumbest of questions with careful respect. His dedication to go beyond talking about assets to incorporating a strengths-based approach to mentorship gave me the confidence I needed for the challenges I faced. I would also like to extend my appreciation to Lee Anne Roman for her sustained commitment to support my growth in conceptualizing and conducting community-based research. Through her efforts I have had the opportunity to learn about how to nurture fragile relationships with community partners, finesse the politics of turf battles, and overcome systemic barriers that obstruct opportunities for low-income families. Such lessons cannot be gleaned from books alone. Next, I would like to thank Alexander von Eye for his patience and willingness to explain things again and again and again until some of the Greek statistical jargon finally made sense. The probability of encountering another statistician with such high levels of both knowledge and patience was exceedingly low. Thank you!

I also would like to acknowledge my appreciation to each of the members of the MOMS Research team. They provided me with valuable insights about interdisciplinary perspectives on problems and constantly challenged me to redefine and reconceptualize my assumptions and ideas. Additional thanks also are due to Pennie Foster-Fishman and Rachel Schiffman for their valuable feedback and shared insights about the complexities of community-based research.

Finally, acknowledgements would not be complete without thanking my family and friends for their tireless support. Friends were never too far away or too busy to share their smiles, sympathy, or suggestions. These gifts were a source of great support and a considerable contribution to the development of this document. Special thanks to all the members of the Barton family whose fun visits helped erase the stress at hand and who were the first to cheer about each step of progress along the way. My gratitude also extends to my sister, Kristen Mathisen, and my brother, Timothy Rosenkoetter. Kristen's empathy and caring was never far away with notes and calls timed to say just the right thing. Timothy's immersion in similar toil was a source of much comfort over many nocturnal telephone chats. My grandparents' encouragement and support also was greatly appreciated. Next, I wish to thank my parents for their continued dedication to helping me define and achieve my dreams. Their steadfast determination, hard work, and persistence have set admirable examples for me. For this, and for all that they have given me and challenged me to do over the years, I cannot thank them enough.

Last, but definitely not least, I wish to thank my husband, John. Years ago when I spoke of a degree and dissertation he had no idea how my choice would change his life. Yet, despite the many sacrifices and frustrations, he has been unconditionally supportive of me and of my work. For knowing when to listen and when to act, how to encourage and if to distract, for sometimes challenging and always loving, I thank you. This study truly was a team effort.

This study was supported by grant MCJ-260743 from the Maternal and Child Health Bureau (Title V, Social Security Act) Health Resources and Services Administration, Department of Health and Human Services.

PREFACE

The problem statements in numerous research documents describe groups of individuals in need or at high risk for experiencing less optimal health and developmental outcomes. Often, these target groups are defined rather matter-of-factly. Programs or policies in place are evaluated to see if they can reduce the clients' needs or ameliorate the negative outcomes that are typically observed in that population. Hypotheses are tested to determine which specific needs place individuals at highest risk and if a causal path can be charted.

Some studies define individuals in need as those with a specific set of predetermined situational life factors that suggest a high need should exist. In contrast, other studies define individuals in need based on the self-perceptions of the individuals themselves. Often research with these two types of methodologies is compared and findings are debated without careful attention to the sampling difference between them. What kinds of differences might result from these alternative approaches?

This dissertation provides a starting point for thinking about the implications of these different ways of defining a sample of individuals in need. Specifically, it investigates individual differences in the extent to which people report needs that are consistent with expectations based on more objective, criteria-based definitions of need. Do reported needs essentially duplicate expected needs? If not, what factors contribute to differences in reported needs? Can individual differences in reported needs be anticipated based on psychosocial characteristics of individuals? Do reported needs reflect a

"readiness" to use home-visiting services? Is individual variation in reported needs predictive of differential programmatic participation rates and of positive parenting and child development outcomes?

A richer understanding of individual differences in reporting needs may offer important information for improving family-centered service delivery. Investigating reported needs may help identify people who are most likely to benefit from existing services and may provide a starting point for developing alternative interventions that prepare people to benefit from available services. In addition, this research may lead to more precise inferences about the effectiveness of preventive intervention programs in particular populations by providing better clarity about the characteristics of the research samples from which we generalize. Considerable variation exists between the "high need" individuals in our communities. Listening to and learning from *how* individuals report their needs may help us consider *what* actions may contribute to solutions.

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OVERVIEW

Research suggests that early intervention programs can be very effective in supporting families and in enhancing developmental outcomes for children. Indeed, a recent review sponsored by the Institute of Medicine recommended that researchers shift their focus from asking *if* early intervention works to asking *what type* of intervention works best *with whom* and under *what circumstances*? (Shonkoff & Phillips, 2000). Such questions are important because, to date, the positive impacts of supportive services only have been shared by a portion, but not all, of those persons targeted for assistance (Daro & Gelles, 1992; Gomby, Culross, & Behrman, 1999).

One factor that undermines the effectiveness of services is underutilization (Gomby et al., 1999). Frequently individuals who might significantly benefit from active participation are missed by these services (Spieker, Solchany, McKenna, DeKlyen, & Barnard, 2000). Often families with high needs and few personal and psychological resources are unlikely to effectively initiate use of available services (Apodaca, Woodruff, Candelaria, Elder, & Zlot, 1997; Huber, Holditch-Davis, & Brandon, 1993; Minde et al., 1980; Spieker et al., 2000). Even those who do connect with services will vary considerably in the extent to which they

[1] While the title refers to "intervention program outcomes", it is important to note that the only outcomes examined in this investigation were quality of parent-child interactions, characteristics of the home environment, and infant mental development. These were not the only outcomes expected to change as a result of participation in either of the intervention programs described in the study.

remain involved consistently or choose to discontinue participation (Clinton, 1992; Faver, Crawford, & Combs-Orme, 1999; Navaie-Waliser et al., 2000). For instance, across evaluated Healthy Family America programs, 20 – 30% of families who initially accepted offers for services failed to successfully engage in active program participation or completely dropped out altogether (Daro & Harding, 1999). Such underutilization may severely diminish the social and economic benefits that parent support and early intervention programs could otherwise realize. In a recent review about mothers who are difficult to engage in prevention and intervention programs, Spieker and her colleagues (2000) wrote "...what is needed to assure that the developmental needs of all children are met is a way to identify families who qualify for participation in a prevention program but who are unlikely to engage in it because of parental risk factors and then to provide mental health treatment and a therapeutic relationship in order to bring them to the point where it would be possible for them to engage in the program" (p. 204).

In discussions with practitioners about families who are difficult to engage in service delivery, many providers refer to broad individual differences between clients in their "readiness" to participate or fully engage in the intervention (Kitzman, Cole, Yoos, & Olds, 1997). Although readiness is a concept that has not yet been fully defined, a growing number of studies refer to constructs like this as explaining differences in individuals' behaviors. For instance, some necessary level of personal readiness has been discussed as a component that affects problem solving competence (Brammer, 1990). Varying stages of

cognitive readiness also have been identified as an important influence on the process of behavioral change in therapeutic treatment of addictive behaviors (Prochaska, 1995; Prochaska, Johnson, & Lee, 1998; Prochaska & Prochaska, 1999) and in the process leading to enactment of risk-reducing behaviors in the transmission of HIV/AIDS (Catania, Kegeles, & Coates, 1990). The progress of individuals along this readiness process continuum even has been associated with differential probabilities that people will terminate substance abuse treatment early (Prochaska, 1996).

Qualitative studies lend further support that actively engaging in help-seeking actions may involve a process of developing increasing readiness to act. Work from both health and emotional support domains suggests that effective help-seeking involves not simply a decision, but rather a longer process, that eventually results in service utilization (Patterson, Douglas, Patterson, & Bradle, 1992; Rawlins, 1991). This process typically begins with the recognition that a concern or need exists and later shifts to the identification that a particular provider is an appropriate agent to resolve the need or assist in efforts to deal with the concern (Patterson et al., 1992). Families identified as not yet ready to fully participate in home-based interventions might not have identified the target areas of the intervention as focal concerns or might not interpret the provider as an appropriate or effective source of assistance.

Understanding how families begin to identify issues as concerns that necessitate some action may be central to understanding effective engagement and use of home-based services. Investigating individual differences in self-

described needs is particularly essential for explaining participation in preventive interventions (Stein, Bauman, & Ireys, 1991). By definition, prevention programs attempt to ameliorate expected negative outcomes before they have fully developed; that is, before the severity of a negative consequence is fully apparent. People who are more proactive in anticipating issues in their lives that might compromise future success and who identify these as areas of need could be more likely to use support services consistently than families whose perceptions of needs reflect more of a reaction to experiencing negative consequences. Individuals who reflect on and articulate their needs more effectively also may elicit more effective assistance from family-centered support services than those with more difficulty identifying and disclosing their concerns.

One research team has begun to theorize that individual differences in reporting needs may be linked to patterns of service utilization. Daro and Gelles (1992) described three types of families at risk for child maltreatment: consumer families, dependent families, and resistant families (Daro & Gelles, 1992). Consumer families generally recognize areas where they might benefit from help and seek assistance for these concerns from their informal social networks and community programs. They often are responsive to public awareness efforts and traditional service delivery mechanisms. In contrast, resistant families are not so responsive to interventions. Typically, resistant families do not self-identify personal needs or concerns and they do not seek help from support services. Moreover, they often exhibit serious functional problems and are not receptive to intervention efforts, even when service providers successfully contact them. The

third group of families identified by Daro and Gelles deserves particular attention as a cluster of individuals who do not initially seek services, but may be very responsive to appropriate intervention. Dependent families tend not to independently recognize specific needs for assistance and do not effectively access services that are available for support. This group of families requires more extensive outreach to locate, but often responds well to a more intensive service delivery style that relates parenting strategies in concrete ways to their particular situations. So, the two groups of high-need families most likely to be missed by service providers share the characteristic of not self-identifying needs in areas where programs provide assistance.

Understanding the abilities of individuals to recognize and describe their personal needs and concerns may have important implications for identifying individuals at high risk for program attrition and for improving service delivery practices (Navaie-Waliser et al., 2000; Sontag & Schacht, 1993). While the importance of self-recognition of needs has not been fully investigated, difficulties with need recognition may be associated with parenting difficulties and poorer child development outcomes. For instance, one study of families mandated to receive child protective services found a very high proportion of clients reported a discrepancy between the needs they perceived that they and their children had relative to the needs reported by CPS workers (Faver et al., 1999).

The current study investigated individual differences in reporting perceived needs within a population of low-income pregnant women. Of particular interest were observed differences between the extent of concern identified by

participants and those that might have been expected by providers based on more objective characteristics of each participant's self-described situation at the outset of intervention. I sought to understand what influenced individual differences in reported needs and what the significance of reported needs was for service delivery. To this end, the investigation was conducted in two stages. The background, methods, and results of each stage comprise a chapter in the dissertation document that follows. In the first stage, analyses investigated factors expected to influence individual differences in low-income pregnant women's reported needs during the prenatal period. Thus, chapter one outlines a conceptual model predicting reported needs and examines the efficacy of using this model to differentiate the need reporting behaviors of pregnant women in the Michigan Maternal Health Services Study. Then, in the second stage I examined how differences in these reported needs influenced postnatal maternal/infant support service utilization, and indirectly, individual differences in parenting interactions and infant development. Chapter two describes the conceptual model of expected postnatal relationships and investigates how effectively this model predicted intervention outcomes for a subset of families in the Michigan Maternal Health Services study. The final chapter of the dissertation summarizes the overall findings from both stages in the study and discusses implications for further research and intervention practice.

CHAPTER 1

PREDICTING REPORTED NEEDS IN LOW-INCOME PREGNANT WOMEN

INTRODUCTION

Interventions Targeting Low-Income Pregnant Women.

Considerable research has described inequalities in both the physical and mental health status of women across socioeconomic groups (Adler, Marmot, McEwen, & Stewart, 1999; Brooks-Gunn, Leventhal, & Duncan, 2000; Kawachi, Kennedy, Gupta, & Prothrow-Stith, 1999). Women living in poverty are disproportionately exposed to physical, social, and psychological stressors (Gorski, 1998; Lynch, Kaplan, & Shema, 1997; McLeod & Nonnemaker, 1999). Stressors affect both maternal and infant health and well-being through biological, psychological, and social pathways (Adler et al., 1999; Ennis, Hobfoll, & Schroder, 2000). Stress elicits biological responses (neuroendocrine, immune, increased preterm labor, and less optimal birth outcomes among pregnant women); mental health responses (depression, negative coping); practice of risk behaviors (smoking, weight gain, drug and alcohol abuse); underutilization of resources and services; and compromises individual resources to respond to daily challenges of parenting in a nurturant manner that promotes positive child development (Baum & Posluszny, 1999; Crnic & Acevedo, 1995; Eisenstadt & Powell, 1987; McLoyd, 1995; Rhodes & Jason, 1990; Taylor, Repetti, & Seeman, 1997; Turner & Lloyd, 1999). Over time, stress responses produce cumulative effects that are associated with negative social consequences across multiple

domains, including: interpersonal relationships, nurturant parenting, productive employment, participation in maternal-child prevention/intervention programs, and child development (McEwen, 1998; McLoyd, 1990; Seguin, Potvin, St. Denis, & Loiselle, 1995).

Targeting pregnancy as a time to initiate supportive interventions that reduce stress and stress responses may offer maximal benefits to improving the health and development of both mother and child. Pregnancy is a period when physicians and other service providers often have contact with low-income women who otherwise underutilize health care and social service systems (Zayas & Busch-Rossnagel, 1992). Relationship-based interventions may establish positive alliances that promote effective health care use and provide a foundation for positive parenting after delivery (Barnard & Morisset, 1995; Emde, Korfmacher, & Kubicek, 2000; Heinicke et al., 1999). In addition, as women experience key transitions during pregnancy, many reassess their life experiences and are receptive to new information and ideas from trusted sources that shape their health and parenting behaviors (Brazelton, 1992). Helping pregnant women cope effectively with poverty stressors also may reduce fetal exposure to neuroendocrine stress responses and minimize maternal risky behaviors (e.g., smoking, other substance use) associated with poorer birth and child developmental outcomes (Gonzalez-Calvo, Jackson, Hansford, & Woodman, 1998; Paarlberg, Vingerhoets, Passchier, Dekker, & Van Geijn, 1995; Thoits, 1995).

To capitalize on the potential benefits of promoting positive behavioral and life changes during pregnancy, a number of communities have implemented intervention programs that target women identified as "at risk". Many of these programs have incorporated a client-centered home-visiting approach that supplements existing obstetric and pediatric services (Grant, Ernst, & Streissguth, 1999; Margolis et al., 1996; Poland, Giblin, Waller, & Bayer, 1991). Providing home-based services allows professionals greater familiarity with the ecology producing stress and permits the opportunity to deliver an individualized intervention tailored to the needs reported by each client (Graham et al., 1997; Hardy-Brown, Miller, Dean, Carrasco, & Thompson, 1987; Kitzman, Yoos, Cole, Korfmacher, & Hanks, 1997). These facets of the intervention are believed to be critical for promoting positive changes with high-risk individuals (Emde et al., 2000; Grant et al., 1999; Kitzman, Yoos et al., 1997).

The effectiveness of home-visiting interventions in achieving positive outcomes for high-risk clients is currently a subject of considerable debate. Over the last two decades, tested home-visiting models have demonstrated positive effects in reducing risky behaviors during pregnancy, enhancing maternal psychosocial state, improving appropriate service utilization, and promoting nurturant parenting behaviors (Benasich, Brooks-Gunn, & Clewell, 1992; Ciliska et al., 1996; Daro & Harding, 1999; Heinicke et al., 1999; Marcenko & Spence, 1994; Olds et al., 1997; Olds et al., 1999; Olds & Kitzman, 1990; Tableman, 1999-2000a, 1999-2000d). Yet, these effects have not been consistently replicated across intervention programs, populations served, or shifts in service

provision staff (Gomby et al., 1999). There are numerous layers of complexity that contribute to the inconsistent findings. Some factors include: variation in intervention content and objectives, intervention dosage (both intended and actual as well as variations in timing of interventions provided), provider type (including variations in background, training, support, supervision, and success in the specific therapeutic relationship established with each client), alternative interventions received by "control" groups, examination of outcomes in an "intent to treat" versus "treated" group, and participant attrition prior to documentation of outcomes (Benasich et al., 1992; Berlin, O'Neal, & Brooks-Gunn, 1998; Korfmacher, 1998; Olds, 1988; Powell & Grantham-McGregor, 1989; Stein et al., 1991; Tableman, 1999-2000b, 1999-2000c; Tableman & Sorenson, 1999-2000; Twohy & Reif, 1997). Yet, one factor that has received little attention in the literature is the concept of need in study sample selection and as an influence on individuals' voluntary participation in programs. Discussing different definitions of need and investigating relationships between need and intervention effectiveness may promote a richer understanding of the impact of home-visiting on individuals.

Two Approaches to Defining High Need Groups.

Both in empirical literature and in service delivery practice, two different methods have been employed to identify individuals at high risk for negative outcomes who might benefit from supportive interventions. These methods underlie what Gifford refers to in the anthropological literature on risk as the difference between "a technical objective or *scientific* dimension and socially experienced or *lived* dimension" (Gifford, 1986, p. 215). That is, the existence of

needs has been established either through the presence or absence of a set of objective characteristics associated with a high probability of experiencing needs or through stated individual perceptions that such a need exists in one's personal life experience.

In the design of programs or the development of policies, a target population that meets specific criteria associated with negative outcomes typically is specified (Flaskerud & Winslow, 1998; Landy, 2000). For instance, many home-visiting programs have been developed to assist low-income, pregnant women because they are presumed to have a set of contextual, social, and health factors that place them at risk for poor pregnancy outcomes as well as parenting and life course difficulties that might compromise the opportunities for their children's future successes (Binsacca, Ellis, Martin, & Petitti, 1987; Weiss & Jacobs, 1988; Zimmerman, 1999). So, in this example, the target population with needs is defined by the objective circumstances related to income and pregnancy rather than by any individual perception or concern about her life circumstances on the part of the mother. Often, then, the effectiveness of programs or policies is evaluated based upon changes observed among a representative sample of individuals possessing the specified need criteria.

While this approach continues to impact service delivery, over the last twenty years service providers increasingly have appreciated the significance of the experiential dimensions of client need as critical foundations for treatment planning. Many practitioners and programs have adopted family-centered care intervention approaches (Nelson & Allen, 1995; Riessman, 1990). A central

tenet of family-centered care is that interventions are individualized to respond to the specific perceived needs articulated by families rather than providing a similar treatment model to all families who share a set of objective characteristics (Dunst, Johanson, & Trivette, 1991; Keen-Payne & Bond, 1997). The family and service provider form a partnership in which they strive to achieve family-defined goals (Thomas, Benham, & Guskin, 2000). Since considerable variation exists in the needs of pregnant women during their transitions to parenthood and experiences with early parenting (Flanagan, 1998; Halpern, 1993), client- and/or family- centered care approaches have been integrated into many interventions delivered during pregnancy and early parenting (McDonough, 2000). This practice encourages providers to individualize interventions based on clients' self-reported needs and provides a more targeted intervention that considers each client's past experiences, confidence related to caring for children, personal skills and strengths, competing environmental stressors, and the availability of social support to meet the client's needs in other ways (Kitzman, Yoos et al., 1997).

The increased personal relevance of information shared in family-centered care interventions may enhance the educational effectiveness of the treatment messages (Korsch, 1984; Williams & Meredith, 1984). These ideas are consistent with health educators' recommendations to tailor messages to address specific individual concerns of learners in order to enhance retention of information and behavioral compliance (Korsch, 1984; Vivian & Wilcox, 2000). Research also has found that individual changes in attitudes and subsequent

behavior are more probable when information is perceived as highly relevant (Covington, 2000; Vivian & Wilcox, 2000).

Indeed, studies evaluating family-centered interventions have documented positive outcomes when these approaches are incorporated into practice across a variety of service domains (Bradley, 1983; Marcenko & Smith, 1992; Weiss & Jacobs, 1988; Weissbourd & Kagan, 1989). Participating families frequently report feeling more empowered using services (Trivette, Dunst, & Hamby, 1996) and display improvements in family functioning and appropriate parenting (as indicated by reduced out of home placements for children) as compared to families participating in more traditional intervention models (Scannapieco, 1994).

However, embedded in the use of a family-centered care model is the assumption that individuals are equally capable and equally willing to perceive and describe their needs (across all domains) to service providers. Yet, little research has described individual differences in reporting tendencies or examined how these differences might shape program outcomes. But, if a client-centered intervention is tailored to address an individual's reported needs, whereas the program effectiveness is evaluated based on the changes in expected needs observed in more objective criteria, one might expect individual differences in reporting tendencies to have a critical influence on program effectiveness.

Clarifying Terminology.

Throughout this document, reference is repeatedly made to three distinct types of needs: expected (sometimes also referred to as objective) needs, perceived needs, and reported needs. Most psychological literature does not clearly distinguish among these three concepts[2]. However, within this document, the terms expected needs, perceived needs, and reported needs will be defined in the manners described below.

Expected needs reflect some assessment of risk or presumed need by someone other than the individual believed to be in need. These needs are often defined by the presence of one or more conditions, characteristics, or circumstances that have been associated with some negative outcome in similar groups of individuals. The association between the circumstance and negative outcome forms the basis for the judgment that the individual does possess a need to modify the characteristic or circumstance to something associated with more positive outcomes. Expected needs are established without regard to whether or not individuals actually believe that they have a need to alter the given circumstance. Hence, the operational definition of expected needs in this document is quite different from terminology in the psychological literature related to expectancies. Whereas literature on expectancies focuses on how individuals' own expectations influence their subsequent outcomes, the expected needs in this study are formulated from the expectations of a third party (e.g., service

[2] One reference to a somewhat similar distinction between the terms needs, wants, and demands (roughly corresponding to expected needs, perceived needs, and intentions to act on needs) was noted in the dental literature. See Davis (1982) for more information.

provider or researcher) who believes that the individual's specific characteristic or circumstance will impact her outcome.

In contrast to expected needs, *perceived needs* are defined by the individual's subjective belief that a negative condition or circumstance must be modified to improve well-being or to survive. By definition, all perceived needs require some subjective individual awareness. Most studies that examine perceived needs choose to operationalize them by documenting the needs that individuals report (e.g., Rawlins, 1991). However, it seems at least plausible that people might perceive specific personal needs, but not disclose them to others. Thus, the language of this document differentiates between perceived and reported needs. *Reported needs* include the needs that an individual discloses to another person. In most cases, reported needs are perceived needs that are subsequently disclosed. However, individuals could also report needs that are inconsistent with their perceptions in efforts to manipulate the behavior of the listener or for social desirability purposes. Given the potential discrepancies that might occur, it is important to distinguish between perceived and reported needs.

Reporting Perceived Needs.

Relatively little work has examined influences on individual perceptions of needs and characteristic differences in the ways these are described to others. (Chung, 1993; Faver et al., 1999). Most research related to perceived needs provides descriptive information on reported needs at the group level. Studies often provide information about which needs certain groups of individuals in a target community prioritize as particularly important or identify as unmet by

existing service systems. For instance, research has described adolescent, African-American mothers' reported unmet needs for parenting assistance (Barnett, 1987); the self-described needs of women who received services from a maternity home and adoption agency during their pregnancies (Keen-Payne & Bond, 1997), the multidimensional needs of families who survived residential fires (Keane, Brennan, & Pickett, 2000), the concerns of mothers with infants in a neonatal intensive care unit (Bolton, Chalmers, Cooper, & Wainer, 1993), women's experiences and needs following interactions with a metropolitan health care system (Taylor & Dower, 1997), and the priority needs described by homeless adults (Acosta & Toro, 2000) and homeless mothers (Kissman, 1999). Descriptive studies like these offer information about whether or not practitioners are "on target" when they identify focal concerns that generally occur within the entire targeted group. But, such work does little either to understand mismatches at an individual level or to consider which people might have greater difficulties articulating their needs and how these individual differences might impact the effectiveness of the interventions that are delivered. However, it is interesting to note that in several of these descriptive studies, a subgroup of participants is listed as having "unspecified" needs wherein people identify needing general help without clearly articulating the types of help desired (Barnett, 1987; Keane et al., 2000; Penn, Levy, & Penn, 1986). Although little attention is directed toward people with unspecified needs in the literature, the repeated presence of such a subgroup suggests that individual differences do exist in people's abilities to report their needs effectively.

Another common line of research into needs considers the extent to which providers prioritize the needs of the target community in similar ways to the priorities offered by the members of that community. A number of investigations have shown that service providers and clients often report different priority rankings and occasionally even domains of individual client needs. Such discrepancies have been found in many different types of service delivery, including perceived child needs among families involved with child protective services (Faver et al., 1999), desired health promotion activities by low-income seniors (Bertera, 1999), reported needs for information about sexuality from teenagers (Cairns, Collins, & Hiebert, 1994), perceived service needs of low-income, urban Black women (Penn et al., 1986), desired vocational training information by young adults (Cherry & Gear, 1987), needs identified as serious by homeless individuals (North & Smith, 1993), perceptions of high and low importance components of parenting support services received by high risk mothers (Pharis & Levin, 1991), and in the needs identified during a community-wide needs assessment to determine priority areas for economic and social development in an underprivileged community (Eng & Blanchard, 1990).

Careful analysis of results from studies with provider-client discrepancies in perceptions of needs reveals a trend such that clients tend to identify more concrete needs for basic resources as higher priorities, whereas service providers seem to identify more abstract needs for intrapersonal change or steps toward self-actualization more readily as priority needs. Yet, it is important to remember that provider priority rankings are partly a product of clinical judgment

based on their interactions with the individual, family, or community. Providers' assessments of clients' needs may be based partly on nonverbal signals or comments interpreted as inferring needs rather than on those needs overtly stated by the client. Differences in perceptions of need between providers and clients also could be driven by different goals for the client as much as by differences in the perception of need (Cairns et al., 1994). Hence, there are a variety of reasons why investigations of discrepancies between clients' reported needs and providers' may not be the most effective way to investigate if people tend to disclose fewer self-described needs than would be expected based on knowledge of more objective characteristics of the client and her situation. Careful examination of what individuals actually report as their needs to listeners who are not making clinical interpretations and who are not personally providing services to the person may be an important first step to analyzing actual client differences in reporting patterns.

Conceptual Model for Predicting Reported Needs in Low-Income Pregnant Women.

Figure 1 depicts my hypothesized model for how key factors predict reported needs among low-income, pregnant women. This model, like family-centered care practice, necessarily confounds the self-perception of needs with whatever information the participant is willing to actually disclose. It is possible, and even likely, that individuals have some concerns or perceive some personal needs that they do not openly report. Yet, undisclosed needs cannot effectively drive the nature of services that participants receive in family-centered care.

Undisclosed concerns also are not easily assessed, particularly since individuals may be at various stages of recognition that a given experience or condition constitutes a need or concern for them. For these reasons, the focus of the model is on factors that predict the needs that individuals actually disclose.

At the core of the model is the assumption that expected needs generated from descriptive characteristics of the client's situation will have a direct positive relationship to the client's reported needs. This represents the path of assumptions inherent in client-centered care models that target individuals with a specific set of objective circumstances and provide individualized intervention based on areas the client identifies as concerns. By individualizing treatment protocols to the reported client needs, providers expect to positively impact some objective indicator that formed the basis for that reported concern. Prior work has found reported perceptions are often based on realistic appraisals of actual circumstances (Cherry & Gear, 1987). However, evidence suggests that a number of other factors also may influence reported needs. Predictions about these factors are outlined below.

The Impact of State on Reported Needs. Considerable research has investigated factors that contribute to heightened stress and to the expression of depressive symptoms. Stress and depression are biopsychosocial responses to events or conditions (Brooks-Gunn et al., 2000; Dunkel-Schetter, Gurung, Lobel, & Wadhwa, 2001; Kessler, 1997). Events and conditions found to be positively associated with greater stress and depression include many of the types of factors embedded in the expected need index for this study (e.g., physical

abuse, unwanted pregnancy, unemployment, food insufficiency, housing instability) (Barnfather & Ronis, 2000; Brooks-Gunn et al., 2000; Kessler, 1997). In fact, such strong relationships have been reported between objective factors and stress that many investigators choose to operationalize stress by using the presence or absence of negative life events in place of perceived stress (e.g., Brooke, Anderson, Bland, Peacock, & Stewart, 1989; Ferketich & Mercer, 1990). High levels of perceived stress also have been associated with increased depressive symptoms among low-income pregnant women (Ennis et al., 2000), mothers of young children (Hall, 1990; Hall, Williams, & Greenberg, 1985), and with adolescent mothers (Barnet, Joffe, Duggan, Wilson, & Repke, 1996).

While much work examines the causes and consequences of stress and depression, research has not directly investigated how stress and depression impact individuals' self-reporting of their needs. However, a few studies provide clues about how these states might influence reporting needs. For instance, increased levels of stress have been found to promote service utilization initially, but interfere with consistent participation and engagement when observed midway through the course of intervention (Eisenstadt & Powell, 1987). If perceived stress acts as a trigger to motivate individuals to participate in services, it might also increase individual tendencies to reflect about the origins of the stress and to report existing needs. This hypothesis would be consistent with coping literature where the identification of an event as a perceived threat is important in the initiation of problem-solving and coping behavior (Gravida-Payne & Stoneman, 1997; McNett, 1987; Thoits, 1995).

On the other hand, existing evidence would suggest that depressive symptoms could interfere with a realistic appraisal of and reporting of needs. Affect influences the amount of attention available for information acquisition, memory retrieval or storage, and appraisal processes (Fiske & Pavelchak, 1986). It also has been found to focus these processes on salient environmental factors, past events, and response options (Bugental & Goodnow, 1998). Specifically, one unique function of sadness is to slow down cognitive and motor systems (Izard, 1993). When sadness occurs for short periods of time at low levels, this mood may be adaptive by promoting slower and more deliberate scrutiny of oneself and one's behavior. However, when sadness is less effectively regulated, maladaptive behavior may result, including problems with emotion-cognition-action patterns often observed in depression (Izard, 1993). In fact, distorted, negative views of the self and a sense of hopelessness about one's ability to impact the future are characteristic of individuals with depression (Rosenhan & Seligman, 1995). So, it is not surprising that individuals with depressive symptoms are less likely to utilize services effectively (Rhodes, 1993). Given the described impact of depressive symptoms on functioning, it would also be expected that individuals exhibiting these symptoms might be less effective in reporting their needs than those without depressive symptoms. The presence of depressive symptoms may shift the focus of accurate self-assessment and identification of needs as well as interfere with the initiative required to seek help from service providers and report needs accurately.

Relationships Between Perceived Ability to Cope and Reported Needs.

The next cluster of factors expected to predict reported needs are individual and social constructs that would influence the individual's cognitive appraisal of her ability to cope with her needs. Whether or not individuals consider that a given situation constitutes a need may be influenced by their perceptions of their options and prospects for managing the event, or what Lazarus and his colleagues referred to as "secondary appraisal" (Lazarus, 1966; Lazarus & Folkman, 1984). The model in Figure 1 includes a construct of perceived individual control as well as support from others that might influence appraisal of need.

Weisz (1982) describes the construct of personal control as consisting of the dual elements of competence and contingency. To feel a sense of control, individuals must believe both that they are capable of succeeding in actions they undertake (competence) and that their actions will have an impact on the outcome of a given situation (contingency) (Weisz, 1982). More recent work has elaborated on these notions to view competence (self-efficacy), contingency (personal mastery, locus of control), and motivation to act embedded within a contextual frame as components of psychological empowerment (Zimmerman, 1990a; Zimmerman & Rappaport, 1988). While little work has directly addressed relationships between perceived control or empowerment and reported needs, research has shown that individuals with higher measures of empowerment characteristics are more likely to be active participants in community

organizations and activities[3] (Wandersman & Giamartino, 1980; Zimmerman & Rappaport, 1988). Case studies have also demonstrated that individuals who possess empowerment characteristics are able to effectively negotiate an unsupportive, bureaucratic health care system to receive desired services (Birenbaum-Carmeli & Carmeli, 1996).

However, this empowerment research does not definitively suggest a relationship between personal control or empowerment and reported needs. High levels of personal control could increase reported needs because increased awareness of one's situation may accompany the transformation in belief that one can alter his or her situation (Koch, Lewis, & Quinones, 1998). An example might include a survivor of domestic abuse who begins to realize and assert her personal needs throughout the course of treatment. In contrast, high levels of personal control could be related to fewer reported needs. Individuals with greater personal control might feel capable of handling issues independently, and thus no longer label and report them as needs. This prediction is consistent with extensive research using the Health Belief Model in which individuals with a perceived threat (i.e., knowledge about susceptibility to an illness combined with awareness of severity of condition), weigh their health behavior decisions based on the perceived benefits of their action, (e.g., Can they prevent it or ameliorate it through their actions? Will their actions have an effect?), the perceived barriers to action (e.g., Do they have sufficient knowledge or competence to achieve the

[3] Later work supported the hypothesis that participation in community activities provides opportunities to enhance perceived control that helps individuals cope with stress (Zimmerman, 1990b). The participation allows people to engage in the process of learned hopefulness by utilizing their skills successfully. Thus, it contributes to psychological empowerment. However, in the cross-sectional study supporting this assertion, the reverse path from empowerment to participation was not tested and therefore cannot be fully dismissed.

intended result if they take action?), and contextual cues that trigger the timing of action (Rosenstock, 1966; Strecher, Champion, & Rosenstock, 1997). In this model, greater competence and contingency would lead to increased independent health behavior action. Though reported needs are not specifically included in the Health Belief Model, it would appear that people with high competence and contingency would report fewer needs for topics they perceive can be handled independently (e.g., parenting, smoking cessation, gathering necessary baby supplies) because they are likely to engage in those health behaviors without need for assistance. However, individuals with high personal control would report greater needs for topics where the health behavior action necessitates a professional's involvement (e.g., HIV/AIDS testing, use of prenatal care, initiation of a chemotherapy regimen). Given that the areas covered in the need index are home-based prevention and intervention issues, most appear to correspond to the former situation, and thus higher personal control would be associated with a reduction in reported needs.

In summary, reasonable explanations exist for both positive (empowerment raises awareness, thereby enhancing perceived and subsequently reported needs) and negative (empowerment enhances beliefs about independent capabilities to handle events without external assistance, thereby reducing reported needs) associations between personal control and reported needs. However, the extensive research supporting other well-defined components of the Health Belief Model lends somewhat greater support to predict a negative association between personal control and reported needs

(Becker, 1974; Burak & Meyer, 1997; Maddux & DuCharme, 1997; Tiedje, Kingry, & Stommel, 1992). In addition, two studies about parenting support service utilization lend further weight to this hypothesis. In two diverse populations of mothers, both the nature and number of nurse home visits in a parenting support program were moderated by levels of mastery (in a rural, European American sample) and psychological resources indicating competence (in an urban, African-American sample) (Olds & Korfmacher, 1998). Individuals with higher levels of control or competence generally received fewer home visits from nurses[4]. This lessened intensity of service delivery would be expected with clients who report fewer needs and seem to be coping well independently.

Previous work has established that personal control may be related to reported needs through indirect as well as direct pathways. Considerable work suggests that personal resources such as self-esteem and mastery can reduce the severity of appraisals about or responses to stressors (Lazarus & Folkman, 1984; Pearlin, 1999; Pearlin, Lieberman, Menaghan, & Mullan, 1981). For instance, Ennis, Hobfoll, and Schroder (2000) found that among European American women, high levels of mastery buffered the perceived stress associated with acute loss of material resources. Turner and Noh (1983) also found that low socio-economic class mothers with high levels of control and high levels of social support experienced less psychological distress than women with other levels of support and control. Other studies have probed beyond distress

[4] This study did reveal a slight increase in number of home visits among those at the highest levels of personal resources. However, despite this curvilinear relationship, the overall number of visits received remained lower for those with high as compared to low psychological resources (Olds & Korfmacher, 1998).

and found that high levels of personal control also reduce behavioral responses to stressors in the form of depressive symptoms (Hiroto & Seligman, 1975; Miller & Seligman, 1975; Seligman, 1975). Personal control mediates outcomes of adverse events by promoting the initiation of and persistence of coping efforts to resolve problematic circumstances (Ross & Mirowsky, 1989). High levels of personal control also have been associated with greater receipt of social support (Eckenrode, 1983). Thus, people with higher levels of individual resources tend to garner greater social resources in their environments as well. Through these links reducing stress responses (especially depressive symptoms) and enhancing social support, personal control was expected to have an indirect as well as a direct impact on the needs that individuals report.

Although the specific relationships between social support and reported needs have not been investigated, a negative relationship between social support and reported need is hypothesized. Higher levels of social support increase the informal sources available for individuals to manage difficult situations (Crockenberg, 1988). Like perceived control, the presence of social support might reduce individual tendencies to define a given situation as a true need or concern. Therefore, social support might reduce the likelihood that people would report their needs even if they perceived that unresolved issues in these areas did exist. Some support for these ideas is present in social support research showing that the presence of informal support assists people and promotes healthier outcomes in difficult circumstances. For instance, evidence suggests that social support is associated with increased health-related quality of

life scores (Achat et al., 1998), reduced stress, anxiety, and depression during pregnancy (Barnet et al., 1996; Dunkel-Schetter, Sagrestano, Feldman, & Killingsworth, 1996), increased reliance on problem-focused coping strategies (Gravida-Payne & Stoneman, 1997), and improved quality of parenting (Simons & Johnson, 1996). Positive outcomes like these would be expected among individuals who can manage their concerns more effectively than among people likely to need formal assistance with their concerns. So, less reported need is expected among individuals with higher levels of social support.

Self-Disclosure of Perceived Needs. In predicting people's reported needs, it is important to consider their willingness to disclose the needs they perceive to the listener. Participants may be fully aware that they possess a given set of needs, but choose not to reveal that information to the service providers or research interviewers.

Indeed, evidence suggests that there are individual differences in people's willingness to disclose personal information. Factors found to influence comfort with, likelihood of, and amount of self-disclosure include past experiences with personal self-disclosure (Vaux, Burda, & Stewart, 1986), cultural views about self-disclosure (Warda, 2000), level of emotional expressiveness (Kunkle & Gerrity, 1997), the nature of the information to be shared (Burnard & Morrison, 1992; Jourard, 1971), the relationship of the listener to the individual (Ahluwalia, Dodds, & Baligh, 1998; Derlega, Metts, Petronio, & Margulis, 1993), costs/threat/risk associated with sharing versus not sharing the information (McNett, 1987; Wheeless & Grotz, 1977), the extent to which others have offered

similar disclosures (Jourard, 1971), and the surrounding context (Kaniasty, 2000).

Personal disclosure of needs requires identifying areas where the individual is lacking some necessary knowledge, object, or capacity. By acknowledging the presence of a deficit, individuals expose themselves to a certain level of vulnerability (Riessman, 1990). Thus, in the context of reporting perceived needs in a one-on-one discussion with a professional research interviewer, three factors particularly related to comfort exposing oneself to this vulnerability are hypothesized to moderate the relationship between perception of and reporting the presence of a given need[5]. These include: comfort with personal disclosure, negative network orientation, and prior experience with child protective services.

The general tendency toward comfort expressing personal matters with others is hypothesized to increase the likelihood of choosing to report needs that are perceived, thus increasing reported needs. The indicator of disclosure comfort was selected as a general assessment of individual tendencies to be reticent or expressive in disclosure. Disclosure comfort represents the coalescence of many cultural, cognitive, and personality factors that affect disclosure, rather than one specific influence. Although little psychological research looks specifically at disclosure of individual needs, a positive association between disclosure comfort and reported needs would help explain the findings of a small study of low-income parents. Eisenstadt (1987) found that

[5] This is the underlying process expected to influence outcomes observed. However, because perceived and reported needs are confounded in this study, the three factors are hypothesized to directly affect reported needs.

reported needs were only effective predictors of program participation among those who were highly expressive about their concerns; the participation of more controlled individuals was better predicted by another, more objective, set of factors about the individual's situation (Eisenstadt & Powell, 1987). If highly expressive individuals were more likely to report their needs, then the relationship between program participation and expressiveness with these families is logical. In contrast, if less expressive individuals reported fewer of their needs, then program planning on this basis would be more difficult. Thus, with less expressive families, it seems that service providers may have based the intensity of the intervention on more objective client factors instead of focusing exclusively on reported needs.

The second factor predicted to influence disclosure tendencies is negative network orientation. Negative network orientation extends beyond simple comfort with self-expression to convey "a set of expectations, or beliefs that it is inadvisable, impossible, useless, or potentially dangerous to draw on network resources" (Tolsdorf, 1976, p.160). Individuals possessing this set of beliefs would find reporting perceived needs to others to be, at best, a waste of time, or at worst, actually a dangerous activity. Evidence suggests that people with more negative network orientations have smaller actual and perceived social networks and less expressiveness about personal and private affairs (Vaux et al., 1986). Thus, one would expect that negative network orientation would negatively moderate whether perceived needs are actually reported. Hence, people with negative network orientations would be expected to report fewer needs, both as

a direct result of their cognitive expectancies and mediated through a reduced general comfort with self-disclosure. The expectancies and discomfort with disclosure associated with negative network orientations also would be expected to reduce the perceived and reported availability of usable informal social support. Indeed, past work supports smaller social networks among people with negative network orientations (McKinlay, 1973; Tolsdorf, 1976).

The final factor expected to negatively moderate whether perceived needs are reported is past involvement with child protective services (CPS) as a parent. History of involvement with CPS may impede full reporting of needs because families often view that a stigma is associated with reporting the presence of needs and fear that reporting needs might provide justification for removal of their children from their homes (Ahluwalia et al., 1998; Faver et al., 1999). This stigma is likely to be particularly pronounced among families who have received services from CPS providers who have not adopted client-centered service delivery approaches. Data collection in the current investigation utilized a group of community health research interviewers that shared similar backgrounds to the participants and did not carry the professional "nurse" or "social worker" titles that are frequently associated with CPS removal experiences. Typically individual rapport was quickly established and nurtured through repeated interviews by the same worker at each time point. However, even with these efforts to provide optimal circumstances for disclosure, it was possible and even likely that a past investigation by Child Protective Services agency representatives in the county had reduced participant comfort with disclosure and decreased her actual

reporting of needs to the interviewer. Thus, prior involvement with CPS as a parent was expected to have a direct negative influence on reporting needs as well as an indirect effect by reducing comfort with self-disclosure.

Summary. Very little research specifically could guide predictions about influences on mothers' reporting of their needs. However, a variety of more peripherally related literatures supported the development of a model to explain the complexity of observed disclosure about needs. Reported needs were hypothesized to be influenced not only by expected needs, but also by factors that influence general self-disclosure tendencies, the individual's state, and the personal and social resources that were available to manage situations without formal assistance. Testing the usefulness of this model in predicting reported needs of low-income pregnant women was expected to provide valuable information about the need identification and the disclosure process. Thus, the aim of the first stage of the current study was to examine whether an observed set of data taken from low-income pregnant women fit the hypothesized set of relationships predicting reported needs as presented in Figure 1. More specific information about the sample providing the data, the measures, analysis methods and findings follows.

METHODS

Sample: Michigan Maternal Health Services Study Recruitment Sample and Primary Study Design.

This dissertation study was undertaken using secondary analysis from the existing Michigan Maternal Health Services Study data source[6]. The Maternal Health Services Study was a multi-site randomized controlled trial conducted to examine the effectiveness of a home-based intervention program with a broad community sample of Medicaid eligible pregnant women. Medicaid-eligible participants meeting inclusion criteria and consenting to participate were randomly assigned to either an experimental group receiving Nurse-Community Health Worker Team care intervention or a comparison group given standard of care nurse home-visiting intervention[7].

Treatment Conditions. The broad aims of both interventions were to improve maternal health, life course development, birth outcomes, and subsequent parenting and infant development among families with low incomes at high risk for psychosocial and developmental difficulties. Both treatments incorporated a home-visiting approach and provided transportation assistance to increase participation in prenatal care. Service providers in both groups also were trained to assess individual client needs and use educational interventions and referrals to community agencies to increase client capacity and improve outcomes. However, the programs differed in who the service providers were,

[6] Approval from institutional review boards responsible for protecting the rights of human subjects was obtained at both Spectrum Health and Michigan State University. The associated approval numbers were Spectrum Health Research IRB # 2001-115 and MSU UCRIHS # 01-569.

[7] The provision of nurse home-visiting is a Medicaid entitlement for all low-income pregnant women in the state of Michigan. Thus, the use of a no-treatment control group was neither ethical, nor practically feasible for this study.

how the intervention was delivered, and the level of integration between the service providers and health services in the community. More specific information about each of these programs is written below and comparative information is provided in Table 1.

Treatment A: Maternal and Infant Support Services Standard of Care (SOC). The standard of care treatment in the community was a maternal/infant support service that received referrals from community agencies and physician's offices. In Michigan, all Medicaid-eligible pregnant women are entitled to receive maternal support services (MSS) from a nurse throughout pregnancy and the first two months after birth. Families meeting basic psychosocial risk criteria are further entitled to nurse-provided infant support services (ISS) during the remainder of the infant's first year of life. Typically, families were connected to the services through direct (referral to agency) or indirect (via provision of information about MSS/ISS services to the client) referrals from obstetric and pediatric clinics. Once a provider referral or client request for services was received, a MSS/ISS nurse was assigned to the case based on the client's geographic region and provider caseloads. The nurse conducted an assessment visit and provided case management to eligible and interested clients according to a jointly developed care plan. Throughout the duration of the relationship, the nurse established contact with the client, repeatedly assessed the health status and needs of both mother and child, and distributed bus tokens or cab vouchers to subsidize transportation to health clinic appointments as needed. The nurse also answered questions and provided whatever educational interventions were deemed appropriate around issues of nutrition, parenting, risky behaviors, health practices, pregnancy, and infant development and care. Nurses often focused service delivery on health concerns of the client and her child and offered referrals to other community agencies for assistance with basic needs or mental health services. Referrals to nutritionists and social workers within the agency were encouraged. Assistance was provided during home visits, with reimbursement for up to a maximum of 9 visits prenatally and 9 visits postnatally without special approval. Prior to the beginning of the trial, an estimated 50% of Medicaid-eligible women in the community received a mean of 4 actual visits prenatally and 5 visits postnatally. As the research trial commenced, supervisors began documenting the number of staff home visit contacts per day to continue to implement the standard of care community intervention according to its intended model.

Treatment B: Nurse-Community Health Worker Team Care (Nurse - CHW Team care). This intervention approached treatment in the home setting from a more holistic, relationship-based perspective. The intervention was developed from an ecological stress process theoretical framework in which a professional nurse and a community health worker (CHW) function as a team with traditional health care providers to increase environmental and personal resources and reduce stress and stress responses among low-income pregnant women (for further information about the conceptual basis of the intervention, see Roman, Lindsay, Moore, & Barton, in preparation). Highly trained CHWs worked in teams with nurses to establish rapport with clients by building on a common framework of understanding through their shared backgrounds. Within the context of this non-threatening relationship, interventions were introduced that responded to and anticipated the unique circumstances of the client's broad situation. Interactions focused on building capacity to identify and use informal support networks, setting goals, building basic life skills (e.g., budgeting, time management), identifying choices and improving healthy behaviors and reducing risky ones, understanding issues of pregnancy, supporting positive parenting, bolstering knowledge of infant care and development, and enhancing appropriate use of resources from the community to help individuals achieve their goals. Often assistance was geared toward shoring up basic needs and building capacities as a core foundation that could be used in future interactions. Issues of communication and sustaining effective interpersonal relationships often were addressed in the context of the CHW-client relationship. Nurses guided the intervention delivered by CHWs and met with the client periodically to assess, monitor, and provide education and care regarding maternal and child physical health concerns. Meetings between nurses, CHWs, social workers, nutritionists, social service workers, and primary care staff acted to avoid duplication of services and meet client needs in a more integrated way. This intervention employed core principles of relationship-based support to empower individuals and promote maternal and child health and development. The treatment especially sought to influence women's perceived stress, rates of depressive symptoms, psychosocial resources (self-esteem, mastery, social support) and life course development (education, unintended repeat pregnancies, and job participation). A curriculum designed to address these issues in the context of pregnancy and parenting provided a foundation for the intervention, but it was individualized to address each client's unique situation and concerns. Secondary intervention benefits were expected in the domains of parenting and child health and development.

Eligibility. The overriding goal in selecting eligibility criteria for participants in the primary study was to consider the effectiveness of using a mixed service

provider model versus a nurse home visiting model of maternal support services within a broad community setting. Thus, a conscious effort was made to consider the impact of treatment under usual clinical conditions (an effectiveness study) and broadly targeted populations, rather than under ideal conditions (an efficacy study). To this end, research participation was *not* limited strictly to primiparous adolescent mothers or to mothers of certain ethnic backgrounds. Rather, it was available to the full breadth of low-income, pregnant women entitled to maternal support services in Michigan. Eligibility criteria (See Appendix A) were determined based on the requirements that each woman: could receive the randomized intervention (i.e., was entitled to it based on Medicaid eligibility, pregnancy, and residence within Kent County, Michigan, and did not have an ongoing relationship with standard of care group health nurse prior to initiation in the study), was influenced by existing state requirements for work and eligibility for entitlement benefits (i.e., is at least 16 years of age), and had not been diagnosed or received treatment[8] for any pre-existing mental health conditions in the last two years. In addition, data collection was administered in either Spanish or English, so individuals were required to speak one of these languages in order to participate. Notably, eligibility was <u>not</u> influenced by whether or not individuals had literacy skills, a telephone, reliable transportation, or stable housing. Indeed, significant efforts were undertaken during the

[8] Individuals were asked if they had received medications or mental health therapy for any mental health condition in the last 2 years. Examples of conditions specifically mentioned by name in the eligibility screening included depression, bipolar disorder, schizophrenia, delusional disorders, multiple personalities, panic attacks, and post traumatic stress syndrome.

recruitment process specifically to include more difficult to serve women and to closely mirror the target population for local health department programs.

Recruitment. Study participants were recruited from four prenatal clinic sites that provided health care to underserved, Medicaid-eligible women of diverse ethnicities. Clinic staff supplied the research staff with the contact information for all individuals who had called or visited the clinic to schedule an initial appointment for obstetric care. Identification of potential participants was not based on any professional referrals or even attendance at the scheduled prenatal appointment, thus reducing a common source of selection bias found in many studies.

Recruitment into the research and subsequent data collection were conducted by six community health research interviewers. These individuals spanned diverse ages, ethnicities, and education levels. Many of them shared similar past experiences to the study participants and were skillful in rapidly establishing rapport with individuals and explaining research questions and concepts in a non-threatening manner. Each individual received extensive training and ongoing feedback regarding research interviewing, professional expectations, and data collection quality improvement. The Maternal Health Services Study team expended considerable effort to enroll and maintain the hardest-to-reach women in the research, including those without telephones, transportation, and who repeatedly were not present at scheduled appointments (for more information, see Roman, Lindsay, Moore, Barton et al., in preparation). Throughout the duration of the longitudinal study, these interviewers were

masked to differences between the two interventions and to knowledge about which intervention group each client had been randomly assigned to receive.

Between January 1997 and August 1998, 613 pregnant women (mean 11.9 weeks gestation) were enrolled into the research study, completed baseline interviews, and were randomly allocated to treatment group (for more specific information about study design and recruitment, see Roman, Lindsay, Moore, Barton et al., in preparation). Single blind randomization was conducted using a computer generated randomization schedule placed in sealed opaque envelopes in blocked groups of four, and stratified on site and level of need for social support (high or low). Need for social support was estimated using the baseline interview Support Functions Scale (SFS) score (Dunst & Trivette, 1988). High need was defined as a score of greater than the median value of 60 measured during a preliminary study with similar women. Lower need was defined as a SFS value below this median cutoff.

Sample: Dissertation Subsample.

Eligibility. Study aims were examined in the subset of Michigan Maternal Health Services Study participants that delivered a live birth with intent to maintain custody of the child and who completed the late pregnancy research interview (typically at 34-38 weeks gestation). One-hundred seventy-five individuals were excluded from the analysis sample based on these criteria, resulting in a final sample of 438 individuals (see Appendix B for a breakdown of cases excluded).

Although statistical imputation of missing data was considered to permit inclusion of all study participants, imputation was not deemed to be conceptually defensible when either of these eligibility conditions was not met. The imputation of developmental information about a child that was never born would be meaningless. The exclusion criteria based on the presence of the 34 week research interview is a more unusual case. However, a focal interest in this study was to examine individual differences in need reporting tendencies. The measurement of these reporting tendencies is described in more depth later in the methods section, but it required extensive information from both the enrollment and the 34 week research interview. Imputation of all information from the 34 week research interview in more than a minor subset of individuals could substantially confound actual individual differences in reporting tendencies with error associated with the missing data imputation process. Thus, in this case, imputation could seriously compromise the meaningful interpretation of analysis results. Even if the characteristics of the sample were slightly modified by exclusion of cases, it was determined that meaningful results about reporting tendencies in more circumscribed sample population would provide a greater contribution to the literature than ambiguous findings in a more representative population. That said, the exclusion criteria were not found to alter the characteristics of the sample population too dramatically.

Sample Characteristics. Table 2 describes the demographic and psychosocial characteristics of the study participants. Comparisons also are provided between study participants and those excluded from the analysis

subsample. A significant difference between groups appeared in weeks gestation at enrollment into the study (t (1, 611) = 3.24, p = .001). Individuals excluded from the dissertation subsample enrolled in the study significantly earlier in the pregnancy than those who remained in the subsample. However, this finding of a difference in weeks gestation at study enrollment was anticipated because of its association with incidence of the spontaneous abortion exclusion criteria[9] ("Abortion," 1993). Unexpectedly, a higher proportion of those excluded from the subsample were unmarried (χ^2 (1, 612) = 4.54, p = .033). Further investigation found this difference primarily resulted from a higher proportion of divorced, separated, or widowed marital statuses among those participants excluded from the secondary analyses.

Overall, the sample characteristics were similar to many groups of low-income women targeted for services during pregnancy. Most participants were 20-24 years of age. The sample was not skewed with an unusually high proportion of individuals at either end of the child-bearing age spectrum. Approximately one-tenth of the group was under 18 years (11.0%) and one-tenth was 30 years or older (9.4%). Most individuals in the sample described themselves as Caucasian (41.6%), African-American (26.5%), or Hispanic[10] (23.1%). Fifteen percent of the group had immigrated to the United States from another country. Less than 20 percent of the sample was married, however, nearly half (47.5 %) of the individuals in the sample lived with the father of the

[9] More than 80% of spontaneous abortions occur in the first 12 weeks of pregnancy. Thus, individuals excluded from the study due to the occurrence of a spontaneous abortion would disproportionately be sampled from individuals who enrolled in the study during the first trimester.
[10] Most of the individuals who identified themselves as Hispanic were of Mexican origin.

baby at study enrollment. Forty-three percent of the women were employed either part-time or full-time at the outset of the study. Forty-four percent of the sample was primiparous; the other participants had delivered anywhere from one to seven previous live births. Many women in the study had experienced some form of abuse, with over half reporting physical (50.9%) or emotional (55.1%) abuse during their lifetimes and over one-fifth surviving sexual abuse (21.1%). These experiences, as well as ongoing financial struggles may help explain the high incidence of depressive symptoms (56.6% over cutoff) and perceived stress[11] among this group.

Data Collection.

Participants were interviewed shortly after scheduling an appointment for obstetric care, again at 34-38 weeks gestation (late pregnancy), and 6 weeks, 6 months, and one year after delivery. Medical records were abstracted following each child's birth and developmental assessments were conducted with the infants at approximately 6 and 12 months of age. Secondary analyses primarily utilized data from enrollment and late pregnancy to test the first conceptual model. Specific information about measurement of key constructs follows.

Measurement of Variables.

Most instrumentation utilized for this study was selected by the principal investigators for the Michigan Maternal Health Services Study. In the selection process, investigators particularly attended to: a) the appropriateness of

[11] Scores on the PSS instrument could range from 0 to 56. While standard deviations were similar, the sample mean among women in this study was 3 points higher than reported in 2 samples of college students (M = 23.18 & 23.67, SD = 7.31 & 7.79), 1 point higher than individuals attending smoking cessation classes (M = 25.0, SD = 8.00), and 6 points higher than a probability sample of women in the United States (M = 20.2, SD = 7.8) in the instrument validation study (Cohen, Kamarck, & Mermelstein, 1983; Cohen & Williamson, 1988).

instrument length, content, and language for a low-income, low-literacy, and ethnically diverse population, b) the theoretical basis of instrument development and consonance of construct measured with conceptual model being investigated, and c) the instrument's established reliability, validity, and usefulness in prior research in the field. Following is a list of constructs tested in the conceptual model predicting reported needs and the manner in which these constructs were operationalized.

Perceived Stress. Perceived stress was measured using a 14-item, five point likert-type scale developed by Cohen, Kamarck, and Mermelstein (1983). The Perceived Stress Scale (PSS) was created to measure "the degree to which situations in one's life are appraised as stressful" with items designed to "tap the degree to which respondents found their lives unpredictable, uncontrollable, and overloading" (Cohen et al., 1983). Past studies reported strong correlations for the PSS with life-event scores, depressive and physical symptomology, utilization of health services, and smoking reduction maintenance (Cohen et al., 1983). The PSS has proven to be a more effective predictor of stress-related outcomes than life event scores (Cohen, 1986; Cohen et al., 1983; Cohen & Williamson, 1988). Regression models also have found negative events at time one to be significantly related to time two physical symptoms, depressive symptoms, and PSS scores (Linville, 1987). Coefficient alpha reliability of greater than .84 has been reported across three samples and test-retest reliability after a two-day period was .85. The PSS has been used in other studies involving pregnant women (Lowenkron, 1999; Ludman et al., 2000) and individuals with low-

incomes (Lobel, Dunkel-Schetter, & Scrimshaw, 1992). Participants in this study self-reported responses to the PSS upon enrollment to the study and again in late pregnancy (typically 34-38 weeks gestation).

Depressive Symptoms. The Center for Epidemiologic Studies – Depression (CES-D) Scale was used to measure the occurrence of depressive symptomology in the study sample. The scale was developed to examine the presence of depressive symptoms in the general population rather than to confirm a clinical diagnosis (Radloff, 1977). The scale includes 20 items representing components of depressive symptoms, including: depressed mood, feelings of guilt and worthlessness, feelings of helplessness and hopelessness, psychomotor retardation, loss of appetite, and sleep disturbance. Individuals reported the frequency of occurrence of each symptom in the one week prior to the interview. These responses were systematically coded on a 4 point (0-3) Likert-type scale. Coefficient alphas across three general population and one psychiatric population samples were all greater than .84 (Radloff, 1977). Coefficient alphas among pregnant women were .83 or higher (Mercer & Ferketich, 1988). Test-retest correlations were found to be moderate (.48 - .67 from two week to two month time intervals) (Radloff, 1977). High test-retest reliability was not expected given shifts in depressive symptoms over time in a general population and scale measurement of symptoms across only a one-week period. As anticipated, higher test-retest correlations were observed in individuals with a shorter time lag between tests (Radloff, 1977). Studies have found increases in CES-D scores when individuals reported experiencing negative life

events and reductions in scores following therapeutic treatment for depression (Radloff, 1977). The CES-D has been widely used as a research tool. Numerous other studies have established its validity or observed expected outcomes when using this scale with large scale community studies (Craig & Van Natta, 1976; Myers & Weissman, 1980; Turner, Lloyd, & Roszell, 1999), primary care populations (Zich, Attkisson, & Greenfield, 1990), pregnant women (Collins, Dunkel-Schetter, Lobel, & Scrimshaw, 1993; Mercer & Ferketich, 1988; Zuckerman, Amaro, Bauchner, & Cabral, 1989), women of color (Hickey, Cliver, Goldenberg, McNeal, & Hoffman, 1995; Melchior, Huba, Brown, & Reback, 1993; Munoz, Gonzalez, & Starkweather, 1995; Roberts, 1980; Woods, Lentz, Mitchell, & Oakley, 1994), and low-income populations (Collins et al., 1993; Melchior et al., 1993). Participants in this study self-reported responses to the CES-D upon enrollment to the study and again in late pregnancy (typically 34-38 weeks gestation).

Social Support. The Multidimensional Scale of Perceived Social Support (MSPSS) was used to measure subjectively assessed social support. The MSPSS is a 12-item measure of individual perceptions of available social support from family, friends, and significant others (Dahlem, Zimet, & Walker, 1991). The scale has been reported to have an alpha coefficient of .88 or higher, test-retest reliability of .85, and has demonstrated an inverse correlation with depression scores (r = -.25) (Dahlem et al., 1991; Zimet, Dahlem, Zimet, & Farley, 1988). The individual subscales for support of family, friends, and significant others also have demonstrated these characteristics. Studies have replicated the original

factor structure of the scale and have shown that the scale scores have little relationship to established social desirability measures (Kazarian & McCabe, 1991). The MSPSS has established its validity or displayed expected outcomes among psychiatric outpatients, pregnant women, adolescents, battered women, incarcerated women, and homeless populations (Barnett, Martinez, & Keyson, 1996; Canty-Mitchell & Zimet, 2000; Cecil, Stanley, Carrion, & Swann, 1995; Eker & Arkar, 1995; Singer, Bussey, Song, & Lunghofer, 1995; Wu & Serper, 1999; Zimet, Powell, Farley, Werkman, & Berkoff, 1990). The scale was adapted to a five point Likert-type format for effective use with the low-literacy population in this sample. This study utilized self-reported ratings of the 4-item family subscale of the MSPSS recorded at the late pregnancy interview.

Availability of social network. In addition to the measure of perceived social support from family, two author-designed questions measured the availability of social support from family and the father of the baby. At the late pregnancy interview, individuals were asked "Thinking about the whole time from the enrollment interview to now, how often has the father of your baby been *positively* involved in your life?" Responses ranged from "Never" (5) to "Always" (1) using a Likert-type format. The question was then repeated regarding positive involvement of family during the time period. Responses to these questions gauge the frequency with which network individuals were available to offer positive support to the participant.

Received support from social network. In addition to the measures of perceived social support from family and availability of family and the father of

the baby, one author-designed question measured the receipt of social support from family and the father of the baby. At the late pregnancy interview, individuals were asked "Who has been important in helping you throughout this pregnancy?" The question was open-ended and individuals were encouraged to identify as many people as they wished who had been important sources of support to them throughout their pregnancy. Answers were coded as two separate dichotomous items identifying whether (1) or not (0) the participant had identified the father of the baby/partner as a source of help and if the participant had identified any family member or relative in this capacity. Responses to these questions gauge the extent to which participants viewed themselves as actually receiving significant instrumental support from their spouses or family members during the time period of the study.

Perceived Personal Control[12]. The perceived personal control construct includes three different indicators – mastery, self-esteem, and mothering ability esteem.

Mastery. Mastery was measured at the enrollment interview using the seven-item Sense of Mastery Scale developed by Pearlin and his colleagues (Pearlin et al., 1981; Pearlin & Schooler, 1978). The scale was designed to measure "the extent to which people see themselves as being in control of the forces that importantly affect their lives" (Pearlin et al., 1981). Participants rated

[12] Although the elements measured in this construct also underscore key elements in the construct of empowerment, I have chosen to refrain from using this term because research has demonstrated that empowerment is contextually embedded (Foster-Fishman, Salem, Chibnall, Legler, & Yapchai, 1998) and requires a contextual analysis to be fully understood (Zimmerman, 1990a). This analysis focuses more on the individually-oriented conceptions of empowerment as primarily a personality variable at one point in time (rather than as a developing process, see Kieffer, 1984) . As such, I have chosen the term personal control to avoid erroneous extrapolation to broader work on psychological empowerment.

items from 1 to 4 on a Likert-type scale. Coefficient alpha reliabilities on this brief scale have been reported between .70 -.76 in a group of pregnant women (Mercer & Ferketich, 1988). Both factor analysis and path analysis confirmed that the items represent an accurate measurement model of sense of mastery (Pearlin et al., 1981; Pearlin & Schooler, 1978). Test-retest reliability at a four year interval was .44 (Pearlin et al., 1981). The measure has demonstrated its sensitivity in identifying individual differences in mastery that are related to other constructs. It has been used in research with African-American participants in a home visiting program (Olds & Korfmacher, 1998), pregnant women (Mercer & Ferketich, 1988), adolescents and young adults (Lewis, Ross, & Mirowsky, 1999), inner city women (Ennis et al., 2000), a broader urban community sample (Turner et al., 1999), and single parent and two parent families experiencing employment transitions (Ali & Avison, 1997).

Self-esteem. Self-esteem, or the judgments one makes about one's own self-worth, was measured using the Rosenberg Self-Esteem Scale. Although, the scale was originally developed as a Guttman-type scale, research literature now commonly sums the four point responses (1, strongly disagree to 4, strongly agree) to yield self-esteem scores ranging from 10 to 40 (Blascovich & Tomaka, 1991; Rosenberg, 1979; Silber & Trippett, 1965). Coefficient alpha reliabilities in pregnant women were .84 or greater (Mercer & Ferketich, 1988). Path analysis confirmed that the items represent an accurate measurement model of self-esteem (Pearlin et al., 1981) and this measurement model is maintained even in high-risk samples (Wang, Siegal, Falck, & Carlson, 2001). At a two-week

interval, test-retest reliability was .85 (Silber & Trippett, 1965). Recent studies indicate that the scale measures what "appears to be a relatively stable trait that reflects general life satisfaction and affective symptoms rather than objective functional status" (Torrey, Mueser, McHugo, & Drake, 2000). This is consistent with an earlier finding of the scale's test-retest reliability of .43 at a four year interval (Pearlin et al., 1981). Numerous studies have used the Rosenberg Self-Esteem Scale and have found relationships between the construct and other psychosocial characteristics and outcomes. Studies have utilized the Rosenberg Self-Esteem scale in samples with pregnant women (Hickey et al., 1995; Kemp & Page, 1987; Mercer & Ferketich, 1988, 1994; Terry, Mayocchi, & Hynes, 1996), pregnant adolescents (Bogat, Caldwell, Guzman, Galasso, & Davidson, 1998; Patten, 1981), women of color (Lutenbacher & Hall, 1998; Rini, Dunkel-Schetter, Wadhwa, & Sandman, 1999; Wasserman, Rauh, Brunelli, Garcia Castro, & Necos, 1990; Woods et al., 1994), mothers receiving home-visiting services (Vines & Williams-Burgess, 1994), and low-income families (Banyard, 1999; Burns, Doremus, & Potter, 1990; Lawes, 1992). Study participants self-reported responses to the Rosenberg Self-Esteem Scale upon enrollment to the research study.

Mothering ability esteem. Mothering ability esteem was measured at enrollment into the research study using four items from the Maternal Self-Report Inventory (MSI) (Shea & Tronick, 1982). The MSI is a 100 item inventory (short form 26 items) developed to assess maternal self-esteem. The full inventory includes the following seven subscales: caretaking ability, general ability and

preparedness for mothering role, acceptance of baby, expected relationship with baby, parental acceptance, body image and health, and feelings concerning pregnancy, labor, and delivery. In other studies, the MSI typically has been used to assess maternal self-esteem and expectations about mothering during the perinatal or neonatal period. However, in this study, individuals responded to these questions during pregnancy. The four items utilized loaded strongly on the general ability and preparedness for mothering role subscale and were included in the short version of the MSI to measure this subscale. The items were "I am confident I will be able to work out any normal problems I might have with my baby", "I think that I will be a good mother", "I feel that I will do a good job taking care of my baby", and "I know enough to be able to teach my baby many things which he/she will have to learn". The MSI, including these four items, has demonstrated high correlations with other measures of similar constructs (Shea & Tronick, 1982). The MSI also displayed expected relationships to infant health status, and parity and maintained a four week test-retest reliability coefficient of .85 (Shea & Tronick, 1982). The cronbach alpha for reliability of the MSI short form items specific to the general mothering ability subscale was .88 (Shea & Tronick, 1982). The MSI also was effectively used to investigate the parenting qualities of low-income adolescent mothers of color (East, Matthews, & Felice, 1994).

Perceived personal control construct. LISREL 8.51 was used to confirm that the measurement model incorporating mastery, self-esteem, and general feelings about mothering ability measure elements of the same latent

construct (termed personal control). The path diagram is displayed in Appendix C. The model fit the observed data well (χ^2 (df = 8, n = 438) = 13.26; p = .103; RMSEA = .039; GFI = .99).

Negative Network Orientation. Negative network orientation is "the perspective that it is inadvisable, useless, or risky to seek help from others" (Vaux, 1985). Negative network orientation was measured using the Network Orientation Scale (Vaux, 1985).The scale was designed to measure a person's propensity toward utilizing his or her social support network in time of need. Item-total correlations were found to be consistently positive and high. Coefficient alphas across five samples ranged from .74 to .88 (Vaux, 1985). The scale showed excellent test-retest reliability of .87 across a two-week time interval (Vaux, 1985). Scores on the NOS displayed expected relationships with measures of perceived social support, social network size, interpersonal trust, and interpersonal coping (Vaux, 1985; Vaux et al., 1986). Scores also showed expected differences between individuals who had been abused and those who had not (Vaux, 1985). The NOS has been used effectively with children over 10 years of age (Belle, Dill, & Burr, 1991), in community samples (Vaux et al., 1986), and with psychiatric outpatients (Cecil et al., 1995). Although there is currently some debate about the dimensionality of the factor structure, the measure has still shown adequate relationships to interpersonal trust instruments, social support measures, and has predicted depressive symptoms (Forbes & Roger, 1999; Gruen et al., 1994). At enrollment into the study, responses to the 20 items on a four point Likert-type scale were summed to yield a NOS score such

that higher values represent more positive network orientations. In this study, one item with highest face validity for comfort with self-disclosure was removed from the scale sum and modeled separately (see next section for specific details).

Given the item removal, prior concerns in the literature regarding scale factor structure, and relatively limited use of this scale among low-income pregnant women, factor analysis was conducted with this measure prior to use. Indeed, the original factor structure was not replicated in this sample. Results showed some similarity with other recent investigations on this issue, but were not uniformly consistent (Forbes & Roger, 1999; Gruen et al., 1994). For study purposes, 13 items loading on two factors were extracted. These were labeled network mistrust (e.g., "You can never trust people to keep a secret", "In the past, I've rarely found other people's opinions helpful when I've had a problem", or "If you confide in other people, they will take advantage of you") and "network usefulness" (e.g., "It really helps when you are angry to tell a friend what happened", "When a person gets upset they should talk it over with a friend", or "In the past, friends have really helped me out when I've had a problem"). These factors consist of 7 items and 6 items respectively. Subsequent reliability analysis found that each scale had reasonable internal consistency given item length (coefficient alpha = .76 and .71 respectively), and represent two related but not identical dimensions of the same higher order construct (13 item coefficient alpha = .72). Appendix D includes more specific information about the factor analysis and reliability analysis conducted. Due to the moderate coefficent

alpha in the reliability analysis, the network mistrust and network usefulness scales were both entered into the data model as separate indicators rather than grouped into a revised general network orientation scale.

Comfort with Self-Disclosure. A single item on the Network Orientation Scale with high face validity for comfort with self-disclosure was modeled separately in this study. At enrollment, participants agreed or disagreed on a four point Likert-type scale to the item "It is easy for me to talk about personal and private matters". Higher scores represent greater disclosure comfort.

Prior Involvement with Child Protective Services. Prior involvement with Child Protective Services was measured by a single self-report item asked upon enrollment into the study. Individuals were asked "Have you ever been involved with child prevention/protection services?". Involvement was coded separately for reported involvement as the child or involvement as a parent. The dichotomous variable of reported involvement with child protective services as a parent was incorporated into this study.

Expected and Reported Need Indices. Two separate indices were created based on self-report study data collected from participants. Expected and reported needs indices contained items related to needs about 13 specific areas that clustered into 11 domains. The need domains included information about pregnancy and childbirth, information on parenting and caring for children, educational needs (of respondent), health insurance, employment, housing, food, personal safety, counseling/mental health, drug use, and pregnancy support. All conversations about expected and reported need variables were conducted

during the research interviews by trained individuals who were *not* involved in providing intervention services to any clients.

Reported needs index. The reported needs index was based upon a series of questions that research interviewers asked participants at 34-38 weeks gestation about each area of need since enrollment into the research study. Individuals were told to reflect on their needs and concerns during the elapsed time from enrollment until the late pregnancy interview. Then, they were asked, "Since you enrolled in the study on (date given), did you have a need or concern about/with/for/related to (insert area of potential concern)?" Individuals received 2 points on the reported need index for each "yes" response and 0 points for each "no" response to questions[13]. Table 3 contains the specific questions asked on the reported needs index.

Expected needs index. The expected needs index was based on specific descriptive information provided by the participant about her situation that would suggest a need would likely exist, but did not require her to state that she possessed that need in her response. So, for instance, participants who reported never delivering a live birth before were expected to have a need for information about childbirth. The information used to construct an expected level of need for each area was primarily taken from data collected at the pre-randomization baseline interview when participants enrolled into the research study. The only exceptions were in the domains of employment, housing,

[13] Please note that this choice to adopt a dichotomous measure of simple presence or absence of needs across each domain probably minimized the extent to which individual differences in interviewer abilities to elicit communication and individual differences in clients' abilities to skillfully describe their needs influenced the level of actual reported needs. Future research that utilizes more open-ended measurement strategies may wish to explore these variables as predictors of reported needs as well.

personal safety, and drug use. In these domains, it was determined that a more accurate level of expected need during the pregnancy period could be obtained by coupling information taken at enrollment with information about status changes that occurred between enrollment and the 34-38 weeks gestation interview. Individual information from participants was used to categorize the participant anywhere from 0 (low) to 2 (high) in level of expected need for that area of concern. Table 3 contains the specific information extracted to generate the expected needs index scores in this study.

Need index characteristics. The participant distributions of expected needs and reported needs are depicted in Appendix E. Expected needs were fairly normally distributed within the sample, with scores ranging from 1 to 21.50[14]. In general, reported need scores were lower than expected need scores although the range of values (0 to 22) was quite similar. Data were influenced by the two point intervals associated with reported needs, but still retained a fairly normal curvature across scores. Finally, the distribution of difference scores calculated between reported need and expected need index scores also is shown in Appendix E. The data depict remarkable variability in reporting patterns. Difference scores ranged from -14.50 to +11.50. These scores were fairly normally distributed around a mean of –1.88 with a standard deviation of 4.66. Thus, the indices created for the study demonstrated good data characteristics for use in subsequent analyses.

[14] Participant scores on both the expected and reported need indices could range from 0-26.

Data Analysis.

Missing Data Imputation. Missing data were imputed in multiple stages. For enrollment information there was very little missing data. All study participants had virtually complete enrollment data. Missing data were typically due to interviewer error (e.g., inadvertently skipping a question) and occurred on multi-item scales. In each case, less than one percent of the participants had missing data and less than twenty-five percent of data were missing from each individual case on the scale. Scores were prorated based on the remaining information from the scale. If the scale had established subscales, then data imputation was based on these subscales instead of the whole scale.

At the late pregnancy interview, there also was very little missing data utilized for analysis. This was primarily due to the established eligibility criteria requiring completion of the late pregnancy interview for inclusion in the analyses involving reported needs (see eligibility section of methods for further justification and explanation). Thus, with regard to conceptual model 1, the only instances with missing data involved situations where single items were skipped (i.e., typically due to interviewer error). When items were skipped on a scale, scores were prorated using the same process as described earlier with enrollment data. There were a few cases where a single reported need item was missing from the interview. In these cases multiple regression was used to develop a predicted value based on other reported needs and expected needs. Again, overall less than one percent of data analyzed was missing and each case had more than seventy-five percent of information completed.

Analytical Methods. The hypothesized conceptual model was investigated using structural equation modeling with LISREL 8.51 software (Joreskog & Sorbom, 1996). The observed covariance matrix of variables was compared to what would have been expected given the set of interrelationships depicted in the hypothesized model. The model was tested using both a structural and a manifest model. The structural model incorporates the measurement models for latent constructs into the analysis, whereas the manifest model explores interrelationships between measured variables rather than latent constructs (Schumacker & Lomax, 1996).

Data from the two intervention groups were combined to test the first conceptual model. Three factors were considered before collapsing the groups. First, the reported needs that comprised the outcome variable in this conceptual model were recorded by research interviewers that were not part of either intervention group. Therefore the recorded responses of participants should not have been impacted by subtle programmatic biases or by differential responses of participants to the distinct interventions. Secondly, neither program specifically targeted changing individual tendencies in reporting needs as a focal goal of the intervention. Thus, while active intervention involvement might alter client behavior or the amount of help received (e.g., for drug use), the intervention was considerably less likely to have a substantial impact on perceptions and reported needs themselves. Finally, only one significant difference was found between intervention groups on the thirteen reported needs that comprise the reported need index (see Table 4). Pregnancy education was

the only reported need area showing a significant difference between intervention groups. This significant difference was only observed among 16-19 year olds in the study and there was no pattern of similar trends with this adolescent group between intervention groups on other variables. Since no consistent pattern of significance was observed and one difference was expected based on chance alone, the effect was viewed not to be strong enough to require separate examination across intervention groups. Hence data from individuals in both intervention groups were collapsed for model testing.

RESULTS

Manifest Model.

Structural equation modeling was employed to investigate whether the observed relationships between measured variables reflected those predicted in the first conceptual model (see Figure 1). The statistical properties of variables necessitated some modifications to the hypothesized model during the course of analysis.

Model Adaptations. First, involvement with Child Protective Services (CPS) as a parent was dropped as a variable from the model. Given that nearly 45 percent of the sample was primiparous and over 85 percent of multiparous individuals did not report contact with CPS, the variable was highly inflated with zero values. The restricted variance coupled with the inflated zero values posed considerable challenges for parameter estimation (especially as a single item indicator in the structural model), and it was dropped from the model.

Careful examination of the data also revealed correlations greater than .60 between perceived stress and depressive symptoms measures. While existing literature had suggested strong relationships between these variables (Ludman et al., 2000; Sachs, Hall, Lutenbacher, & Rayens, 1999), the presence of this characteristic created severe multicollinearity problems. The relationships observed in one variable were altered when the other variable was added to the model. This problem persisted even after attempts to center both variables and to use the categorical rather than continuous measure of depressive symptoms. Hence, perceived stress and depressive symptoms were collapsed into one

variable (stressor responses) by summing the z-scores obtained on the measures of perceived stress and depressive symptoms collected at enrollment and at the late pregnancy interview.

Preliminary examination of the measurement model for perceived personal control suggested that although mothering ability esteem loaded on the control construct, the relationship was somewhat weaker than that observed for mastery and self-esteem. Thus, each of these variables was examined individually prior to collapsing them in the manifest model. Mastery and self-esteem revealed similar relationships to other variables, with only minor deviations in strength of relationships observed[15]. However, mothering ability esteem demonstrated opposite relationships to reported need. Mastery and self-esteem were collapsed into a single variable by summing z scores on both from the enrollment assessment, whereas enrollment mothering ability esteem was separated and included as a distinct variable in the model.

Model Fit. Generally, the hypothesized model of influences on reported needs was supported (See Figure 2). Appendix F contains the means, standard deviations, and correlations that were used in the analysis. The normal theory least-squares weighted chi-square for the overall model ($df = 29$, $n = 438$) was 19.86 ($p = .90$), suggesting that the model fit the data well. The chi-square measures the discrepancy between the covariance matrix of relationships observed in the sample and the estimated matrix from the model (Schumacker & Lomax, 1996). The Root Mean Square Error of Approximation (RMSEA)

[15] Mastery was more strongly related to both reported needs and social support than self-esteem, but differences between them were relatively minor.

(Steiger, 1990) was 0.0, indicating exact model fit (Brown & Cudeck, 1993). Other indicators of good model fit also supported adoption of the model (Goodness of Fit Index (GFI) = .99; Comparative Fit Index (CFI) = 1.0; See Appendix F for other indicators of fit). These results were found using maximum likelihood parameter estimation techniques. Similar findings also were observed when data were re-analyzed using generalized least squares approaches. The model fit criteria using generalized least squares were nearly identical (normal theory least-squares weighted chi-square (df = 29, n = 438) = 22.99, p = .78; RMSEA = 0.0, GFI = .99, CFI = 1.0; See Appendix H for other indicators of fit). Figure 3 displays the path estimates using generalized least squares approaches. No path estimates deviated in the direction of relationship or in statistical signficance status from the maximum likelihood model. All of path estimates were within .03 of the estimates in the maximum likelihood model.

Observed Effects. The adopted model included statistically significant hypothesized relationships in the expected directions between expected and reported need index scores, expected needs and stressor responses, mastery/self-esteem and stressor responses, mastery/self-esteem and social support. Heightened stressor responses were significantly related to higher reported needs. This effect was found with both perceived stress and depressive symptoms collapsed together and with each measure individually, whereas a positive relationship to reported need was only predicted for perceived stress. Neither level of social support nor indicators of network orientation displayed significant relationship to reported needs. However, greater comfort with

personal disclosure was surprisingly related to less, rather than more, reported needs. Of disclosure-related indicators, only network use usefulness displayed the expected significant positive effect on social support.

Contrary to predictions, personal control in the form of mastery and general self-esteem exhibited a statistically significant positive relationship to reported needs. However, more specific mothering ability self-esteem showed the expected (although non-significant) negative relationships to reported needs. These relationships from general mastery/self-esteem and maternal self-esteem to reported need were retained even when a path from general mastery/self-esteem to mothering ability self-esteem was included in the model. The added path indicated a statistically significant relationship (standardized estimate = .29). With the inclusion of this path, the overall model fit, although still indicative of a close fit, did deteriorate (minimum fit function chi-square (df = 27, n = 438) = 38.53; RMSEA = .031; GFI = .98; CFI = .98). The direction and significance of the paths of interest remained unchanged (general mastery/self-esteem to reported needs estimate = .13; mothering ability esteem to reported needs estimate = -.08). See Figure 4 for the complete model of estimates following inclusion of the personal control path using maximum likelihood estimation approaches. Indicators of overall model fit for Figure 4 are listed in Appendix I.

Although not included in the conceptual model, maternal age also was tested to consider whether it was confounding other relationships in the model. Age was included as an exogenous variable impacting reported need. Regardless of whether age was modeled as a continuous variable or a

categorical variable (≤ 18 or ≤ 19 both modeled), the standardized path estimate to reported need was not statistically significant (consistently standardized path estimate = -.01). Other paths in the model also remained unchanged. So, maternal age was not included in the final model.

Structural Model.

Structural equation modeling also was used to examine whether the hypothesized interrelationships between variables were modeled effectively at the latent construct level as well as the observed variable level.

Model Adaptations. For the structural model, expected and reported need indices were broken into three indicators based on conceptual factors. Lack of information about pregnancy/childbirth and lack of information on parenting/caring for children were combined into a parenting factor. Education, health insurance, employment, housing, food, and pregnancy support were collapsed into a basic needs factor. Finally, personal safety (including domestic abuse), counseling/mental health, and drug use were collapsed into a high risk life experiences factor. Index scores were summed for each factor and utilized as indicators in the structural model.

The two factors generated from the network orientation scale (mistrust network and network use usefulness) as well as the single item from that same scale representing disclosure comfort were modeled as three indicators of a higher order latent factor titled "disclosure".

The investigation of whether the observed data were adequately described by the conceptual model began with entry of the conceptual model

pattern as shown in Figure 1 (other than the aforementioned modifications to need indicators and the disclosure construct). However, serious problems were encountered with the stress and depression constructs. Both factors had only two indicators and numerous paths to be estimated. This created identification problems with the data. Various steps were undertaken to minimize problems, including the development of two parallel forms of each perceived stress and depression scale to double the number of indicators. However, these efforts were not sufficient, particularly with the considerable estimation demands on the reported need construct. Ongoing multicollinearity problems like those observed in the manifest variable model also were encountered. Thus, I chose to collapse the perceived stress and depressive symptoms constructs and model them jointly as stressor responses.

After creating the stressor response variable, the data still did not closely fit the model. Given that relatively little background was available for predicting model relationships at the outset of the study, I engaged in exploratory examination of the data to investigate whether unforeseen relationships between variables masked an acceptable model fit. Modification indices provided by LISREL based on empirical relationships in the data were considered for theoretically substantive relationships that could be included to optimize the model fit. Throughout this process, care was taken not to violate the precedence rule. That is, correlations between constructs were never estimated if a path, either directly or through a series of indirect paths, already modeled the relationship between the two variables (McDonald & Ringo Ho, 2002).

Substantive additions not initially developed in the conceptual model or the manifest model included a path from expected need to personal control, a correlation between disclosure and expected need, and a correlation between disclosure and stressor responses. The negative relationship from expected needs to personal control would be consistent with the common premise that early life experiences (e.g., abuse history), developmental phase (e.g., experiencing transition to parenthood or multiparous pregnancy), and current life situation (e.g, access to basic life needs) influence each individual's current appraisal of her control over her environment. Likewise, the correlation between expected needs and disclosure represented a relationship between life experiences and one's willingness to trust others with confidential information and share personal information about oneself with them. Finally the correlation between disclosure and stress responses would logically model the relationship between comfort with actual personal disclosure and scores on self-report instruments identifying circumstances of individual vulnerability (e.g., items like: "I had crying spells" or "Felt that you were unable to control the important things in your life") to the interviewer.

Other changes to the model included permitting correlations between residuals that were not explained in the model itself. These residual correlations were based on substantive consideration of the recommended modification indices. The residuals that were permitted to correlate are listed in a table in Appendix K. Each of the relationships indicated is interpretable.

Model Fit. Despite the complexity of this structural model, the hypothesized model of relationships was generally supported. Figure 5 displays the final model of relationships that was adopted. The normal theory weighted least squares chi-square value (df = 224, n = 438) was 547.72, (p = 0.0). Although the chi-square never dropped below the threshold of significance or the rule of thumb of a chi-square value less than twice the degrees of freedom, other fit indicators suggested that this model was an acceptable fit for the data (RMSEA = .058, GFI = .90, Independence AIC = 3171.3, Model AIC = 699.72). Acceptable fit (as opposed to close fit) threshold values are more common in structural than manifest models because the measurement error, as well as the relationships between variables influences model fit. The values of alternative fit indices for this model are listed in Appendix M.

Measurement Models. The measurement models embedded within the larger structural model were effective throughout the model. The measurement model being tested met the necessary condition for identifiability that each indicator loaded on only one latent construct. Indeed, no indicators loaded on more than one construct and each one loaded significantly on the expected latent factor. The only exception was in the case of the Family Helper indicator that was expected to load on the social support construct. In this case, the factor loading for social support was only .02. The Father of Baby (FOB) Helper variable also yielded a low factor loading (.15), however it retained statistical significance. These poor measurement model characteristics for the social support variable are explicable on both empirical and theoretical grounds. First,

both helper variables are author-designed single item measures with less prior validation than other social support indicators in the model. Second, whereas the other three social support items were measured using Likert-type response scales, the two helper variables were scored from participant response to an open-ended question. So, individual differences in response in these diverse measurement methods may have contributed to poorer factor loadings for these variables than for the other three support indicators. Finally, social support is widely regarded as multidimensional construct (Dunst & Trivette, 1988). The five indicators in this model represent 3 different types of social support. The two helper variables were intended to measure received instrumental support whereas the other three indicators tapped available and perceived support. The variability in these types of support as well as in the measurement characteristics of the variables probably produced observed differences in the social support factor loadings. Although the family helper indicator did not load significantly on the social support construct, evidence suggested that this indicator played a critical role in the cohesiveness of the factor structure, perhaps through residual correlations across types of support as well as in the factor loadings. Despite the lack of significant factor loading, the exclusion of this variable from the model resulted in an unstable social support factor and contributed to a lack of convergence in the overall model fit. In addition, the indicator did not load on other factors in the model more effectively than it loaded on the social support construct. Given the empirical and theoretical considerations underlying the low factor loading and the significance of the indicator's inclusion to the factor, the

family helper variable was retained in the model despite the non-significant factor loading.

The measurement characteristics of other variables in the model can be gleaned, in part, from looking at the error terms for indicators. These are listed in Appendix J. These error terms ranged considerably[16]. Nevertheless, each of the indicators other than family helper significantly loaded on the intended factor and contributed to explanations about relationships in the model.

Observed Effects. The adopted model included statistically significant hypothesized relationships in the expected directions on paths[17] from expected need to reported need index factors, expected needs to stressor responses, personal control to social support, and personal control to mothering ability esteem. Heightened stressor responses were significantly related to higher reported needs, as was predicted for perceived stress but not depressive symptoms. As theorized, a negative relationship was observed in the path from social support to reported needs, however, the strength of this path did not reach a statistically significant threshold. Contrary to predictions, but consistent with the findings in the manifest model, personal control as derived from mastery and

[16] One notable problem occurred in the estimation of errors. The error variance listed for the latent factor of reported need is -.74. However, variances are, by definition, positive values. Thus, it is clear that an error occurred somewhere in the LISREL 8.51 estimation process. While this is indicative of a flaw in the software, the discovery of similar problems has occurred by other users and is not necessarily suggestive of problems with other parameter estimates in the model. We are, unfortunately, at the software's mercy until the next program patch is available!

[17] Please note that standardized estimates documented on Figure 5 do not have a maximum value of 1. The LISREL standardization process divides parameter estimates by unity standard deviations, resulting in comparable values, though not scaled to a maximum ratio. Thus, comparisons between paths should be limited to those conducted with ordinal level data. That is, larger numbers represent a stronger relationship. However, a standardized estimate of 4 is not necessarily twice the size of an estimate of 2. One path on each measurement model and the path from expected to reported needs have also been fixed to a value of one. LISREL routinely requires this action for scaling purposes. Fixing the path from expected to reported needs was also critical to support model identifiability of the reported needs construct.

self-esteem indicators displayed positive relationships to reported needs. However, more specific mothering ability self-esteem showed the expected, and now statistically significant, negative relationship to reported needs predicted for the entire personal control construct. The disclosure factor yielded a surprising, statistically significant negative relationship with reported needs similar to that found in the manifest model. However, the strong negative correlation between disclosure and expected needs may underlie the negative relationship observed in the disclosure to reported need path. The expected positive relationship between disclosure and social support appeared, but did not reach a statistically significant threshold. Finally, the expected strong, statistically significant, negative path from personal control to stressor responses observed in the manifest model was not replicated in the adopted structural model. Instead a small nonsignificant positive relationship was observed. However, these contradictory results may be explained by the strong, significant negative path from expected need to personal control that was modeled in the structural, but not the manifest model.

DISCUSSION

The purpose of this investigation was to understand relationships between expected and reported needs among low-income pregnant women. Are these constructs the same? The empirical answer was no. Expected needs *do* form the basis for reported needs. But, expected and reported needs proved to be far from identical constructs. The models tested in chapter 1 provided a number of insights into what factors underlie differences between expected and reported needs.

Influences on Reported Needs.

Expected Needs. Path estimates demonstrated that expected needs formed the basis for the needs that individuals reported. Expected needs yielded powerful direct and indirect effects on reported need. Both manifest and structural models included a statistically significant direct positive path from expected to reported needs. Thus, as assumed in family-centered care models, the presence of relatively objective risk criteria developed by researchers did translate into a higher perception of needs in the personal lives of low-income pregnant women. People who lacked food, housing, personal safety, and experience with caring for children were more likely to express having needs in these areas when asked directly about them. However, the size of the path estimate suggests that while expected needs were influential predictors of reported needs, they did not directly account for nearly all of the variance in reported needs.

Stressor Responses. Expected needs also displayed dramatic indirect effects on reported needs. The presence of higher numbers of expected needs had a significant positive effect on the stressor responses experienced by study participants. That is, people with fulfillment of fewer basic needs and more challenging life experiences (including histories of illicit substance use, physical or sexual abuse) perceived greater stress in their lives and reported more depressive symptoms such as sadness, crying, and changes in sleep, appetite, and social activities. These significantly heightened stressor responses were positively related to greater reported needs. Thus, when expected needs elicited a stress reaction individuals reported significantly higher levels of need to interviewers.

The presence of stressor responses mediating a pathway from expected to reported needs was consistent with existing research. A number of studies have documented perceived stress and depressive symptoms as responses to difficult life events (Brooks-Gunn et al., 2000; Dunkel-Schetter et al., 2001; Kessler, 1997). Thus, the link found between expected needs and stressor responses was not unique to this study. However, less prior investigation has focused on relationships between stressor responses and reported needs. The significant positive effect that was modeled is consistent with a study by Eisenstadt (1987) in which increased levels of perceived stress promoted initial service utilization. Perceived stress may trigger both the self-report of needs and the active response of seeking services for assistance.

The relationship between stressor responses and reported needs also was consistent with work using the health belief model. Although it is the least-studied component of the health belief model, cues to action are expected to trigger preventive health behaviors (Maddux & DuCharme, 1997). External or internal cues are believed to stimulate the belief-action link when an individual perceives a threat and when he or she rationalizes that the benefits of health behavior action outweigh the costs and barriers to act (Strecher et al., 1997). Stressor responses may serve as cues for individuals that create a sense of immediacy to resolve the issues underlying those responses. Data collected in this study were insufficient to test whether stressor responses increased the perception of threat from inaction or, instead, were critical in instigating behavior (i.e., reporting need) in individuals who already perceived a threat but would not otherwise choose to act on that perception. Future research should consider this distinction further to clarify more precisely how stressor responses influence reported needs.

An alternative explanation for the stressor response to reported need effect could include the influence of stressor responses in the process of labeling oneself as "in need" or not. Health research suggests that most people possess some measure of illness or disequilibrium in their lives (Antonovsky, 1987). Yet, considerable variety exists in when people begin to identify themselves as ill and act on these beliefs. Prior work found that individuals labeled themselves on a continuum from healthy or ill depending on their condition along four dimensions: degree of pain, prevention of role and task performance, threat to life, and

external recognition that the condition requires care (Antonovsky, 1973; Gochman, 1997). Since the degree of pain and threat to life are considerably weakened in most of the maternal support services intervention areas, it may require a higher degree of urgency along the other two dimensions to create the failure of functioning and disequilibrium necessary to label oneself as in need of assistance. The presence of heightened stress responses may have contributed to reporting a "need" because the stressor responses interfered with routine role and task performance in daily life.

Finally, the relationship between stressor responses and reported needs could be attributed to shared methodological bias. Questions on the PSS and CES-D pertain to feelings or experiences of vulnerability. For instance, each participant rated the frequency of experiences in which she "felt difficulties were piling up so high that [she] could not overcome them", "felt that [she was] unable to control the important things in [her] life", "had crying spells", or "thought [her] life had been a failure". Individuals who were uncomfortable revealing these experiences to interviewers also may have been uncomfortable reporting about personal needs for pregnancy support, drug use, housing, or domestic violence. However, in the structural model a correlation between disclosure and stressor responses was included to model this more general reporting tendency. Even after the inclusion of the significant positive correlation between disclosure tendencies and stressor responses, a sizeable significant positive path from stressor responses to reported needs remained. Given the strength of this path estimate, it seems unlikely that shared methodological variance could completely

account for the relationship. This is consistent with an older study by Yamamoto and Kinney (1976) in which lie scale scores were significantly correlated with manifest anxiety scale[18] scores ($r = .43$, $p < .01$), but still left sufficient unexplained variance for life event scores and adaptive potential scores also to provide significant, unique contributions in the regression analysis predicting anxiety. Future work may wish to expand the model to include a social desirability component and/or a lie scale to more completely discount the possibility of methodological bias contributing to increased reported needs among individuals with higher levels of stressor responses.

Depressive symptoms. Both perceived stress and depressive symptoms displayed similar relationships within the model when each was included individually. Like perceived stress, higher levels of depressive symptoms were significantly positively related to reported needs. So, the hypothesized positive relationship between perceived stress and reported needs was supported whereas the expected negative relationship between depressive symptoms and reported needs was not. The depressive symptom-related interference in the cognitive processes of appraisal described by Fiske and Pavelchak (1986) and others may have been attenuated by the use of an interviewer engaging the participant in conversation in the research methodology. People who successfully completed the one-hour interview maintained a reasonable level of social interaction throughout the session. So, even individuals who reported high levels of depressive symptoms in the week prior to

[18] Although not included in the stressor response variable used in this study, anxiety is often coupled with perceived stress and depressive symptoms as a response to difficult life events (Nations, Camino, & Walker, 1988).

the interview probably were not exhibiting their highest levels of symptoms during the actual interview session when they reported their needs. Finally, the data in the analyses undertaken did not differentiate whether participants with high depressive symptoms displayed inaccurate self-assessments by over-, rather than under-, estimating their needs. Future research will need to explore if over-reporting occurs among individuals with depressive symptoms or if people with depressive symptoms continue to make accurate appraisals of need in their self-reports. Based on the data provided through investigation of conceptual model one, it appeared that both depressive symptoms and perceived stress operated similarly to increase reported need.

Perceived Personal Control. Contrary to predictions, a direct positive relationship between perceived personal control and reported need was found. Individuals who reported higher levels of mastery and self-esteem also reported more needs to the interviewer. This finding was consistent with work suggesting that empowering individuals also raises their awareness about needs and issues in their lives. For instance, in a qualitative study investigating resistance among mothers in a homeless shelter, one mother said (Koch et al., 1998):

> "I never thought being in the shelter was going to lead to what it led to. Finding out things that you ignore, and you hide....The shelter was positive as far as getting the support and the help and the awareness of what is actually going on in your life, that I kept shutting out." (76)

In this example, as the shelter intervention expanded feelings of personal confidence and worth, individuals were increasingly able to label and confront the difficult truths in their lives. Another study validated this assertion as well. It found that abused women seeking help from a shelter reported higher levels of

abuse and learned helplessness as compared to abused women who had not sought help and to women who had not experienced abuse (Wilson, Vercella, Brems, Benning, & Renfro, 1992).

However, the positive relationship between control and reported need is somewhat inconsistent with existing research finding that individuals with greater personal control generally received fewer visits from service providers in a client-centered home visiting program (Olds & Korfmacher, 1998). Whereas individuals reporting more needs would typically be expected to receive more services, the individuals with high levels of control actually completed fewer home visits. This inconsistency may be explained, in part, by the relationships between control and other variables in the model.

As hypothesized, a strong, statistically significant negative relationship was modeled between manifest control and stressor response variables. Individuals with higher levels of control exhibited fewer stressor responses. So, less frequent home visits to individuals with high control may have been necessary despite the high level of reported needs because service providers did not have to closely monitor and intervene to reduce the depressive symptoms and perceived stress observed. However, closer examination of the data in the structural model suggested that the negative relationship between personal control and stressor responses was a spurious one, generated by links with expected needs. The presence of higher expected needs was related both to increased stressor responses and to reduced perceived personal control. These dual relationships suggest that the heightened frequency of home visits reported

by Olds and Korfmacher (1998) actually reflected intervention sensitivity to the higher expected needs that existed among those low in control.

The finding that both stressor responses and personal control were influenced by expected needs is consistent with Link and Phelan's (1995) assertion that social factors such as socioeconomic status are "fundamental causes" of disease and should be targets for intervention[19]. It is also consistent with work by Turner and his colleagues (1999) documenting that the social distributions for mastery and self-esteem complement those distributions for depressive symptoms and depressive disorders. However, whereas Turner et al. used a series of regressions to assert that mastery and self-esteem largely mediated the connection between socioeconomic status and depressive symptoms, the findings in the present study do not concur (Turner et al., 1999). Using simultaneous estimation within structural equation modeling, I instead found no significant relationship between personal control and stressor responses (including depressive symptoms) after the influences of expected need on each factor were taken into account. It is important to consider that this study differed from Turner's in operational definitions as well as in analytical methods employed. Although all participants in the current study were classified as low socioeconomic status, considerable variation was observed in participants' expected need scores. Thus, using the more refined measurement

[19] Link and Phelan posit that interventions must target these "fundamental causes" of disease rather than any mediating conditions because "in the context of a dynamic system in which risk factors, knowledge of risk factors, treatments, and patterns of disease are changing, the association between a fundamental social cause and disease will endure because the resources it entails are transportable to new situations. If one genuinely wants to alter the effects of a fundamental cause, one must address the fundamental cause itself" (Link & Phelan, 1995, p. 88).

of need rather than socioeconomic status may account for differences in study outcomes.

Mothering ability esteem. To this point, my discussion about the personal control construct has focused on control as defined by mastery and self-esteem. Yet, four indicators measuring general feelings about mothering/maternal ability self-esteem also measured elements of personal control. Contrary to expectations however, these specific esteem appraisals displayed quite different relationships to reported needs than did the general measures of personal control. Whereas general personal control surprisingly exhibited a strong positive influence on reported needs, specific mothering ability esteem displayed the hypothesized negative relationship to reported needs. This relationship was weaker than that observed between the general control construct and reported needs, however, it reached statistical significance when it was modeled at the latent variable level. The finding that individuals with less mothering ability esteem reported greater needs is consistent with prior home-visiting research in which the most beneficial gains from participation (presumably stimulated by intervention in areas of unmet needs important to the client during the intervention period) were documented with primiparous adolescent mothers (Olds et al., 1999).

Personal control and appraisal processes. The findings with regard to the opposite influences of general and more specific constructs of personal control on reported needs raised interesting questions about the self-appraisal process. Do individuals sequentially perceive personal needs, report them,

appraise their prospects for managing the event effectively with various actions, and then implement selected health behavior activities? Or, is the process of appraising one's prospects for managing the event intertwined with whether the event is initially perceived to be, and thus, reported as an existing need? The current study was not designed to test these alternative possibilities. However, embedded in the findings was some support for the latter of these process models.

The results of the current study supported the assertion that people do use general assessments of personal competence and contingency to appraise their prospects for changing a given condition prior to labeling themselves as having a need and reporting it. However, appraisals of personal control did not reduce one's tendency to describe a situation as a need (because presumably one could handle it independently). Instead, strong appraisals of personal control actually augmented one's labeling a given condition as a personal need. A potential explanation could be that individuals attributed a personal need to exist only when the given condition was dissonant from the condition expected based on their general views of their competence and their beliefs that their individual actions had contributed to that condition. For example, study participants without high school diplomas might only have perceived themselves as having needs for further education if they felt that they possessed the capabilities to continue pursuing education successfully (yet had not done so) and believed that their actions to access further education would make a difference in changing their future educational status into high school graduates.

Individuals might tend not to define education as a need if they believed either that they could not successfully complete the required work even if the opportunity arose or that external factors (e.g., cost, logistics of getting to classes, attitudes of a boyfriend/spouse toward attempts to further education), rather than their own actions, primarily influenced their current and future educational status. While this potential explanation is speculative, the current study results did suggest that a foundation of personal control was necessary to report a need. Thus, reporting a need seemed to involve defining that a given condition not only could be changed, but also constituted a personal "need" that the individual would like to change within her individual situation at some point in the future. That is, reporting a personal need had a considerable amount in common with setting a personal goal to change the condition or circumstance[20]. The self-report of a need related to a specific issue was, in effect, the first step in commitment to change the condition.

The view that reporting a need is an incremental step toward behavioral action is consistent with the importance of problem perception in existing theoretical models of risk reduction behavior change. In the AIDS Risk Reduction Model (AARM), problem perception indicated by knowledge of risk, personal susceptibility, and perceived undesirability of the consequence (HIV/AIDS transmission) is the first step in enactment of behavior changes

[20] This commonality between reporting needs and goal-setting has not previously been addressed in the literature. In fact, it was not obvious at the outset that one would expect these two concepts to take such similar forms. For instance, one could have found that people try to appraise whether or not they had a need in specific areas by taking the perspective of others (e.g., her mother, the father of the baby) and reporting their perceptions of her needs or by a more objective comparison of their competence or fulfillment of needs in each area relative to other people they know.

(Catania et al., 1990). Likewise, in Prochaska's theory of change, the critical difference between the precontemplation and contemplation stages of change is not the individuals' readiness to commit to behavior change, but rather his/her awareness that a problem does exist (Prochaska, DiClemente, & Norcross, 1992). While both of these theories acknowledge that identifying the problem or the presence of a need for change is an important step in risk reduction, neither theory has discussed personal control as a critical element influencing labeling of the problem. In contrast, researchers studying social cognitive theory have reported that efficacy beliefs influence goal-setting practices, expected outcomes of action, behaviors undertaken, and the extent of continued persistence toward goal achievement when barriers were encountered (Bandura, 1986). This research also has found that people act to enhance their self-evaluations when behaviors are compared to personal standards (Bandura, 2001; Higgins, 1987). Hence, social cognitive theorists might explain the current study results as indicating that people who appraise themselves as not having the capability or the agency to evoke change would be motivated to avoid reporting a need (or goal) to change. Using this social-cognitive interpretation, the current study findings then were consistent with a large body of work on learned helplessness in which individuals and animals experiencing repeated failure in altering an unpleasant situation eventually cease to initiate self-protective behaviors (Maier & Seligman, 1976; Seligman, 1968, 1974; Seligman & Maier, 1967).

However, data in the current study also suggested that two appraisal processes may operate simultaneously to influence reported needs. While

general indices of personal control (overall mastery and self-esteem) displayed a direct positive effect on reported needs, more specific content-related areas of self-esteem exhibited the opposite relationship to reported needs. So, individuals expressing greater mothering ability esteem reported significantly fewer needs than those identifying ambivalence or low mothering ability esteem. Thus, individuals appeared to simultaneously evaluate their prospects for managing the event (through general control constructs) and their perceived existing level of competence in the specific need area. So, skills and deficits related to parenting were considered prior to individuals' reports of whether or not they each possessed a need related to parenting. Participants who were more confident about their parenting abilities and caretaking skills were less likely to report a need to the interviewer. This finding is consistent with work conducted with the health belief model (Strecher et al., 1997). Individuals with higher perceived competence would be expected to see less sizeable benefits from reporting and acting on a need, and thus be less inclined to do so than people who could gain more from this activity.

Finally, one might be tempted to examine the relative size of path estimates from general and specific personal control constructs to reported need and infer the relative importance of the two processes. However, the influence of mothering ability esteem on reported need may have been diminished because of the way that the constructs were measured. The broader self-esteem literature has noted that specific indices of self-esteem can be powerful predictors of attitudes and behaviors for certain areas and they explain unique

variance beyond that measured in more general self-esteem indicators (Hoge, Smit, & Hanson, 1990; Rosenberg, Schooler, Schoenbach, & Rosenberg, 1995). However, the significance of these specific indices of esteem tends to be limited primarily to the domain addressed in the index. Likewise, the specific mothering ability esteem construct was likely to show the greatest influence with reported needs specific to parenting abilities. It would be expected to have less influence (if any) on reported needs in other areas such as housing, personal safety, and drug use. However, the reported needs construct was a combination of various domains of need. Whereas general control indicators would be expected to display relationships across domains, the more specific esteem indicators would not. Thus, readers should cautiously interpret the relative size of these two path estimates until future work can examine shifts in these patterns when reported needs are restricted to the focal domain measured in the specific esteem construct.

Cognitive Ability. The current study did not assess relationships between verbal or general intelligence and reported needs. Thus, little is known about the influence of cognitive ability on reported needs. No support was found for any significant influence of developmental differences in cognition as indexed by age on reported needs. However, eligibility criteria restricted the age of participants to at least sixteen years of age, thereby reducing the variability in cognitive patterns that might otherwise have been observed. The potential influence of cognitive ability on need-reporting behavior also may have been minimized through the methodology by which individuals reported needs. Instead of open-

ended questions, interviewers named specific areas of potential needs and asked study participants to simply acknowledge whether or not they had experienced a need or concern with each issue. Future research should explore the influences of cognitive ability, verbal fluency, and literacy on reporting of needs in various interviewing approaches.

Social Support. Results found a significant, positive path estimate between personal control and social support. Individuals who reported greater feelings of both competence and contingency also were more likely to report access to support from family and friends and actual receipt of instrumental support during the pregnancy period. This finding was consistent with previous research and theoretical discussions in the social support literature (Eckenrode, 1983; Sheppard, 1993). Individuals with an internal locus of control have reported more supportive contacts with people in their social networks following stressful experiences (Eckenrode, 1983). Thus, results suggested that when higher levels of expected needs undermined personal control, they also produced the indirect effect of reducing the social support available to the individual. So, individuals with greater expected needs experienced higher levels of stressor responses and had fewer individual (i.e., personal control) and social (i.e., social support) resources with which to cope.

Despite a lack of research investigating links between social support and reported needs, higher levels of social support were hypothesized to reduce reported needs. The presence of social resources to assist with difficult circumstances was expected to reduce individual tendencies to define a situation

as a need. The findings in this dissertation did not lend support to this hypothesis. Although both manifest and structural models generated negative path estimates between social support and reported need, these estimates were consistently small and non-significant. Thus, it may be that individual appraisals of need were relatively unaffected by the presence or absence of social resources to meet that need. Or, it may have been that the true relationship between social support and reported need was masked by inadequacies in measurement in the current study. The latent social support construct included available, perceived, and received social support from two different sources (family and father of the baby). Future research may look at each of these dimensions and sources individually to consider if specific types or sources of support have an important influence on reported needs. In addition, measurement of social support in specific situations relevant to the needs (e.g., with parenting issues, providing housing or food, helping you deal with a substance use issue) rather than global indices may produce stronger relationships to need. In the same way that specific indicators of mothering ability esteem indicated different relationships to need than general indicators of overall esteem, more specific indicators of social support might yield interesting results. In addition, measurement of social support in more specific situations may inform researchers about whether social resources are critical to the need appraisal process in widely varied situations. For example, it may be that the presence of support from the social network with parenting may overcome the attribution of a personal parenting need whereas even the presence of social

support related to drug use issues would not because of a differential perception that professional involvement is needed to handle that issue.

Disclosure. The final set of relationships tested in the model involved the disclosure construct. Surprisingly, in both the manifest and structural models, disclosure yielded a significant negative relationship on reported needs. That is, people who agreed that "when a person gets upset they should talk it over with a friend" and "it is easy for me to talk about personal and private matters" actually reported fewer personal needs to the interviewer than people with lower scores on disclosure items. Initial explanations for this counterintuitive finding focused on the relationship between disclosure and social support. Participants who expressed greater comfort with disclosure might rely on informal support networks more than professionals, and thus, disclose less to the research interviewer. This explanation was neither completely supported nor discredited. Path estimates for the direct path from disclosure to social support were consistently positive, but they were small. In the structural model, the relationship between the two latent constructs was nonsignificant. However, the power of this path may have been minimized by the inclusion of the mistrust indicator with the talk usefulness indicator. Although both of these indicators loaded significantly on the disclosure construct, they appeared to have different relationships to social support. When each indicator was modeled individually in the manifest model, mistrust was unrelated to social support whereas talk usefulness was significantly associated with higher levels of support. These differences are reasonable given that individuals vary their disclosure levels

depending on their relationships with the listener (Burnard & Morrison, 1992; Derlega et al., 1993; Jourard, 1971). Thus, the usefulness of talking problems over with friends (as measured in the talk useful indicator) would be very relevant to eliciting social support from people inside the social network. In contrast, whether or not individuals displayed general mistrust of "other people" may be considerably less related to their actual disclosure levels among friends and family members[21].

An alternative explanation for the counterintuitive negative path from disclosure to reported need involves links to expected need. In the structural model, a moderate, statistically significant, negative correlation between expected need and disclosure was found. This correlation implies that a common underlying experience (e.g., insecure attachment histories) contributed both to higher expected needs and to less trusting disclosure patterns. If this was the case, then the heightened reported needs among those low in disclosure might have reflected greater needs among individuals sharing this underlying experience rather than a main effect of disclosure on reported needs. Existing research literature supports the possibility that a pathway of this type might exist. Research on disclosure established long ago that people's comfort with self-disclosure is influenced by their past experiences, including the previous responses (e.g., lack of acceptance, ridicule, lack of confidentiality) of individuals to them after sharing occurred (Burnard & Morrison, 1992; Derlega et al., 1993;

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[21] Instructions read prior to answering the scale asked individuals to consider "what [they] think about talking to people in general". So, unless a question specifically referenced a "friend", individuals were primed to expect that "other people" indicated individuals from the larger population in general rather than common social network associates.

Vaux et al., 1986). In addition, a qualitative study investigating preventive intervention effects with 47 pregnant mothers at exceedingly high risk to abuse or neglect their children found the following co-occurring characteristics within their sample: difficult attachment histories[22]; prior abuse or neglect of a child of their own; considerably limited life skills and high needs for basic necessities (food, housing, clothing, etc.); and extremely guarded and nonverbal behavior with strangers (Pharis & Levin, 1991). Other studies focused on survivors of domestic abuse also have documented links between components in this pathway. Findings have included the following: links between difficult relationship and attachment histories over time with subsequent cycles of repeated coupling and de-coupling with abusers (Landenburger, 1998), associations of involvement in abusive relationships with lack of fulfillment of basic life needs and a paucity of individual life skills and personal resources (Lein, Jacquet, Lewis, Cole, & Williams, 2001), and limitations imposed by the abuser on the survivor's social contact opportunities, resulting in social isolation[23] and self-blame (Barnett et al., 1996; Kurz, 1998). Taken together, this work suggests that disclosure probably mediates a more significant causal agent rather than drives a reduction in

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[22] At the outset of the study the authors describe individuals as "extremely high-risk mothers, many of whom are products of chaotic homes, their lives replete with evidence of their lack of previous success in human relationships – women in whom the capacity for relationships might well seem to have been destroyed...." (Pharis & Levin, 1991). More than 50 percent of the women had experienced 9 or more events on an 18-item index of misfortune. Events on the index were highly difficult life experiences. Examples included: previous experience of physical or sexual abuse, psychiatric hospitalization, early childhood loss of significant others, and expulsion from school. Many of the factors on the list include components associated with considerable disruption in the parent or caregiver-child relationship.

[23] One study quoted a woman as saying "I was not allowed to go out. I wasn't really allowed to talk on the phone. . . I wasn't allowed to have a job. I wasn't allowed to have friends." (Kurz, 1998, p. 205). This level of control exerts extreme limits on the amount of disclosure that can occur and, over time, erodes the individual's interest in and willingness to even attempt disclosure.

reported needs. Further research is needed to investigate which factors influence disclosure, how individual differences in disclosure not attributable to those underlying factors impact reported needs, and which reported need areas are most effected.

Summary.

Testing a conceptual model examining the interrelationships between expected and reported needs among low-income pregnant women has yielded interesting findings bridging numerous existing literatures on human behavior. Findings from this investigation have supported the common assumption of numerous research and family-centered care intervention models that reported needs do reflect expected needs defined by more objective criteria. Expected needs underlie reported needs, yielding their influence through both direct and indirect pathways.

Reported needs also appeared to incorporate some level of readiness within participants to address events and conditions contributing to need areas. People were more likely to report needs when they experienced a stressor response that perhaps heightened their perception of threat associated with inaction or acted as a cue to focus attention toward meeting needs and/or to trigger action. They also were prone to reporting needs when they viewed themselves as having general competence to take efficacious action at some point related to that issue and when benefits would be greatest due to low existing competence in the specific issue area characteristics. Finally reported needs were greatest among those with the least open disclosure tendencies.

Whether this effect was a product of differential disclosure patterns to informal support network members as opposed to professional sources or related to influences of life experiences and expected needs on disclosure tendencies will need to be explored in subsequent research.

Understanding the factors that coalesce to alter an individual's willingness to report a need has important implications for individualizing intervention approaches to clients with different levels of reported needs. These implications are addressed further in Chapter 3. Chapter 2 describes the investigation of a critical follow-up question. That is, how do expected and reported needs influence program participation and more distal outcomes observed in families?

CHAPTER 2:

PREDICTING THE INFLUENCE OF REPORTING TENDENCIES ON SERVICE UTILIZATION AND INTERVENTION PROGRAM OUTCOMES

INTRODUCTION

The previous chapter described the investigation of and findings about factors that influenced reported need behaviors among low-income pregnant women. These results provide critical information about relationships between expected and reported needs and offer some insights into potential processes that influence need perception and disclosure. However, given the paucity of research on individual differences in reporting needs and the documented success of family-centered care practice without attention to this issue, skeptics might be tempted to ask what the significance of these individual differences is for service delivery and family outcomes. Is variation in reporting needs predictive of service utilization? How do expected and reported needs relate to subsequent parenting and child development outcomes?

Conceptual Model for Predicting the Impact of Maternal Reporting on Service Utilization and Intervention Program Outcomes.

Figure 6 depicts my hypothesized model for predicting parenting and child developmental outcomes using information about maternal reporting behavior. It examines how participant need relates to use of formal support services and indirectly to parenting interactions and the mental development of the child. The conceptual basis for the interrelations depicted is described in more detail below.

Relationships Between Needs and Service Utilization. Family-centered early intervention programs are designed to provide varying levels of support intensity that is commensurate with each family's specific needs. Hence, the first section of the model examined how needs were related to service use. One would expect that programs devote greater intensity of intervention to the neediest families. In fact, traditional policy initiatives often target high-risk populations or provide additional funding for more intense service delivery when families meet criteria suggesting especially high levels of expected needs (Zimmerman, 1999). Also, previous studies have established that socioeconomic status is an important predictor of increased intensity of home visiting support service use among both rural Caucasian women and urban African-American women (Olds & Korfmacher, 1998). Although much broader, socioeconomic status is a proxy variable for hardship and expected needs within a population. Thus, expected needs were predicted to directly increase maternal and infant support service use intensity among families. However, expected needs also were likely to have an indirect effect by positively influencing reported needs. In the family-centered care framework, interventions should be shaped by the reported needs, goals, and concerns of the clients. So, the reported needs also should directly influence the intensity of services received by families. Indeed, several recent studies found that individuals who reported having needs for support consistent with program objectives were more likely to maintain longer active participation in a preventive intervention programs than those who did not

report the presence of similar needs (Gross, Julion, & Fogg, 2001; Ireys, DeVer, & Chernoff, 2001; Navaie-Waliser et al., 2000).

Maternal Availability and Service Utilization. Two additional factors were hypothesized to influence maternal support service use intensity by influencing the availability of the mother to receive the intended services. The first was the presence of the mother in the county where the services were delivered. In Michigan, eligibility to receive maternal and infant support services is based on county residence. Thus, when an individual moved out of the county she may or may not have been connected with similar services in the next county or state of residence, but she did not continue to receive the intervention services under study in this research. Because of this county-based service delivery method a positive relationship between number of postnatal data collection points when the client resided in Kent County and intensity of service utilization was expected.

Postnatal employment also was hypothesized to influence intensity of service utilization among low-income pregnant women in the sample. Study participants were followed from 1997 – 2000. This was a time period immediately following radical changes in national and state social welfare policies (Greenberg et al., 2002; Larner, Terman, & Behrman, 1997). Michigan implemented new requirements that mothers receiving Temporary Assistance to Needy Families (TANF) must work 20 hours per week beginning twelve weeks after the birth of an infant or else their stipends would be reduced or discontinued altogether. Thus, numerous study participants, including both those who had been and had not been active in the workforce prior to delivery, became

employed postnatally. Finding and maintaining employment, transportation to and from employment, and reliable child care were considerable challenges for many of the participants in the first six months after delivery. The pressing time demands following employment and conflicting schedules associated with service provider availability (more limited evening availability) were reported by service providers to interfere with client participation in the services being studied[24] as well as in other programs (Gross et al., 2001; Kitzman, Cole et al., 1997). For these reasons, employment during the postnatal period was expected to reduce the intensity of intervention services actually received by families.

Perceived Program Helpfulness and Service Utilization. The final factor hypothesized to influence the intensity of service use was the participant's perception of the helpfulness of the program. Whereas expected and reported needs were likely to impact the intensity with which providers attempt to visit families, the mother's perception of program helpfulness may contribute to her engagement in the program and to the successful completion of attempted visits (Berlin et al., 1998). Ratings of program helpfulness may, in part, reflect a client's assessment of the extent to which she and the service provider(s) share a mutual understanding about the perceived problem and goals that they hope to jointly achieve as well as the usefulness of intervention activities in promoting changes. These more specific characteristics that may be embedded in program characteristics have been linked to active program involvement in other studies

[24] This information is based on preliminary review of qualitative interviews with MHSS service providers in both intervention programs. Complete analysis and dissemination of results is expected in future months. The relationship between increased employment and reduced participation in services also has been corroborated anecdotally in conversations with individuals engaged in research with another home visiting program in Denver, Colorado.

(Epperson, Bushway, & Warman, 1983; Gross et al., 2001). Regardless of whether perceived program helpfulness was an indicator of these specific characteristic or a more general appraisal of overall satisfaction, stronger perceptions of the program as helpful were expected to motivate individuals to overcome potential service use barriers and to more effectively make and keep appointments with providers.

The Impact of State on Service Use and Parenting Interactions. The mother's state also has been identified as an important factor in predicting behavior. As discussed in the previous chapter, perceived stress has been closely linked to objective need characteristics typical of expected need components and positively related to the expression of depressive symptoms. The challenges imposed by high levels of perceived stress also have been identified as negatively affecting service use intensity during the middle phases of program participation (Eisenstadt & Powell, 1987; Gravida-Payne & Stoneman, 1997; Gross et al., 2001; Josten, Mullett, Savik, Campbell, & Vincent, 1995). Whereas initiating contact with a new program might be seen as a positive response to overcoming the stress at the outset of program use, the perception may be very different midway through the intervention. At that point, the intervention may be perceived as partially contributing to the individual's stress level, taxing the individual's stress-limited problem-focused coping capabilities (Gravida-Payne & Stoneman, 1997). In fact, qualitative interviews with nurses in a home-visiting program with low-income parents validated this idea (Kitzman, Cole et al., 1997). They reported a reduction in service intensity during periods

when clients had been emotionally stressed by broaching a difficult intervention concern together or when participants were physically taxed by the added stressors of employment coupled with responsibilities of caring for a young infant (Kitzman, Cole et al., 1997).

Perceived stress also was expected to both indirectly and directly reduce the quality of parenting interactions between mothers and their infants. Evidence suggests that the relationship between high levels of perceived stress and negative parenting interactions is significantly mediated through an increase in depressive symptoms among women with heightened levels of stress (Simons & Johnson, 1996; Simons, Whitbeck, Melby, & Wu, 1994). A large body of work relates maternal depression to less positive parenting interactions, including both withdrawn and intrusive interactional styles (Campbell, Cohn, & Meyers, 1995; Field, 1998; Planos, Zayas, & Busch-Rossnagel, 1997). Studies have noted that depression results in reduced abilities to modify speech and behavior to the cues of infants and young children in a structured teaching task (Bettes, 1988; Goldsmith & Rogoff, 1995). Thus, perceived stress was hypothesized to increase the depressive symptoms expected to be directly, negatively related to high quality parent-infant interactions in a structured teaching task.

Yet, other research supports the presence of a direct, negative relationship between stress and positive parent-child interactions (McKelvey, Fitzgerald, Schiffman, & von Eye, 2002). This direct relationship even has been replicated in research that has incorporated depressive symptoms as a mediator of interactions (Sachs et al., 1999). Other researchers might attribute this direct

relationship to unstudied mediators like authoritarian child-rearing beliefs (Conger, McCarty, Yang, Lahey, & Kropp, 1984), ease of anger expression (Rodriguez & Green, 1997), or negative changes in interpersonal relationships within the broader family unit (Crnic & Acevedo, 1995). However, in each case when these factors were not measured, stress was expected to produce some negative impact unrelated to depressive symptoms that would generate a direct negative relationship between stress and parenting interactions when conceptual model 2 was tested.

Predicting the Quality of Parent-Child Interactions: Influences of Intervention, Child Cues, and the Mothers' Self-Reporting of Needs. Research on the quality of parent-child interactions has indicated the importance of parents' abilities to notice and interpret each child's cues and to adapt their behavior to meet the physical, social, emotional, and cognitive needs of the child within the shared context of the interaction (Sumner & Spietz, 1994). Earlier, I described how the presence of depressive symptoms may interfere with cognition-emotion-action patterns that influence maternal behavior and interpersonal interactions. However, other factors also may influence the extent to which high-quality parent-child interactions are displayed.

The clarity of the child's cues and his/her responses to parent behaviors are important predictors of positive parent-child interactions. The skill and clarity with which infants send cues to their caregivers influence how easily individuals can read and respond to those messages (Sumner & Spietz, 1994). Caregivers tend to have more difficulty maintaining positive interaction styles with infants

who display ambiguous cues or who provide few subtle cues about their changing needs prior to displaying potent responses (Minde, 2000). Studies have found that children with medical complications following birth, serious health conditions, or who were born prematurely are more likely to display unclear or disorganized cues in interactions (Parke & Tinsley, 1983). Research also has shown that caregivers experience greater frustration during interactions with these high-risk infants (Beckwith, 1984). Medically high-risk and preterm infants also are documented to experience higher rates of child maltreatment, perhaps partly in response to difficult interaction sequences (Kotch et al., 1995; Sachs et al., 1999). This evidence supports the prediction of a direct positive association from child health to the clarity of cues displayed during caregiver-child interactions and a direct positive effect of clarity of cues on the overall quality of parent-child interactions.

Another factor hypothesized to show a direct positive relationship to the quality of parent-child interactions is the degree of matching between maternal reported and expected needs. An important element in high quality parent-child interactions involves the parent's accurate perception of both the child's needs and the task demands and the parent's ability to tailor his/her behavior to provide needed assistance (Rogoff, Ellis, & Gardner, 1984). Although previous research has not investigated the specific relationship between parental reports of high proportions of expected personal needs to their subsequent interactions with their children, the hypothesis of a positive relationship extends from the belief that mothers who can more effectively define and report their own needs may be

better at perceiving and responding to their children's needs as well. Research from the area of emotion regulation lends some support to this notion. Several studies have found that individuals who have difficulties labeling and discussing their own emotions show similar difficulties in labeling, discussing, and responding to the emotions of their children (Dunn & Brown, 1994; Gottman, Katz, & Hooven, 1997; Parke & Buriel, 1998). The action patterns established in their own behavior also were employed in parenting behaviors. Another line of research that examined families with dysfunctional interaction patterns also has noted a frequent breakdown in parents' appropriate perceptions of their children's needs. For example, after a general lack of cooperation, the second most frequently cited barrier interfering with children in CPS caseloads receiving needed services was "family's misunderstanding of child's needs" (Trupin, Tarico, Low, Jemelka, & McClellan, 1993).

A number of interventions have been developed to help parents become more adept at interpreting and responding to children's cues (Barnard et al., 1987; Kang et al., 1995). Although variation exists in the processes used to help families develop more positive parent-child interactions, many interventions, including both of the interventions in the Michigan Maternal Health Services Study, expect that program involvement will promote more positive parent-child interactions (Roman et al., 2001; Zeanah & McDonough, 1989). The most positive outcomes particularly are expected among individuals who remain actively engaged in the program long enough for the focal intervention components to be delivered. So, as shown in Figure 6, service use intensity was

expected to have a direct positive effect on the quality of parenting interactions of participants.

Predictors of Mental Development in Children. Over the last several decades, studies have demonstrated links between the quality of parenting and child development (Baumrind, 1993; Maccoby & Martin, 1983; Maccoby, 1992). Taken together, research suggests that parenting styles characterized by warmth; clear, responsive communication; inductive reasoning; and appropriate monitoring; foster improved cognitive functioning, developmentally appropriate social skills, and psychological adjustment of children (Simons & Johnson, 1996). The Nursing Child Assessment Teaching Scale (NCATS) has been widely validated and utilized as an indicator of the responsive parent-child interaction component of positive parenting styles (Barnard & Kelly, 1990; Sumner & Spietz, 1994). Evidence suggests that high quality parenting interactions as measured by the NCATS are positively related to home environment ratings on the HOME scale (Sumner & Spietz, 1994), mental development index scores on the Bayley Scales of Infant Development (BSID) (Barnard & Eyres, 1979; Sumner & Spietz, 1994), and indices of IQ at older ages (Bee et al., 1982). Given the findings of prior research, the quality of maternal parenting interactions was expected to be directly and positively related to the quality of the home environment and to the child's mental development. An indirect relationship was also hypothesized as a result of the positive association between responsive parent-child interactions and the presence of a high quality home environment.

Provision of nurturing home environments also was predicted to have a direct, positive impact on children's mental development. Especially during infancy, the child's home environment forms the primary context where young children interact with people and objects, learn to solve problems and develop understandings of symbols and concepts. Home environments containing high levels of responsive and non-restrictive parent involvement, developmentally appropriate play materials, organization, and variety have been associated with improved cognitive development in children (Bradley, 1993, 1994; Bradley & Caldwell, 1988).

In addition to parenting interactions and the contextual environment, evidence suggests that children's mental development is also influenced by several key child characteristics. Infants' health was expected to positively impact their mental development. Studies have demonstrated that preterm infants and children with medical complications after birth tend to score lower on standardized measures of infant mental development (Field et al., 1978; Widerstrom & Nickel, 1997), although many preterm infants reared in highly supportive environments "catch up" to their full-term peers by school age (McCarton, Brooks-Gunn, Wallace, Bauer, & al, 1997). Research also has found that infants who experienced persistent, reoccurring middle ear infections often display less persistence at tasks and show poorer performance in language skills embedded in mental development assessments (Feagans & Proctor, 1994; Feagans, Sanyal, Henderson, Collier, & Appelbaum, 1987; Teele et al., 1990).

So, it is important to consider the health history of infants when trying to predict their mental development outcomes.

In addition to health characteristics, the child's behavior during the assessment situation also may impact mental development outcomes. Children's abilities to maintain orientation and engagement throughout tasks and to regulate their emotions effectively are particularly likely to influence observed behavior in a standardized infant assessment situation (Sattler, 1992). Indeed, some researchers have identified that the behavioral dimensions assessed on the Bayley Scales of Infant Development (BSID) behavior rating scale account for the largest proportion of individual variation in mental scores (Matheny, 1980) and that optimal behavioral functioning during the evaluation is characteristically associated with higher cognitive performance of children in the assessment (Matheny, Dolan, & Wilson, 1974; Roth, Eisenberg, & Sell, 1984). So, more effective orientation, engagement, emotion regulation, and motor quality during the test was hypothesized to be directly, positively related to mental development scores on the BSID.

Intervention Group Differences.

The conceptual model described in Figure 6 was tested separately for each intervention group in the Michigan Maternal Health Services Study. No between group differences were expected in relationships between parenting interactions, home environments, and child health and development. However, intervention group differences were probable in predictions of number of

intervention visits and perhaps in the relation of service use to parent-child interaction measures.

Programmatic differences were hypothesized in the path from perceived helpfulness of services to intervention intensity. The Nurse-CHW Team care intervention included a relationship-oriented intervention approach that built on the similarity of the CHW to the empower the participant, help her establish and maintain healthy, supportive relationships with others in her environment (including, but not limited to, her infant), and provide timely client-centered support, information, modeling, and referral on intervention content issues in the context of this relationship. Given the careful attention devoted to relationship issues and client needs in the Nurse-CHW Team care model, I hypothesized that assignment to the Nurse-CHW Team care intervention would contribute to higher levels of perceived helpfulness of services. In addition, there was considerable persistence of the Nurse-CHW Team care group in finding and repeatedly attempting to meet with individuals who missed appointments. Hence, in addition to level differences in perceived helpfulness of and actual receipt of services, I hypothesized a stronger direct positive relationship between perceived helpfulness of services and service use intensity in the Nurse-CHW Team care group than in the SOC group.

Both treatment groups were expected to have comparable influences of county residence, employment, and maternal state on service use intensity. If any intervention group differences were predicted in these areas it would occur in the incidence of employment and the levels of state conditions as outcomes of

prenatal intervention rather than a differential process impacting service use intensity.

Since both interventions espoused a client-centered case management approach embedded in the client's ecological environment, I did not hypothesize treatment group differences in relationships between expected and reported needs and service use intensity. Differences that might exist were likely to be primarily a function of individual service provider variation in implementation of the intended intervention as opposed to conceptual formulation of intervention plans between the programs.

Finally, a critical link in conceptual model 2 (see Figure 6) involves the relationship between increased intensity of intervention and improved mother-infant interaction. The relationship-based focus of the Nurse-CHW Team care intervention was expected to promote greater sensitivity and higher quality interactions in Nurse-CHW Team care mothers than in SOC mothers within the parent-infant relationship. This effect was expected to be most pronounced among those engaged more intensively in the ongoing intervention relationship (i.e., those with higher levels of service use). However, the Nurse-CHW Team care plan identified maternal outcomes as primary focal points of intervention with the belief that these changes across maternal domains would support improved parenting and child development. In contrast, SOC identified the mother as the primary client through pregnancy and in the first two months after birth. But, by eight weeks after delivery, the infant had to be identified as the primary client in order to continue delivering services. While this is a subtle

distinction and there was considerable overlap in the nature of activities in both programs, the slightly greater focus on infant outcomes in the SOC group might minimize expected intervention group differences actually observed. Taken together, participants randomized to the Nurse-CHW Team care group were expected to display a small, but somewhat stronger positive relationship between service use intensity and mother-child interaction than was observed among individuals in the SOC group.

Summary.

Despite the possibility that increased understanding about patterns of reporting needs might yield important information about service utilization and intervention outcomes, existing work examining the influences on and the implications of reported need behavior remains in its infancy. The model in Figure 6 provides hypothesized interrelationships for understanding how needs and reporting styles impact service utilization, parenting interactions and subsequent mental development outcomes of children. Maternal state, child characteristics, and the contextual features of the home environment also have been identified as key factors to consider in predicting child-related outcomes. Examining the extent to which the observed data fit the predicted interrelationships in this model will increase knowledge about if and how different tendencies in reporting needs ultimately influence program participation and subsequent developmental outcomes in low-income children.

METHODS

Sample.

The sample for testing the model of conceptual relationships identified in Figure 6 included a subsample of 438 participants of the Michigan Maternal Health Services Study. Information about recruitment, eligibility, exclusion criteria for secondary analyses, and descriptive characteristics of the sample were described in Chapter 1.

Data Collection.

Data were collected from study participants at enrollment into the study (prior to treatment group randomization), again at 34-38 weeks gestation, at 6-12 weeks after delivery, and again 6-7 and 12-14 months after delivery. At the final two data collection points, assessments of infant development, mother-child interaction, and the characteristics of the home environment were conducted. Medical records were abstracted for infant health characteristics at birth and program records were abstracted for contact with program providers. Data collected at 6-12 weeks and 6-7 months after delivery form the primary sources of information utilized to test the relationships between needs, service utilization, and intervention program outcomes as shown in conceptual model 2 (see Figure 6) how reported needs influence intervention outcomes.

Measurement of Variables.

Expected and Reported Need Indices. The expected and reported need indices utilized to test the conceptual model in this chapter were identical to that

developed and described in detail in Chapter 1. The actual index items are listed in Table 2.

Degree of Match Between Expected and Reported Needs. Two different measures relating expected and reported needs were developed. Difference scores were calculated (e.g., reported needs – expected needs) to assess the distance of reported needs from the expected index score ascribed to them. Probablility scores were also created by dividing reported needs by expected needs to determine the proportion of their expected needs that individuals reported.

Perceived Stress. Perceived stress was measured using the 14-item, Perceived Stress Scale (PSS) developed by Cohen, Kamarck, and Mermelstein (Cohen et al., 1983). Specific reliability and validity information about this instrument was provided in Chapter 1. Study participants were interviewed about their responses to scale items at 6-12 weeks and 6-7 months after delivery. Scores at the two time points were summed to yield a postnatal perceived stress score.

Depressive Symptoms. The Center for Epidemiologic Studies – Depression (CES-D) Scale was used to measure the occurrence of depressive symptomology in the study sample (Radloff, 1977). Further information about scale development, validation and reliability was described in Chapter 1. Individuals were interviewed about their responses to scale items at 6-12 weeks and 6-7 months after delivery. Scores at the two time points were summed to yield a postnatal depressive symptoms score.

Perceived Helpfulness of Services. An author-designed question was used to measure individual perceptions about the helpfulness of services. Study participants were asked to think about the period since they last had been interviewed for the study. Then they were asked the following question: "Using a scale from 1 to 10 where 10 is extremely helpful and 1 is not at all helpful, how helpful do you think the maternal/infant support services have been for you?" Scores reported at 34-38 weeks gestation and at 6-7 months postnatally were summed to yield a overall rating of service helpfulness throughout the course of the intervention.

Postnatal Employment Status. At 6-12 weeks and again at 6-7 months, individuals were asked whether or not they were currently employed. Regardless of the number of hours or type of work reported, individuals who reported employment outside of the home at either or both time points were coded as 1 (participating in postnatal employment). Those who were not employed outside the home at both time periods were coded as 0 on the dichotomous postnatal employment status variable.

Postnatal Residence in Kent County. Research interview records were abstracted to determine whether each study individual lived in Kent county (regardless of whether or not research data were successfully collected) at each of the three postnatal data collection points. Individuals were given one point for each data collection wave at which they resided within the county. All 438 individuals resided within Kent County at both enrollment and 34-38 weeks gestation, so prenatal variation did not exist in this variable.

MSS/ISS Postnatal Service Use Intensity. Service use was measured by the number of support service provider (either nurse or community health worker) visits between delivery of the infant and one year later[25]. Both programs anticipated engaging clients in a greater number of home visits in the first 6 months after delivery. Clinical paths showed many fewer visits in the second half of the year. Conversations with service providers revealed that visits substantially scaled back after six months both as a function of clinical path recommendations and due to greater frequency of missed appointments associated with employment conflicts, increased transience, or reduced commitment to the program.

Since there were several cases with extreme values for service use visits, an alternative measure of service use also was constructed. Rather than using the actual number of visits received, individuals were ranked ordinally in amount of postnatal service use. So, for example, if a set of individuals received 0, 0, 1, 5, and 12 visits, they were ranked 0, 0, 1, 2, and 3 respectively.

Child's Mental Development. Infant mental development was measured by using the mental development subscale of the Bayley Scales of Infant Development (BSID). The BSID is the most widely used assessment tool for infant development (Clark, Paulson, & Conlin, 1993). The instrument includes items that

[25] I had initially planned to use a measure of visit contacts from birth to six months, however, at this time that data is neither available nor retrievable without the assistance of a colleague's creation of a program to extract the data from its current format. This program will not be available until Fall 2002. Modification of the model to look at 12 rather than 6 month outcomes was not possible because final developmental and parent-child interactions data will not be fully cleaned until Mid-Fall 2002. Thus I opted to use overall postnatal service use as a best estimate for the intensity of service use individuals received during the first half of that time period. As soon as the actual contact data becomes available, I will re-run the model with the new variable and explore any differences that arise.

assess memory, habituation, problem solving, generalization, classification, vocalizations, language, and social skills. Scale administrators assess these skills by providing infants with situations and tasks that capture their interest and produce an observable set of behavioral responses. The BSID mental development subscale has shown high reliability at six months (.92) and at 12 months (.88) (Bayley, 1993). The BSID's restandardization based on the 1988 U.S. Census data has strengthened its accurate representation of every demographic group and makes it an excellent measure of infant development (Bayley, 1993). Mental development was assessed typically around 6-7 months of age and converted into mental development index scores. Infants born more than two weeks prematurely were assessed at corrected age.

Child's Test Behavior. The child's behavior during the developmental assessment situation was measured using the total score on the Behavior Rating Scale (BRS) of the Bayley Scales of Infant Development (BSID). The BRS was designed to assess qualitative aspects of the child's test-taking behavior, including orientation/engagement (toward the tasks, examiner, and caregiver), emotional regulation, and quality of movement (Bayley, 1993). The total score incorporates the child's overall behavior in these three areas during the test situation. The Behavior Rating Scale has shown high reliability at six months across each of the subscales (6 month - .87, .75, .83; 12 month - .84, .86, .79) and the total score as well (6 month - .88; 12 month - .90) (Bayley, 1993).

Quality of Parenting Interactions. The quality of parenting interactions was measured using the caregiver interaction score on the Nursing-Child Assessment

Teaching Scale (NCATS) at 6-7 months after delivery. The NCATS was developed by Katherine Barnard and her colleagues to assess the behaviors, content, and responsiveness observed in maternal and child contributions to a structured social interaction task (Sumner & Spietz, 1994). The caregiver interaction score includes 50 binary items grouped into four conceptually-derived subscales assessing caregiver sensitivity to cues, response to distress, social-emotional growth fostering, and cognitive growth fostering. The NCATS is widely-used as a research and clinical tool. Internal consistency has been reported as .87 in mixed groups and in subgroups of participants of color (Sumner & Spietz, 1994). Test-retest reliability on caregiver scores (total from four subscales) at 1, 4, 8, and 12 months of age was .85 (Sumner & Spietz, 1994). The instrument has differentiated between groups of high- and low- risk mothers and was related to subsequent child cognitive outcomes and parent-child interaction quality (Barnard & Morisset, 1995; Bee et al., 1982; Booth, Barnard, Mitchell, & Spieker, 1987; Farran, Clark, & Ray, 1990). Administrators of the NCATS all received training and national certification (indicating a reliability of greater than .85 on standardized videotapes). Inter-rater reliability in the home setting by research interviewers was repeatedly assessed throughout the study duration and consistently exceeded .85 in each case.

Clarity of Child's Cues. The child's contribution to the mother-child interaction was measured by a subscale on the NCATS measure titled "Clarity of Child's Cues". The subscale was designed to assess the extent to which the child provided readily observable nonverbal and/or verbal reactions to events

occurring during the teaching interaction (Sumner & Spietz, 1994). Internal consistency reliability on this ten item scale has been low (Cronbach's alpha = .50) (Sumner & Spietz, 1994). This finding is probably attributable to the wide range of cues the scale measures . For example, "child is awake", "child smiles or laughs during episode", "child displays potent disengagement cues during the interaction", and "child makes clearly recognizable arm movements during the teaching" all serve as cues about the child's interests and experiences to the mother. But, infants who exhibit one behavior will not necessarily exhibit all of these behaviors during brief teaching situations with considerable variety in events and maternal interactions. Thus, one would expect lower internal consistency in this measure than in more commonly utilized attitude scales where responses would cluster together more tightly. Despite considerable changes in infant development between 1, 4, 8, and 12 months of age, test-retest reliability for the infant scale (including the clarity of cues subscale) was .55 (Sumner & Spietz, 1994). Evidence suggests that the clarity of cues subscale is effective at identifying expected differences between preterm and full-term infant cues and changes in interactive behavior among twins depending on the presence of the other twin in the interaction (Barnard, Eyres, Lobo, & Snyder, 1983; Sumner & Spietz, 1994). Inter-rater reliability in the home setting by research interviewers was repeatedly assessed throughout the study duration and consistently exceeded .85 in each case.

Quality of Home Environment. The quality of the home environment was assessed at 6-7 months using the Infant/Toddler Home Observation for

Measurement of the Environment Scale (HOME) (Bradley & Caldwell, 1978). The HOME is a 45 item semi-structured interview and observational tool that assesses 5 subscales describing the characteristics of the home environment in which an infant is being nurtured. Subscales include emotional and verbal responsivity, acceptance, organization of the physical environment, provision of appropriate learning materials, parental involvement with the child, and opportunities for variety in daily stimulation. The HOME has demonstrated acceptable levels of reliability and has a long established record of validity through associations with child cognitive and language development, positive parenting behavior, and positive maternal-child interactions in research (Bradley, 1994; Bradley et al., 1989; Bradley, Corwyn, McAdoo, & Garcia Coll, 2001b; Coon, Fulker, DeFries, & Plomin, 1990; Sumner & Spietz, 1994). Over time the HOME has showed consistent associations with both parental educational and socioeconomic status (Bradley, Corwyn, McAdoo, & Garcia Coll, 2001a; Lotas, Penticuff, Medoff-Cooper, Brooten, & Brown, 1992; Sumner & Spietz, 1994). It also has demonstrated reliability in culturally diverse samples (Bradley et al., 2001a; Lozoff, 1995; Seidman et al., 1994). Inter-rater reliability in the home setting by research interviewers was repeatedly assessed throughout the study duration and consistently exceeded .90 in each case.

Child's Health. The child's health was measured through the creation of a six item index representing the presence or absence of conditions associated with greater risk for poorer health and developmental outcomes. Information was drawn from the medical record abstraction unless otherwise noted. Cases were

assigned one point for the presence of each of the following conditions: 1) < 259 days gestation at birth based on report of last menstrual period (LMP) or ultrasound if results from an ultrasound conducted prior to 20 weeks gestation were present in the medical record and the estimated due date was at least two weeks discrepant from the due date determined by LMP, 2) < 2500 grams at birth, 3) infant's discharge from hospital was three or more days after delivery, 4) infant was admitted to the neonatal intensive care unit for one or more days during hospital stay, 5) child was diagnosed with a major medical condition associated with poorer developmental outcomes (e.g., Hirschsprungs disease, hole in baby's heart, cystic fibrosis), 6) child was diagnosed with a medical condition placing the child at risk, but typically associated with less serious developmental consequences for the child (e.g., asthma, more than three ear infections diagnosed between birth and six months). Scores ranged from zero to six with six representing more serious health problems.

Whereas the aforementioned infant health index assessed congenital, neonatal, or serious long term health issues, a second, two item, health index was constructed to identify the infant's more proximal health status. Children received one point if mothers reported that the infant had been sick with a cold or upper respiratory infection in the week just prior to the developmental assessment. Cases were assigned an additional point based on maternal report of moderate to poor child health from birth to six months. Thus, scores of more proximal child health ranged from zero to two.

Data Analysis.

Missing Data Imputation. Missing data were imputed using PRELIS 2. Out of the 21,900 data points used in analyzing the second conceptual model, only 827 (3.78%) missing values were imputed. Even after the imputation process, every variable contained more than 85% of original non-missing values. Imputation was conducted separately for each intervention group. Data were imputed using the hot deck method (Ford, 1983; Schoier, 1999). In the hot deck method, the analyst defines a set of variables that describe key demographic or psychosocial characteristics that are highly indicative of the individual's situation and significantly related to the outcome variable with missing values. During hot deck imputation, existing cases with complete data are examined to find a matching response pattern on the identified variables for the case with the missing value(s). Once a unique match is found, the existing values from the complete case are imputed to replace the missing value(s) in the twin case. The use of these match characteristics minimizes the effects of bias if cases with missing values tend to be different in important characteristics from the sample mean or from overall group characteristics. The hot deck method has the benefit of using relationships within the actual collected data to make estimates for missing values. In addition, the imputed score also has some error variance imputed into it since it uses an actual score already found within the data set (Roth & Switzer, 1999). Appendices M and N list the variable means and standard deviations for each intervention group before and after missing data imputation. Careful analysis of this information as well as the correlations

between variables demonstrates that missing data imputation did not significantly alter the characteristics of the data utilized in this study.

Analytical Methods.

To investigate the pattern of relationships identified in the second conceptual model (See Figure 6), data were separated by intervention group assignment. Baseline characteristics of individuals in each of these intervention groups are shown in Table 4. No significant differences were found between groups at enrollment. So, any differences between model characteristics were expected to result either from differences in program characteristics or from variation in client characteristics as a result of participation in the intervention.

The hypothesized conceptual model was investigated using path analysis. Specifically, the observed covariance matrices in each of the intervention groups were compared to what would have been expected given the set of interrelationships depicted in the hypothesized model. The estimated paths and fit characteristics for each intervention were compared against a model with invariant gamma and beta matrices (same structure of relationships and same path estimate values) and later against a model where the gamma and beta matrices displayed the same pattern of relationships and the same starting values but were free to vary in final path estimate values. The intervention group comparison necessitated use of a manifest model since the sample size of each group did not contain sufficient power to analyze a structural model.

RESULTS

Manifest Model.

Model adaptations. The only major model adaptation conducted to optimize fit was the removal of the degree of match between expected and reported needs variable from the model. An oversight in the operationalization of this variable was that both the difference scores and the probability scores constructed to measure this phenomenon were completely linearly dependent on expected and reported needs variables. Thus the inclusion of all three related variables in the model created substantive problems in the parameter estimation process. In future studies, I plan to investigate differences in variable relationships across groups with different patterns of reported and expected needs. So, even with removal of the expected-reported need match variable from this model, I will eventually be able to address this question through an alternative methodology.

Model fit. Overall the hypothesized model fit the observed data from both intervention groups well (See Figures 7 and 8 and Appendix O). Both groups shared the same pattern of relationships between variables and utilized the same starting values. Appendices P and Q list the error terms for the observed variables. The normal theory weighted least squares chi-square (*df* = 156, *ng1* = 217 *ng2* = 221) was 117.73 (p = .99), suggesting that the model fit the data very well. Other fit indices further supported strong overall model fit (RMSEA = 0.0, CFI = 1.0). Examination on individual group fit suggests that the two groups provided fairly similar contributions to the overall chi-square (*g1* = 69.41

(56.57%), *g2* = 53.28 (43.43%)) and the goodness of fit index supported a model with close fit in both groups (*g1* GFI = .96; *g2* GFI = .97). Use of the invariant constraint on beta and gamma estimates between groups also generated a model with acceptable overall fit (χ^2 (*df* = 175, *ng1* = 217, *ng2* = 221) = 157.25; RMSEA = 0.0; CFI = 1.0) and within each group (*g1* χ^2 contribution = 94.17 (58.90%), GFI = .94; *g2* χ^2 contribution = 65.70 (41.10%), GFI = .96). However, selection of the more parsimonious model of invariant estimates resulted in the adoption of a significant path estimate in each group based on the overall model that was not present when estimates were modeled separately for each group.

Observed effects. The adopted model included statistically significant hypothesized path estimates for both groups in the expected directions between the following variables: expected needs and perceived stress, expected needs and reported needs, reported needs and service use, postnatal employment and service use, duration of residence in Kent County and service use, maternal teaching interactions and home environment ratings, and infant behavioral ratings on the test day and infant mental development scores. Expected influences of perceived service helpfulness on enhanced service use only reached statistical significance in the Nurse-CHW Team Care group. The expected direct, positive effect of clarity of infant cues on maternal teaching interactions only reached statistical significance in the standard of care group.

No paths were found to have statistically significant relationships in directions contrary to predictions. However, surprisingly, a number of expected relationships were not modeled in this sample that deserve further attention. Of

particular interest was the finding that expected needs did not influence intensity of service use except indirectly by increasing reported needs. Also surprising was the lack of influence of home environment ratings or of maternal teaching interaction characteristics on infant mental development scores. The hypothesized relationship between poor infant health and both the infant's expression of cues during a teaching interaction and his/her performance on the mental development assessment also was not supported. These paths yielded very small estimates of relationships between health index scores and these outcome variables in both intervention groups. In addition to nonsignificant effects observed in child and parenting outcome variables, no statistically significant relationships were found between perceived stress or depressive symptoms and maternal teaching interaction ratings. While not statistically significant in either group, path estimates for both groups did suggest a negative relationship between reported depressive symptoms and observed caregiver scores in an infant teaching interaction setting. Finally, nonsignificant relationships were found in both groups between service use and maternal teaching interactions. Heightened service use did not necessarily lead to better outcomes for study participants.

Exploratory Analyses.

After careful examination of the model, several alternative explanations for the pattern of relationships observed were considered. In some cases, data were available which permitted exploratory examination of the influences of these alternative distributions of variables or potentially confounding variables on the

outcomes of interest. When possible, these variables were included in the model individually to examine their effects.

Service use. The variable for ordinal service use was replaced with the actual number of postnatal visits recorded for each case. This exchange had no meaningful effect on path estimate or even the overall chi-square. Exploratory analyses subsequently were conducted to explore whether maternal teaching interactions were influenced by effective service use modeled as a u-shaped distribution with highest and lowest intensity clients expected to have poorer outcomes than more moderate users. Data on number of postnatal visits were centered using mean and median values for each intervention group. Then, the absolute value of the centered variable was utilized. This resulted in both those with high and low numbers of visits relative to the mean and median values possessing high values on the new variables and individuals nearer the mean and median possessing low values. Thus, a negative path estimate would have been consistent with prior hypotheses because lower values on these new variables (i.e., moderate levels of service use) would be expected to improve maternal interaction outcomes. Entry of these new variables in the model replacing intensity of postnatal intervention visits did not alter the nonsignificant relationships in both groups between service use and maternal teaching interactions. Standardized path estimates from the revised service use variable to maternal teaching interactions were small as well (Nurse-CHW Team + .06 using both mean and median-centered variables; SOC -.03 using mean centered, -.09 using median centered).

Infant health. The two-item proximal health variable was inserted in the model to predict infant cues and mental development. Inclusion of this variable either in addition to or in place of the six item health index yielded no significant influences on the expected outcome variables. Modifications also explored the influence of the six item health index on infant behavior in the test situation (i.e. poor health may undermine infant attention, motor quality, and effective engagement in tasks). However, no statistically significant influence was observed in either treatment group.

Infant sex. Infant sex also was entered into the model to explore any potential moderating role in the influence of six item infant health on infant cues, the influence of infant cues on maternal teaching interactions, or the impact of any of the predictor variables on infant mental development. However the inclusion of infant sex in the model did not alter the significance threshold or meaningfully alter the directions or sizes of any pathways considered.

Maternal education. Finally, the model was also re-run with the addition of maternal education (years completed in school) included as a predictor of postnatal job status, NCATS scores, HOME scores, and MDI scores. The inclusion of maternal education resulted in a model with good fit characteristics (Chi-Square (df =176, n=438) = 151.18, p = .91; RMSEA = 0.0; CFI = 1.0; Nurse-CHW Team Care GFI = .95, SOC GFI = .96). Statistically significant paths were found in both intervention groups indicating influence of maternal education on postnatal employment (Nurse-CHW Team care = .22; SOC = .31) and HOME scores (Nurse-CHW Team care = .26; SOC = .22). Significant paths between

education and NCATS scores were found only in Nurse-CHW Team care group (Nurse-CHW Team care = .19; SOC = .12). The presence of significant paths from education to NCATS and from education to HOME weakened relationships between NCATS and HOME in both treatment groups. Whereas the value of this path dropped below the level of statistical significance in Nurse-CHW Team care group, it remained above this threshold in the SOC group (Nurse-CHW Team care = .13; SOC = .18). No statistically significant relationship was modeled between maternal education and infant MDI scores in either group (Nurse-CHW Team care = .01; SOC = -.01). The inclusion of maternal education in the model also did not alter the significance of paths from NCATS to MDI scores or HOME to MDI scores.

DISCUSSION

The second phase of this investigation was designed to examine how expected and reported needs influenced service utilization and maternal and child outcomes of program participation. Were the number of intervention visits completed related to more objective criteria about an individual's circumstance or more closely tied to her perceptions of her circumstances? What were the implications of differential intensity of service use on selected maternal and child outcomes? The findings may contribute to ongoing debates about influences on program participation in home visiting interventions and challenge the field to more carefully define which individuals benefit from home-based interventions.

Influences on Service Utilization.

Expected Needs. Of particular interest was the finding that expected needs did not influence service use except indirectly by increasing reported needs. In both intervention groups, study participants with higher levels of expected needs were not significantly more likely to receive a higher dosage of intervention. Thus, clients with multiple problems and risks were not engaged in a higher number of service provider contacts to address those issues. This finding suggests that since service providers utilized a similar number of contacts in treating lower expected risk and higher expected risk clients, then they must either have diminished the time spent to address each client need in high risk cases or they simply did not address all of the need areas in these cases. Either of these alternatives probably did not contribute to the best possible outcomes with families at highest need.

The reasons why intervention dosage was not greater for families with more expected needs are open to speculation. However, all of the individuals who met eligibility criteria for study participation had high levels of need relative to the general population. Individual differences of need within this high need group may have been relatively weaker than differences observed in a broader population including individuals from all socioeconomic levels. Thus, it is possible that expected need would have displayed a stronger direct effect if sample eligibility had not restricted the range of need observed.

An alternative explanation for the lack of influence of expected needs on intervention use involves the differential responses that individuals with high expected needs might have displayed. Whereas, some clients at highest need may have been highly attention-seeking, others with these characteristics may have displayed high avoidance patterns. Berlin and her colleagues (1998) noted these two opposite patterns among high-risk clients, stating that "...although in some instances more vulnerable participants appear to derive more program benefits, they may not necessarily be described as easily served by program staff. Frequently, the more vulnerable participants are hard to reach and difficult to engage. Alternatively, more vulnerable participants may be more visible and more demanding, and, as a result, elicit more attention from staff and more program services" (Berlin et al., 1998, p.11). The combination of these two different responses among those at highest expected need may have hidden the appearance of effects of expected need on actual intensity of service use.

Reported Needs. Whereas expected need index scores did not significantly predict service use in either treatment group, increased reported need scores were related to greater use in both interventions. In addition, the strong positive path estimate from expected needs to reported needs found in chapter one was replicated. So, heightened treatment intensity was provided in cases where objective indicators suggested clients had more needs and clients acknowledged the presence of these concerns. These results were consistent with research that has found individuals with higher perceived needs related to program goals were more likely to maintain long-term, consistent participation in an intervention than those who reported lower needs in these areas (Navaie-Waliser et al., 2000). The findings also supported family-centered care practice models in which services are tailored to meet expressed client needs, thereby promoting changes in objective circumstances facing the client. Thus, the significant path from reported needs to service use in both groups lends credence to the effectiveness of both interventions in attending to client concerns and implementing the intended client-centered intervention models.

Chapter one identified a number of factors related to whether or not individuals reported needs that were expected. It was posited that, in combination, these factors may represent the client's "readiness" to label a need as a first step in committing to act or to change the circumstance creating the need. If differential readiness to accept help and modify behavior partly was embedded in the client's tendencies to report needs, then the significant positive path from reported needs to service use could have represented the client's

willingness to "take" the intervention. In this alternative explanation, the individual's acceptance of the intervention influenced differential service use among those with higher needs rather than differential treatment intensity provided by service providers in response to heightened reported needs. Using existing data, I cannot discern which of these processes accounted for the positive effect of reported needs on service use. However, it is likely that future investigations designed to more carefully consider these issues will reveal that both the readiness of the client and the service provider response to identified needs contribute to the achieved intensity of home-based treatment completed.

Regardless of whether increased service delivery to those with higher reported needs is indicative of service provider behavior and/or client readiness, findings in this model suggested that individuals who were less able or willing to report their needs received fewer services. So, individual differences in reporting needs did make a difference in the amount of help people received. Secondly, this finding raised concerns about existing methodologies. Frequently, a target population with high expected needs is recruited, offered intervention, and assessed to document the effectiveness of the intervention in meeting their needs. But, if only a fraction of the recruited population actually reported needs that triggered increased intervention, then the effectiveness of treatment among those who reported their needs may have been masked by the numerous individuals receiving a different treatment process because they did not report expected needs. This concern challenges researchers and program planners to examine intervention outcomes separately for individuals who report needs

compatible with program goals and for those who do not. Future research and interventions may need to incorporate the client's readiness for treatment into the type of intervention delivered and the type of expected outcomes expected and examined.

Maternal Availability to Receive Services. Two factors related to the participant's availability to receive services were expected to influence the number of home visits completed. Both employment and continued residence in the county displayed significant effects in the expected directions in both treatment groups.

Postnatal employment. In both intervention groups, individuals who were employed at some point between birth and 6 months after delivery received fewer visits from service providers. Employment was operationalized not to represent continuous employment during this period, but rather, reported employment at some point during that time. Thus, employed individuals included both those who maintained consistent employment in the same job and those who cycled between various jobs and in and out of work. Given this operational definition and the increased demands for individuals receiving TANF to be employed, it seems unlikely that the negative relationship between employment and service use entirely resulted from an overall effect of higher client functioning necessitating less treatment. Kitzman and others actively involved in developing and delivering interventions have observed that employment in low-income families often was associated with a different set of challenging issues, including child care problems, transportation difficulties, unusual and inconsistent work

schedules, and challenges juggling competing demands of parenting and employment demands on time (Kitzman, Cole et al., 1997). "Fitting in" the appointments with a service provider, particularly one who may have limited flexibility around the participant's scheduled work hours, may become increasingly difficult and less of a priority for some participants. Indeed, the data in the current study supported that employed individuals successfully completed fewer visits. While further work is needed to pinpoint why this occurred, these findings suggested that the effective implementation of interventions was influenced by the competing demands on participants of the program. Programs may need to restructure policies (e.g., scheduled work hours for service providers), supports (e.g., to insure safety of employees during evening home-visits), format (e.g., continue home-based services or transfer to wrap-around support in center-based setting that provides child care), and curricula content and dosage for employed families. Likewise, communities may need to consider how shifting employment policies influence the extent to which low-income families can access and utilize the services designed to provide support to those at risk.

Although postnatal employment reduced service intensity in both groups, employment undermined service use to a greater degree in Nurse-CHW Team care intervention than in SOC treatment. While both programs ostensibly offered flexible appointments to clients, subtle differences in employee adoption of this practice may have existed. On average, service providers were older in the SOC intervention and few of them had young children of their own. Thus, without

need to address their own childcare challenges, it may have been easier for SOC nurses to schedule evening or weekend appointments than for nurses and CHWs in the other intervention. The stronger path estimate in the Nurse-CHW Team care intervention also could have resulted from two other possibilities. First, the more restricted range of total visits in the SOC group may have weakened the apparent differences in intensity of service delivery attributed to employment in that group. Finally, the individuals who participated in postnatal employment may have differed between the two intervention groups. Though significant in both groups, a stronger relationship was observed between maternal education and employment in the SOC group than in the Nurse-CHW Team care group. Thus, the Nurse-CHW Team care group may have been more successful at engaging women with more limited educational histories and fewer job skills in employment during this period. Individuals with limited educational histories and fewer job skills probably found the task of balancing work, family, and involvement in the intervention more challenging than people who had successfully juggled time management challenges in school settings previously. The observed difference in the strength of the path from employment to service use between intervention groups might then reflect this heightened engagement of vulnerable families to the workforce by the Nurse-CHW Team care intervention.

Time points in Kent county. Another factor found to influence the amount of services received in both programs was the length of time the individual was in the county where the services were delivered. While the effect of county residence on receipt of county-based services was not surprising, it is

important not to overlook its significance. Many social services and intervention programs are provided at either the local or county level. Yet, many individuals targeted to receive services frequently move between communities, counties and states. No comprehensive network exists to connect individuals with services as they make transitions between communities. Likewise, no system is in place to transfer any information from one provider to the next about identified needs or past services delivered to the family. In addition, from community to community similar services have different names and are associated with different institutions (e.g., health systems, school systems, departmental branches within the government) making it difficult for people to seek out similar services when they move to other communities. Furthermore, funding sources and eligibility guidelines for many of these services vary across locales, rendering some individuals eligible for services in one community and ineligible in others. In the current study, those families who moved between counties received less intervention. This limited receipt of intervention due to transience undermines the program's ability to have a positive impact on maternal and child outcomes and attenuates the perceived effectiveness of interventions when research results simply report findings on an intent-to-treat target group without consideration of transience.

Service Helpfulness. Research has noted enhanced service utilization and/or compliance with intervention regimens when people find that treatments "matter to them" or are particularly relevant to their lives (Vivian & Wilcox, 2000). Consistent with this work, the findings in the current study generally supported

the hypothesis that individuals who perceived the maternal and infant support services to be more helpful to them would display greater use of intervention services. In both groups there was a positive path estimate from service helpfulness to intensity of service use. However, this path only reached statistical significance in the Nurse-CHW Team care intervention. This result also was consistent with expectations. Since the Nurse-CHW Team care intervention was a relationship-based intervention (between mother and service provider) with considerable flexibility to increase or decrease intensity of services to meet individual case demands, the number of intervention visits was expected to be more related to the individual's perceived helpfulness of the program (and of the service provider and the relationship underlying the program). In contrast, the SOC intervention officially viewed the infant as the primary client (rather than the mother) and was more educationally-oriented than relationship-based. The wording of the helpfulness question asked individuals to rate how helpful the maternal and infant support services have been "to you". In some cases, participants may have responded with perceptions about their personal benefit from the program rather than the combined benefit to themselves and their babies. Thus, the answer to perceived helpfulness might be more related to service use for a relationship-based approach focused on the mother than for the information-based service approach focused more on the infant. An alternative explanation could also lie in the ranges of responses to the variables in each group. Both groups exhibited similar variation in helpfulness ratings, however

there was considerably greater variability in the number of intervention visits received in the Nurse-CHW Team care group than in the SOC intervention.

Perceived Stress and Service Utilization. As predicted, statistically significant positive relationships were found between both expected needs and postnatal perceived stress and perceived stress and depressive symptoms. These relationships were consistent with a large literature establishing links betweens difficult life events or circumstances and the perception of stress (Barnfather & Ronis, 2000; Brooks-Gunn et al., 2000; Kessler, 1997) and between different responses to those difficult events through perceptions of stress and expression of depressive symptoms (Barnet et al., 1996; Dunkel-Schetter et al., 2001; Ennis et al., 2000; Hall, 1990).

Contrary to study hypotheses, perceived stress did not exhibit a significant direct effect on service use in either intervention group. Thus, it appeared that perceived stress was more influential in altering individual's tendencies to label or report a need (see Chapter 1) than it was in decreasing or increasing individual tendencies to use services to meet those needs. The lack of relationship between perceived stress and service use is inconsistent with existing work identifying reductions in service use intensity when individuals experienced considerable stress (Eisenstadt & Powell, 1987; Kitzman, Cole et al., 1997). A potential explanation for this inconsistency lies in the populations referenced in the studies. Both Kitzman and her colleagues and Eisenstadt and Powell discuss changes in service use among individuals engaged in programs. However, the participants in the current study included both those who

participated in the program at varying levels of intensity and those who never were successfully engaged in the intervention (i.e., received zero visits from providers). It is possible that dual processes occurred in the current study that counter-balanced one another. For instance, among those using the program, individuals with higher stress levels may have reduced their intensity of service use. But, the group of individuals with no visits from providers overall may have included a subgroup of individuals with relatively low levels of stress and high levels of coping (i.e., generally functioning very well), who did not feel that they needed services. In this example, the subgroup with no provider visits could have masked the influence of high levels of perceived stress on service intensity among those participating in the program. Future analyses comparing participators to non-participators could investigate this the validity of this explanation.

An alternative interpretation for the nonsignificant influence of perceived stress on service use should also be explored. This study examined relationships between stress and service use in the first 6 months after delivery of an infant. The period immediately after the birth of a child brings many changes to families (Tietjen & Bradley, 1985; Williams & Williams, 1997). Among low-income mothers, there are many different factors that could contribute to perceptions of stress. It is possible that some events evoking stress (e.g., uncertainty about baby's behavior, difficulty helping baby adjust to day-night sleep schedule, concerns about baby's illness) during this period might lead to increased service use, whereas other events evoking stress (e.g., finding and

adjusting to employment, problems in relationship with father of the baby, financial problems) might reduce service use. The use of methodology that measured only overall levels of perceived stress rather than stress associated with different originating factors may have obscured relationships to service use. Future research is needed that explores global ratings of perceived stress as well as more specific indices on domains of stress (e.g., parenting-specific stress).

Perceived Stress and Parenting Interactions. The hypothesis that higher levels of perceived stress would have a direct negative influence on maternal interactions in a structured teaching task was not supported in either intervention group. This result was surprising because a number of studies have found a direct negative effect of perceived stress on maternal interactions with their children (Crnic, Greenberg, & Slough, 1986; McKelvey et al., 2002; Planos et al., 1997; Sachs et al., 1999). Other studies not necessarily finding a direct effect between perceived stress and parenting interactions have found that perceived stress exerts an indirect influence on interactions through its relationship with depressive symptoms (Planos et al., 1997; Sachs et al., 1999), authoritarian parenting style (Conger et al., 1984), ease of anger expression (Rodriguez & Green, 1997), or family disruption/changes in personal relationships (Taylor, Roberts, & Jacobson, 1997). However, much of the existing work involves parental interactions with either children across a wide range of ages (Sachs et al., 1999), or older toddlers (Crnic et al., 1986) and children (Conger et al., 1984; Planos et al., 1997; R. D. Taylor et al., 1997). Interactions with six-month-old infants have some important differences from those with older children (Crnic &

Acevedo, 1995) and mother-infant interactions have not demonstrated uniform stability in style as their infants develop from six to thirteen months of age (Pettit & Bates, 1984). Thus, changes in infant behavior may be related to different influences of maternal stress on observed interactions across ages. For instance, young infants may not be as likely to interact in ways that could be perceived as willful disobedience (e.g., walking away, throwing toys, talking back) by a stressed parent and trigger negative interactions (Middlebrook & Forehand, 1985; Webster Stratton, 1990).

Existing research also tends to identify relationships between stress and the socio-emotional components of parenting, such as maternal affect, acceptance, sensitivity to cues, and participation in dyadic synchrony (Crnic et al., 1986; McKelvey et al., 2002). However, the current study utilized all four maternal subscales on the NCATS. This included a cognitive growth fostering subscale that may have been more influenced by maternal education, verbal fluency, and intelligence than by maternal stress and depressive symptoms.

A final explanation for the lack of direct effect of perceived stress on maternal interactions involves the NCATS assessment itself. When administering the NCATS, mothers are asked to select a task that they have not yet observed their infants perform and to teach the child to perform the chosen skill. Common activities selected in the six-month age range included the following: transfer block from one hand to the other, squeak a squeaky toy, pick up a food object and eat it, or scribble on a piece of paper. While not addressed as a significant scoring variable by instrument developers (Sumner & Spietz,

1994), research observers noticed considerable differences in maternal behavior depending on the task utilized with children at this age. Mothers teaching their infants to scribble, for instance, displayed more negative reactions to the child's attempts to mouth the crayon than mothers teaching the child to use a squeaky toy or to eat food. In addition, considerable differences in caregiver interactions have been reported between mothers of different racial and ethnic groups (Sumner & Spietz, 1994). However, to maintain sufficient power to test the proposed hypotheses in each intervention group, the current study collapsed individuals of various racial and ethnic backgrounds and teaching various tasks into one group. Thus, it is possible that the existing variability in NCATS maternal scores associated with the teaching task itself and the racial/ethnic group of the mother masked the influence of perceived stress on the outcome.

Depressive Symptoms. In both intervention groups, increased depressive symptoms were directly related to reduced maternal interactions. However, contrary to study hypotheses, these effects did not reach statistical significance in either group. A number of other studies have found significant negative relationships between depressive symptoms and parent-child interactions (Field, 1998; Planos et al., 1997; Sachs et al., 1999). However, much of this work has been conducted with alternative measures of parent-child interaction (Field, Healy, Goldstein, Perry, & Bendell, 1988; Planos et al., 1997; Sachs et al., 1999). The developers of the NCATS scale report mixed results in studies relating depressive state to teaching scores (Sumner & Spietz, 1994). Research providing simultaneous, independent ratings of maternal affect and teaching

interventions reported only correlations ranging from .36 to .41 between affect and maternal teaching scores (Crnic, Ragozin, Greenberg, Robinson, & Basham, 1983). Other researchers have suggested that nonsignificant relationships between maternal internal state and teaching interactions may have occurred because "We might expect that all but the most depressed mothers could marshall sufficient internal resources to 'perform' adequately in brief teaching and feeding situations" (Booth et al., 1987, p. 304).

The NCATS instrument also combines multiple types of positive caregiver behaviors into one composite maternal score. This approach may contribute to inconclusive relationships between depressive symptoms and interactions with young infants. Since six-month-old infants have not yet begun to speak words, parents may emphasize modeling rather than instructing and verbalizing feedback to children[26]. Parents who indicate high sensitivity to and responsiveness to child cues, avoid punitive expressions and actions, offer verbal and nonverbal instruction, feedback, praise, and description of task materials will score higher in the NCATS interaction. Using another methodology, Planos and her colleagues (1997) found that individuals with high parenting stress displayed less inquiry and praise and more modeling and mothers with depressive symptoms used more negative feedback, directives, and modeling behavior with their children. If these findings were translated to the current study with six-month-olds where fewer moms verbalized instructions with

[26] Although I have not noticed mention of this in the literature, individuals conducting the observations in the current study anecdotally noted considerable changes in parent behavior (increased language, instruction, feedback and increased punishment, spanking, scolding, and yelling with child age) between experiences scoring 6-month and 12-month interactions.

children, then high modeling behavior and feedback would enhance the NCATS maternal score. Thus, unless the depressive symptoms also influenced other aspects of the interaction (especially punitive responses or lack of affection toward the child), interaction differences between mothers with and without depressive symptoms might be difficult to extract from the overall maternal score. Evidence also suggests that difficult interactions might be even less readily distinguishable in the current study sample due to the socioeconomic similarity of the group. Past research has documented that working-class dyads exhibited differences from middle class mothers that included many of the same characteristics[27] as reported in mothers with depressive symptoms (Phinney & Feshbach, 1980).

Lastly, the effect of depressive symptoms on maternal interactions may not have reached statistical significance, because its influence was partly confounded with task and racial/ethnic variables not included in this analysis. Future research that examines the influence of these potentially confounding variables may further inform understanding of the influence of depressive symptoms on maternal interactions in low-income women.

Maternal and Child Program Outcomes.

The second set of questions investigated by testing the conceptual model shown in Figure 6 related to the indirect influences of need mediated through service utilization on parenting and child outcomes. Did the individuals who

[27] Middle class mothers displayed significantly less intrusive behavior and used significantly fewer negative statements and imperatives in interactions than did working-class mothers. Middle class mothers also asked significantly more questions of their children. Two maternal styles emerged within working-class moms – a negative intrusive style and a positive, non-directive style.

reported higher needs and subsequently used more maternal and infant support services display better outcomes in parenting interactions, provision of nurturing home environments, and have children with higher scores on mental development assessments? The simple answer was no. Increasing service use did not result in differential performance on these outcome measures in either intervention group. However, a closer examination of the relationships modeled raised some interesting questions.

Maternal Interactions. Earlier in this chapter's discussion, I identified that neither perceived stress nor depressive symptoms had statistically significant effects on maternal interactions. While these relationships were of interest, a more primary focus of the study was on understanding how service use influenced maternal-child interactions. It was hypothesized that greater intensity of service use would result in more positive maternal-infant interactions in structured teaching tasks. Individuals who received a higher dosage of treatment were expected to benefit more than those who participated at lower levels of involvement. However, contrary to predictions, results suggested that increased service use (either in actual number of visits or as a ordinal ranking of visit quantity) did not significantly alter maternal interactions with their children for individuals in either intervention group. Heightened service use did not necessarily lead to more beneficial parenting outcomes. Upon closer scrutiny, a number of factors may have contributed to this outcome.

Other researchers have discussed the difficulty of measuring engaged participation in an intervention (Emde et al., 2000; Scott & Sechrest, 1989). In

the current study, problems associated with measurement of intervention dosage may have masked a dosage treatment effect. Number of intervention visits (or even rank order of amount of visits received in its ordinal form) may only tell part of the intervention story. Importantly, this measure of intervention dosage does not provide information about specific aspects of the treatment. Some of these might have included the following: the overall length of the intervention (e.g., a 35-minute visit and a two hour visit both counted as a single visit, receiving very frequent visits for a short length of participation may have counted the same as completing regular visits spaced evenly throughout the whole intervention period), the content of the intervention (e.g., number of issue areas addressed, types of activities undertaken, or whether content was crisis-oriented or issue-oriented), the extent to which the client was fully engaged in and actively participated in the visit, the extent to which others in the client's social network (e.g., father of the baby or her own mother) were included as part of the intervention and perhaps continued to reiterate concepts to client at additional intervals when the service provider was not present, the impact of additional treatment dosage offered by other professionals that the service provider may have contacted on the client's behalf (e.g., referrals to social workers, nutritionists, play groups, quality child care providers), or the contribution of phone-based conversations with the client to answer questions or lend very brief encouragement and support. Examination of the number of visits received provides a rough approximation of the amount of intervention support received by one client relative to others. In this case, it was the only comparable piece of

intervention dosage information available in both treatment groups and it was a service utilization outcome that is commonly reported in many studies. However, before drawing final conclusions about intervention effectiveness on maternal interactions, more research is needed that explores the influence of these more specific types intervention involvement differences.

Research also is needed that considers differences between those who participated in the intervention and those who did not. In the current project, all study participants were included, regardless of whether or not they had actually participated in any of the intervention that they were randomly assigned to receive. As a result, low service use intensity was confounded with a number of individuals who did not participate at all. Individuals who either actively chose not to participate or were simply missed by the services may have critical differences from individuals who accepted the services and participated in relatively few visits. Indeed, prior work has found differences both between intervention participants and non-participants (Apodaca et al., 1997; Ireys et al., 2001) and between those who participated at different levels of intensity or duration within the group involved in the intervention (Eisenstadt & Powell, 1987; Navaie-Waliser et al., 2000; Olds & Korfmacher, 1998; Unger & Wandersman, 1988). The results of these studies have been mixed. Some of the prior research has found non-participants to be more vulnerable and needy than individuals who participate in intervention programs (Apodaca et al., 1997; Lindy, Grace, & Green, 1981; Minde et al., 1980; Vachon, Rogers, Freedman, & Freedman, 1980), whereas other studies have indicated that non-participants

appeared to be coping well (Duggan et al., 2000; Ireys et al., 2001; Vinokur, Price, & Caplan, 1991). Another study further validated both of these claims by finding that both a high functioning group and a highly vulnerable group may exist within those who do not participate in services (Brown, 1978). Associations between service utilization at varying levels of intensity and quality of maternal interactions may have been clouded by the presence of a vulnerable group, a high functioning group, or both of these subgroups within the cluster of individuals who did not participate in the intervention.

The potential for a lack of natural fluctuation in service visits also may have interfered with finding a relationship between service use intensity and maternal interactions. A number of external constraints in each intervention group may have reduced the possibilities for study participants to receive the number of intervention visits they desired. In the standard of care intervention nine nurse visits with clients were reimbursed during the pregnancy period and the first 2 months after delivery (maternal support services) and again from 2-12 months postnatally. Nurses who wished to exceed this level of intervention in a particular case had to acquire the approval of a supervisor and complete additional paperwork indicating why the needs of the case merited further intervention. The presence of this policy may have created an obstacle that interfered with natural fluctuation in number of visits in this middle-intensity range, and perhaps influenced the amount of intervention that a subset of individuals received.

In the Nurse-CHW Team care group, a different external constraint may have influenced service use intensity. Unlike SOC nurses, the Nurse-CHW Team care service providers did not have to justify higher intervention dosages for clients. However, in this intervention program, turnover issues[28] influenced many of the clients' intervention histories. Out of 196 cases[29] in this group, only 43 (21.9%) individuals maintained the same nurse and CHW handling their cases throughout the whole intervention period (See Appendix R for more specific information on turnover characteristics in the sample). The impact of changes in service providers depended upon the specific circumstances of each staff turnover event. In some cases, negative consequences could have been minimized by maintaining one consistent provider with the client during the transition. Yet, the possibility of an intervention lag or a gap in services occurred with each turnover incident. Clients may have received less intense services or experienced a short period without services while the case was reassigned, caseloads were adjusted for remaining staff members, or new employees were trained. Thus, the final number of visits clients received may have been

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[28] Staff turnover issues were unusually high during the study period for several reasons. A number of service providers developed highly marketable skills and, during the low unemployment economic times, accepted alternative job offers and promotions. Additional staff were hired prior to the outset of the evaluation to enhance capability to serve the large number of expected program participants. After a period of training, and in many cases some case management, a portion of these individuals could not handle the demands of the job and were terminated or chose to resign. However, the largest cause of turnover occurred midway through the study when all staff in the program (and the health system) were given 2% pay reductions due to an economic shortfall resulting from the merger of two hospitals. This pay cut significantly hurt morale and many providers chose to leave the program to pursue other job opportunities. Notably, these changes in pay did not occur in the SOC intervention and turnover was extremely limited in that program. Other studies also have reported higher rates of turnovers in interventions staffed with paraprofessionals as opposed to those who have been trained through more traditional professional educational settings (Korfmacher, O'Brien, Hiatt, & Olds, 1999; Wells, 1997).

[29] Two cases were missing data on staff turnover and nineteen cases were excluded because no postnatal visits from service providers were noted in their records.

influenced by program turnover influences as much as by individual characteristics of the client and her situation. The program may have been less able to provide the desired intensity of services or the client may have shifted in her willingess to continue the same intervention intensity with the new provider[30]. In addition to influencing the fluctuation of service use intensity variable characteristics, turnover also may have had implications for progress in sensitive intervention content areas. Especially in cases with difficult relationship histories, even very smooth transitions between service providers had the potential to undermine the stability of the provider-client relationship and to reduce the potential effectiveness of a relationship-based intervention.

Home Environment. The quality of mothers' interactions with their infants was expected to directly affect the quality of the home environment provided to nurture each infant's growth and development. As predicted, in both intervention groups, mothers displaying more positive interactions with their infants also provided more nurturing home environments for their infants. This result was consistent with prior research supporting positive associations between the NCATS and HOME scales (Sumner & Spietz, 1994) and between both of these scales and naturalistic observations of mother-child behavior in the home (Tesh & Holditch-Davis, 1997). Exploratory analyses suggested that individual differences in maternal educational experience accounted for some of the relationship between NCATS and HOME scores in both groups. Past work also has reported relationships between maternal education and each of these

[30] For instance, some individuals may have chosen to stop using services rather than to establish a new relationship with a provider. Others may have decided to reduce the intensity of visits with a new provider due to perceived differences in the client-provider relationship.

instruments (Bradley, 1994; Bradley et al., 2001a; Sumner & Spietz, 1994). So, while it was not surprising to observe a weaker relationship between NCATS and HOME after taking education into account, the difference between intervention groups in this regard was more unusual. After partialling out maternal education differences, maternal-infant interactions did not exert a significant influence on HOME scores in the Nurse-CHW Team care group, whereas a significant positive effect remained in the SOC group. There were not significant differences in mean education completed between individuals in either intervention group (See Table 4). However, more subtle variation in the distribution of educational experiences did exist (Nurse-CHW Team Care: 9.2% < 8th grade, 46.6% 8-11th grade, 24.8% 12th grade, 19.4% > 12 years of education; SOC Care: 7.7% < 8th grade, 49.8% 8-11th grade, 32.1% 12th grade, 10.4% > 12 years of education). If extremes on the distribution exerted a greater influence in NCATS and HOME scores, then this difference might explain the stronger influence of education on both NCATS and HOME scores in Nurse-CHW Team care and the weaker relationship between NCATS and HOME scores after partialling out this effect. Alternatively, variation in programmatic emphases should be explored in treatment approaches with mothers who have more limited educational backgrounds. Perhaps, SOC service providers actively encouraged books, reading, and toys to mothers of young infants more aggressively than Nurse-CHW Team care providers in these homes.

The hypothesis that higher quality home environments (as indexed by total HOME scores) would have a direct positive effect on infant mental development

was not supported in the current study. No statistically significant effect of home environment on BSID mental development index scores was observed in either treatment group. The lack of observed relationship was surprising because prior research has found that home environments containing high levels of responsive and non-restrictive parent involvement, developmentally appropriate play materials, organization, and variety were related to improved cognitive development in children (Bradley, 1993, 1994; Bradley & Caldwell, 1988; Burchinal, Campbell, Bryant, Wasik, & Ramey, 1997).

Several factors may explain the lack of support for a direct effect of home environment on mental development in the current study. First, based on eligibility requirements, all families in the current study had very limited financial resources. Research on the HOME has found that poverty status explains considerable variance in scores and nearly accounts for the observed variation in scores between ethnic groups (Bradley et al., 2001a). Changes in family income during the first four years of a child's life also have been associated with increased HOME scores in those families (Garrett, Ng'andu, & Ferron, 1994). So, restricting the range of potential scores by selecting a sample that was entirely low-income families may have reduced some of the instrument's discriminability. The correlation tables between HOME and MDI scores printed in one study showed a reduction in size[31] when values among lower socioeconomic class families were compared to the larger group with varied socioeconomic backgrounds (Bradley et al., 1989). In addition, unpublished study results from

[31] Correlations between 12 month total HOME scores and 12 month MDI scores were .25 in the overall sample, .03 in the lower class sample, .17 in the lower middle class sample, and .25 in the middle class sample (Bradley et al., 1989).

Koniak-Griffen and her colleagues (data were later reported in Sumner et al., 1994) found no statistically significant association between concurrent HOME scores and MDI scores at 24 months in a very homogenous white, married, middle-class sample of mothers participating in an intervention (Sumner & Spietz, 1994).

Secondly, the current study measured the characteristics of the home environment at the same point in time as the child's mental development outcome. Although recent studies have documented reasonable stability[32] in home environments across time, changes also do occur. So, if high HOME scores at six months were not necessarily indicative of similar environments in the preceding months, then these supportive home environments might not contribute to noticeable changes in developmental outcome until months or even years later. A time delay may be necessary in order for infants to benefit from the learning materials, parental involvement, and caregiving practices found in the home environment at six-months after delivery. Correlations from another research project supported this possibility. Specifically, larger correlations were reported between 12 month HOME scores and 24 month MDI scores ($r = .50$) than between 12 month HOME scores and 12 month MDI scores ($r = .25$) (Bradley et al., 1989). A number of other studies documenting the influence of HOME scores on subsequent developmental outcomes also have measured HOME scores at an earlier time point and developmental status at a later one

[32] Burchinal and her colleagues (1997) found that the correlation between 6 and 12 month HOME scores was .47.

(Bradley & Caldwell, 1981; Bradley et al., 2001b; Burchinal et al., 1997; Thompson, Catlett, Oehler, Gustafson, & Goldstein, 1998).

In addition to the absence of a delay between measures, the actual child age at assessment also may have influenced the nonsignificant HOME-MDI finding. Interviewers in the current study noted that many families viewed their children as "babies" at six month assessments and engaged in relatively little toy-based play with children, whereas much greater emphasis on play with toys occurred at twelve month assessments. Indeed, studies do report changes in widespread availability of learning materials on the HOME by child age (Bradley et al., 2001a). Researchers also have acknowledged a tendency to observe higher HOME scores with increasing child age, a finding that may be indicative of age-related differences in learning materials (Bradley et al., 1989; Caldwell & Bradley, 1984). Studies have demonstrated that variability in available learning materials in the HOME subscale was heavily weighted in the predictive ability of the HOME for subsequent intellectual development (Bradley & Caldwell, 1980; Bradley et al., 2001b; Stevens & Bakeman, 1985). If parental perceptions of learning materials for infants in the sample changed markedly from six to twelve months, the relationships between HOME and MDI scores may also change during this period. Work by Bradley and Caldwell (1980) supported this assertion. After controlling other relevant factors in their sample, twelve month HOME scores were a significant predictor of Stanford-Binet scores at age three, whereas six-month HOME scores were not. This effect persisted even after partialling out six month HOME scores from the twelve month analysis.

Finally, limited relationships may have been observed between HOME Scores and MDI scores because of the characteristics of the BSID assessment for 6-month-olds. At the six-month assessment the BSID contains items designed to tap the developing cognitive and linguistic skills of the child. However, many of the items on the mental subscale at younger ages include a considerable motoric component that becomes somewhat minimized at older ages. For example, scale items noted to be at the 6 month cognitive and language developmental levels on the assessment include the following: Pulls string adaptively to secure ring, cooperates in game, retains two of three cubes for three seconds, rings bell purposely, lifts cup by handle, looks at pictures in book, and uses gesture to make wants known. The development of some of these skills may be less influenced by home learning materials and interactions than items at subsequent ages that involve fine manipulation of puzzle-like toys, pointing to pictures, following verbal commands, expressing words, and anticipating future actions in play event sequences. In a recent article Bradley and his colleagues (2001b) supported this notion, acknowledging that child performance on instruments measuring motor and self-care routines "are not as likely as cognitive and language development to be affected by the kinds of indicators included in the HOME-SF...." (p. 1879).

Infant Mental Development. Maternal interactions as evidenced in performance during the NCATS teaching task were hypothesized to have a direct, positive effect on infant mental development scores. However, the path from maternal interactions to mental development index scores on the BSID-II

was not statistically significant in either intervention group. This nonsignificant finding was surprising because it is through joint interactions with primary caregivers that infants acquire language, develop symbolic representations for people and objects, and learn to identify and solve problems in their environments (Fogel, 1990; Lang, 1984; Rogoff, 1998; Saarni, Memme, & Campos, 1998). Furthermore, research has established positive relationships between maternal interactions with children and subsequent child competence on indicators of cognitive and language performance (Barnard & Morisset, 1995; Bee et al., 1982).

Probable reasons for finding no effect of NCATS performance on MDI scores were previously enumerated in the section discussing relationships of HOME scores with MDI outcomes. These included: (a) no time lag existed between measurement of NCATS scores and MDI outcomes, (b) greater emphasis on motoric skills and less emphasis on language skills in the assessment of mental competencies at 6 months than at subsequent ages, and (c) potential restriction of predictive instrument discriminability through restriction of sample to low-income population. Prior work that has established the influence of maternal interactions on cognitive outcomes has routinely assessed child outcomes after some passage of time following the initial interaction assessment (Barnard & Morisset, 1995; Bee et al., 1982). The strong relationships found between the maternal interactions in these studies and subsequent child language outcomes also underscores the significance of positive caregiver-child interactions in the mastery of symbolic and language

skills that were less prominent in the six-month MDI assessment. Research also suggests that child cognitive development is more negatively impacted by contextual influences of poverty (including differential home environments and proximal interactions) than motor development outcomes (Petterson & Albers, 2001). So, as assessments increasingly separate assessment of cognitive mastery from motor skills, the influences of background characteristics for the child would be expected to relate more strongly to the individual differences observed. Indeed, NCATS instrument validation studies have identified only minimal associations between parent-infant interaction prior to twelve months of age and subsequent child cognitive ability (Sumner & Spietz, 1994).

Child Performance Factors. Several factors included in the conceptual model were expected to reflect individual differences between infants that would influence their interactions with their mothers and with the administrators of the Bayley Scales of Infant Development. The inclusion of these variables was intended to more accurately model individual differences in key outcome variables by taking into account developmental histories of children and their tendencies to exhibit unusually intense or ambiguous responses in interactions.

Test day behavior. The Behavior Rating Scale (BRS) of the BSID-II reflects the child's orientation/engagement (to tasks, the examiner, and the caregiver), emotional regulation, and quality of movement during the testing situation. As predicted, in the current study BRS scores displayed significant positive effects on infant MDI scores in both treatment groups. This finding is

consistent with a long history of previous research indicating that the BRS[33] and the constructs that it taps are powerful positive predictors of both proximal infant assessment scores and subsequent cognitive performance in childhood (Burchinal et al., 1997; Matheny, 1980; Matheny et al., 1974; Roth et al., 1984). The assessment situation exposes children to a variety of frustrating tasks and it demands developmentally-appropriate periods of sustained attention and engagement. Thus, it was not surprising that infants who were more alert, socially responsive, persistent, and able to regulate their emotions following periods of distress would receive higher overall scores. While it was not a primary focus of this study, further research is needed to understand factors that contribute to individual differences on the BRS since successful negotiation of many of these behaviors will enhance the child's subsequent social competence and probable success in more structured school situations in the future.

Clarity of cues. Previous work has established individual differences in the clarity of cues that infants exhibit in social interactions (Parke & Tinsley, 1983). Babies who display more ambiguous or confusing cues are less likely to elicit appropriate responses from their caregivers, and therefore are less effective in maintaining positive interaction sequences (Beckwith, 1984; Minde, 2000). However, in this study the hypothesis that children sending clearer cues would elicit more positive interactions from their parents was only supported in the SOC group. For SOC intervention families, babies with clearer cues engaged mothers

[33] Some research discusses the IBR rather than the BRS. The BRS was named the Infant Behavior Record (IBR) in the previous edition of the Bayley Scales of Infant Development. The scale was renamed the Behavior Rating Scale after revisions and further validation associated with the restandardization of the BSID-II (Bayley, 1993).

in significantly more positive interactions. However, cues were unrelated to maternal performance in the Nurse-CHW Team Care mothers. Careful examination of the data found no difference in mean quality of interactions between intervention groups (Nurse-CHW Team Care $M = 31.54$, $SD = 4.41$; SOC $M = 31.93$, $SD = 4.87$, $t(1, 436) = -.864$, $p = .388$) despite the fact that infants in the Nurse-CHW Team Care group displayed significantly more ambiguous cues than infants in Nurse-CHW Team care group (Nurse-CHW Team Care $M = 7.30$, $SD = 1.19$; SOC $M = 7.65$, $SD = 1.25$, $t(1, 436) = -2.94$, $p = .003$). So, mothers in Nurse-CHW Team care more effectively compensated for their children's lack of responsiveness than did mothers in SOC group. Differences in the interventions may have contributed to this effect. Nurse-CHW Team care providers may have helped mothers identify and read ambiguous cues more effectively than SOC treatment. However, the mean difference in infant cues observed was not huge. Typical infants in both groups exhibited at least seven out of ten cues. Future work should explore whether participation in the intervention actually contributed to the nonsignificant impact of cues on maternal behavior or if similar compensatory maternal behavior was observed among those who did not participate in the intervention as well.

Poor infant health. The hypothesis that poor infant health would contribute to decreased MDI scores and more ambiguous cues was not supported in this study. In both treatment groups, no significant effects of infant health were observed. Although the health index used in this study was composed of factors noted in the literature to be related to poorer developmental

outcomes in children, it had not been designed or tested in prior research. Thus, the instrument may simply not be effective at discriminating high and low risk infants. For instance, the use of a cumulative approach that encompassed birth, neonatal, and postnatal health factors may have equally weighted risks that should have been weighted differently.

Study sample selection also may have contributed to the nonsignificant relationships between infant health and behavior. For selection in the subsample, individuals had to complete the late pregnancy interview. This interview was typically collected at 34-38 weeks gestation. Data were not collected if individuals delivered prior to completion of the late pregnancy interview. This selection criterion had the effect of excluding the highest risk preterm infants from the sample. With the exception of one three pound baby born at 32 weeks gestation[34], all of the babies in this subsample were at least 34 weeks of age at delivery and weighed at least four pounds at birth. While some babies were still born prematurely and met the low birth weight criterion, this group of infants typically has better developed lungs and has a considerably better prognosis overall than infants born at 24-32 weeks gestation and weighing under 1500 grams (Paneth, 1995; Widerstrom & Nickel, 1997). The exclusion of infants at highest risk based on birth outcomes and the use of corrected rather than actual age at assessment (both NCATS and BSID assessment) probably

[34] In this case, the interview was conducted early based upon a wrong due date listed in the research chart. Although the due date had been altered based on an early ultrasound, the chart listed the date given based on last menstrual period. The client delivered this baby within a couple days of the late pregnancy interview. The baby weighed 1375 grams and gestational age was 224 days.

primarily accounted for the lack of explanatory power of the child health variable in this study.

Summary.

A focal interest in this study was to investigate not only what factors influenced initial reports of need, but also how expected and reported needs related to participation in prevention/intervention programs and to individual maternal and child outcomes. The findings suggested that understanding reported needs is critical. Actual use of service was driven not by individuals' expected needs, nor by their stressor responses to those needs, but by their self-reported needs. Thus, this work corroborated discussion in chapter one indicating that reported needs may be the first step, even a beginning commitment or personal goal, toward the individual change process.

However, embedded within the data presented was the clear finding that service use was not simply a function of reported needs. Instead, reported need was a key element within a bigger system of influences on use of services. Program involvement also depended on access to the services, competing demands on the individuals' time and resources, and their perceptions of the overall helpfulness of the program itself. None of these insights are earthshaking revelations. But they are critical considerations for reaching target populations with services designed to support them. Services were used with greater intensity when they were personally relevant, related to a reported need, accessible, and approachable within the schedules and competing interests of individuals.

Finally, the results reiterated that program use does not always translate into improved outcomes. Greater dosage did not necessarily promote more change. Understanding the factors influencing program engagement will not provide simple solutions to the complicated issue of how best to enhance outcomes among eligible families. Creating a network of services that reaches the families that may benefit and benefits the families it reaches will be an ongoing challenge.

CHAPTER 3

REPORTED NEEDS AMONG LOW-INCOME WOMEN: DISCUSSION AND IMPLICATIONS

Study Aims.

This dissertation study investigated individual differences in reporting perceived needs within a population of low-income pregnant women. Initially, I conceptually distinguished between three types of needs: expected, perceived, and reported. Through several sets of analyses, I then considered if there was an empirical, as well as conceptual, basis for distinguishing between expected and reported needs. To this end, I particularly examined observed differences between the extent of concern identified by participants (reported needs) and that which might have been expected by providers based on more objective characteristics of each participant's self-described situation at the outset of intervention (expected needs). Specifically, how were expected and reported needs related to service use and intervention program outcomes? What influenced individuals' tendencies to report the presence of a need? What are the implications of these findings for research and practice?

Is the Distinction Between Expected and Reported Needs Important?

The findings suggested that reported needs do matter. In this sample, reported needs were based upon substantive expected needs, but they were not interchangeable with them. Unlike expected needs, reported needs predicted subsequent service utilization behavior. Simply disclosing a need--labeling that a

concern was present in personal experience--increased people's tendencies to use community services designed to assist with those needs. Thus, it appeared that reporting the need was a step toward action or behavior change, even perhaps an indicator of some commitment to engaged program participation.

So the distinction between expected and reported needs mattered. Why is that significant? Numerous studies and programs begin with the premise of producing change or attenuating a likely negative impact on groups "at risk" or "in need". Yet, little consideration has been given to the initial definitions of these groups based on expected needs versus self-reported needs. The current investigation suggested that the presence or absence of reported needs had important implications for active participation in the treatment being tested. Although it was not directly investigated, levels and types of reported needs also probably produced substantive influences on the character and course of the treatment itself. Thus, even when offered the same treatment, samples based on reported versus expected needs would not be directly comparable with respect to the intervention received. In the current study, need reporting seemed to reflect a higher level of individual "readiness" for services. Differences between randomized trials based on expected needs and quasi-experimental pre-test/post-test comparisons often involve samples with divergent levels of reported needs at the outset of the study. Yet, typically reported needs are not measured and included as a factor in the analyses and interpretation of findings. Attention to reported needs in future research might result in more precise descriptions of

whom an intervention "works" for[35] rather than reiterating that a program is not effective for the whole population with expected needs or that it displays very weak effects across the general population with expected needs. Alternative intervention approaches may be designed to enhance readiness to use services among those who do not report the presence of expected needs.

While the findings from the current study supported the assertion that development of different interventions for people with diverse need reporting characteristics (or perhaps more specific readiness criteria to be developed later), it is not the first to invite such a call to action. Indeed, client-centered care approaches employed by many programs already recognize the usefulness of individualizing interventions based on reported needs and choices of program participants (Allen & Petr, 1998; Nelson & Allen, 1995). However, an important next step is to further tailor programs and services to address the different set of intervention issues among people reporting few needs, including both non-participants and underreporting[36] participants. In past work, Prochaska and his colleagues have advocated identifying individual stages of change and adapting

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[35] The tone in current home visiting evaluation literature often underscores that interventions do not appear to be effective across a broad population with expected needs. Home visiting is not "THE" universal answer. However, studies may have defined the population too broadly, thereby undermining evidence of effective outcomes. For instance, neither Alcoholics Anonymous or Weight Watchers programs probably would appear to be effective across the broad populations with treatment of their respective addictive behaviors. But, when individuals achieve a level of need recognition and readiness, participation in these programs appears to produce more positive results than individual efforts alone. Likewise, specific home-visiting programs may be effective interventions among people who have a certain level of readiness and receptiveness to information and intervention. Measurement of reported needs and other factors indicating a readiness to change may be the first step to investigating the validity of this possibility.

[36] Although this terminology of underreporting implies that individuals are inaccurate in their representation of their needs, this is not the connotation that is intended. The perceptions of individuals, regardless of their match with others' perceptions, are real and are influential in guiding behavior. In this context the use of the "underreport" term provides a reference not to the individuals "real" needs, but rather to the needs that policy makers, program planners, and researchers might attribute to them based on expected need characteristics.

specific addictive behavior treatment strategies appropriate for clients in each stage (Prochaska, 1996; Prochaska et al., 1992). However, to my knowledge, development of a similar protocol has not been discussed within the preventive intervention domain. Application of these ideas into the design, marketing, and implementation of interventions may improve the abilities of agencies to target appropriate service delivery to community members and to maximize potential changes in outcomes over time. Likewise, evaluations that take into account client readiness in investigations of program effectiveness may define intervention "success" differently depending on the initial characteristics of the clients. Modification of research designs and outcome indicator selection to consider differences in client readiness may serve as an important first step to understanding which interventions are most effective with which clients.

What Influences Reported Needs?

Although reported needs were based on substantive expected needs, expected needs influenced the level of reported needs through both direct and indirect pathways. Stressor responses were found to mediate relationships between expected needs and reported needs. Future research will need to identify whether these stressor responses heightened the perception of individual threat associated with inaction or acted as a cue to expedite action among individuals who already had perceived a threat. Yet, the data suggested that the presence of stressor responses increased need-reporting behaviors. This finding might be useful in developing intervention efforts to enhance individual readiness to use services. For instance, a program could help pregnant women or parents

with expected needs vicariously experience the stress[37] associated with not developing a coherent parenting strategy or the uncertainty associated with not knowing strategies to handle difficult child behaviors. Exposure to these kinds of experiences within a safe context might increase individual tendencies to report needs for parenting support and subsequently either seek or accept information and assistance from others.

Individuals who viewed themselves as having general competence to take efficacious action at some point related to the issue and who felt that benefits of action would be greatest due to low competence in specific issue area characteristics also expressed more needs. Since high expected needs were negatively related to feelings of personal control, an important component of some interventions may involve empowering people sufficiently so that they begin to identify their own needs. In some cases, the presence of more reported needs at the end than at the beginning of an intervention may represent movement toward effective use of preventive intervention services that can promote change. Thus, programs and evaluations may not necessarily expect to see a reduction in reported needs, or a greater appearance of need fulfillment, following treatment. Attention to the multiple meanings of evaluation data collected for clients with different levels of readiness may provide greater clarity in understanding the impact of home-based intervention.

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[37] Examples might include highly realistic vignettes in television commercials (cereal, shoes, and alcohol establish a "need" for products through advertising, why not use these outlets to encourage people to learn about parenting?). Alternatively, interventions could be developed for patients in obstetric or pediatric office waiting rooms. For example, people could be exposed to tapes with periods of extensive infant crying, virtual reality games handling common toddler discipline issues, or other simulated challenges that ultimately highlight the usefulness of having additional parenting knowledge and support.

Taken together, the current study results suggested that people who saw greater relevance of the issue in their lives (e.g., because it was contributing to heightened stress responses), who believed that they possessed the capability to eventually take action related to the issue, and who thought that their actions would provide some tangible benefit beyond their existing levels of competence in that specific issue area, were the people who tended to report higher needs. Thus, this pattern combining general mastery resources with heightened relevance and potential benefit played a significant role in the active reporting of expected needs that existed. This pattern of characteristics and apparent appraisals helped people label a personal need that existed. Furthermore, this labeling process was later shown to be more relevant than the presence of the simple expected need in determining the intensity of later service utilization. Thus, this combination of factors among low-income women contributed to a "readiness" for service utilization at an individual level.

What Contributes to MSS/ISS Service Utilization?

Importantly, actual service use intensity was not a direct function of expected needs in this sample of low-income women. Instead, a combination of individual, environmental, and programmatic characteristics contributed to the intensity of service utilization. Influential factors that were supported in the study included the following: individual readiness to use services (as indicated by reported needs), broad access to services (i.e., residence in the county), minimized competing responsibilities (i.e., employment), and the program itself. Program characteristics influenced not only how many visits were necessary to

indicate greater intensity of service use, but also how much client evaluation of the program as personally helpful was important in determining the subsequent amount of use. Although factors at a number of these levels were listed among those described in McCurdy and Daro's (2001) recent theoretical model of service utilization, the inclusion of employment and residence in the county are notable additions to their model. These findings draw attention to the significance of factors at a number of levels in contributing to effective service use. Attention of communities toward the range of influential factors in service use may help establish more effective support to families or more flexible adaptation of services for families with different needs (e.g., unemployed and employed) in order to maximally facilitate service use whenever individuals and families wish to participate.

How Does Service Utilization Relate to Outcomes?

The results of this investigation also underscore the reality that, although maximizing service use is a critical programmatic concern, more service does not always result in better outcomes. Use of services is necessary to benefit from intervention, but it is not sufficient. Programs and researchers must carefully document which aspects of interventions were implemented and utilize more effective coding schemes for the type of intervention conducted with each family. Comparisons of actual needs addressed versus needs reported will provide further information about how effectively family-centered care models are implemented. In addition, repeated assessments of client and family engagement in the intervention, perceptions about the relevance and usefulness

of the intervention, activities and issues addressed during the intervention, and relationships with service providers will offer maximal information to improve program implementation as well as contribute to a better understanding of links between the intervention provided and subsequent behavioral indicators of family and environmental improvement as a result of participation.

Why Focus on Needs in a Strengths-Based Setting?

Currently, in both service delivery and research realms there is a shift away from examination of "needs" in favor of focusing on the less deficit-oriented notions of assets or strengths (Nelson & Allen, 1995; Reed & Brown, 2001). Although this dissertation uses terminology involving individual needs, the findings herein raise questions that are highly relevant to those espousing a strengths-based approach to their work. The results presented point to critical interrelationships between the constructs of needs and strengths. Individuals with greater self-esteem and mastery (indicative of people highly aware of their strengths) were more likely to subsequently report the presence of needs. That is, needs were *not* identified as the absence of a given competence or strength. Reported needs did not appear simply to be the opposite pole on the "strengths" continuum. Indeed, this study on reported needs may have identified part of the process explaining why asset-oriented approaches work so well with some individuals and families. The focus on strengths during intervention may enhance individuals' abilities to identify, report, and ultimately take action to overcome substantive needs. Future work is needed to examine how existing constructs of need and strengths are theoretically, empirically, and experientially

related to each other. It is likely that considerable improvement in prevention/intervention effectiveness in promoting behavioral changes will lie at the intersection of these components.

Study Limitations and Recommendations for Future Research.

Although this investigation has provided some important contributions to the understudied literature on expected and reported needs, a number of limitations must be acknowledged. First, although the distinction between expected, perceived, and reported needs has been identified, unfortunately the study methodology confounded perceived and reported needs. While this is likely to be an ongoing problem in many studies, future work must search for ways to measure these constructs effectively. These efforts are needed in order to differentiate whether factors that contribute to reported need are tied to the need appraisal process or to the determination about whether or not to disclose a need that is perceived to the audience. To understand that process as well, future explorations should include more careful measurement of disclosure constructs, including both social desirability and lie scale instruments.

Although the data set used was quite rich with information about low-income pregnant and parenting women, future studies may benefit from the collection of some additional information. First, the introduction of greater socioeconomic variability into research would help explore whether factors and processes described are specific to women of low-socioeconomic classes or are more broadly applicable.

Second, inclusion of a larger sample for future work is essential. In this case, the sample size lacked sufficient power to examine models stacked by racial/ethnic group or neighborhood characteristics. Yet, the attitudes and experiences prominent within one's proximal community and within one's racial or ethnic group are likely to have a considerable impact on attitudes toward service use in general and in perceptions of specific programs more particularly (McCurdy & Daro, 2001).

The inclusion of more specific measures to this research question also would contribute greatly to potential understanding of this phenomenon. A critical analysis of how reported need patterns vary depending on the structure of need related questions, the contexts in which they are asked, and the variations observed across need topic areas is needed. Also, assessing each individual's progress along various dimensions of Prochaska's stages of change would help identify if need reporting emerges and is maintained or if need-reporting tendencies fluctuate with personal efforts to change behavior. Other measures too, including coping styles, measures of cognitive and verbal abilities, perceived threat, and reported competence, stress, and social support related to specific need constructs, would maximize the potential explanatory power of future work. Finally, distinctions between reported need, intention to enroll, actual enrollment, and ongoing retention/participation in services would help elaborate the links between model components.

Closing Comments.

With relative ease, many scientists have categorized individuals by levels of needs based on relatively objective criteria. However, closer examination suggests that experiential definitions of need are much more complex. As people identify whether or not current situations constitute a personal need, they appear to be making significant judgments about their capabilities and readiness to act as well. While existing work examining the influences on and the potential implications of various reported need behaviors remains in its infancy, it appears that continued investigation in this area holds promise for expanding understanding across a wide range of areas. Components in models of coping, empowerment, service utilization, risk reduction and preventive intervention efficacy may be revisited and/or developed as further research unfolds. But, the greatest potential benefit from investigating differences between the scientific and "lived" dimensions of need will be our eventual ability to more successfully apply scientific knowledge to address the all too real needs of families in our midst.

TABLES

Table 1. Comparison of treatment characteristics across study intervention groups.

Characteristic	Nurse-CHW Team Care	Standard of Care
Service provider responsible for case management	Nurse and Community Health Worker team	Nurse
Relationships to nutrition and social service providers	Encouraged to refer to nutritionists and social workers	Encouraged to refer to nutritionists and social workers
Relationships to health care providers	Regular communication about client needs and ongoing treatment with health care providers	Refers to and receives referrals from health care providers. Not regular communication about client needs.
Format of service delivery	Home-visiting, visits in other locations at client's request	Primarily home-visiting, however one subgroup of contracted prenatal providers relies on face-to-face contact at health clinic instead of home visits in many cases
Primary client – prenatal	Mother, but also encourage inclusion of informal support network members	Mother
Primary client – postnatal	Mother and infant, but also encourage inclusion of informal support network members	Infant

Table 1. (Cont.) Comparison of treatment characteristics across study intervention groups.

Characteristic	Nurse-CHW Team Care	Standard of Care
Intervention treatment	Assessment followed by individualization of curriculum modules to client's situation, her priorities, and her intervention format preferences. Repeated re-assessment of client's needs and priorities throughout the intervention. Curriculum modules addressed the following issues[1]: maternal mental health, life skills, pregnancy and childbirth issues, risky behaviors, service use social relationships, infant care and development, and parenting.	Assessment followed by developing a multidisciplinary treatment plan that recognizes client's situation and her priorities. Nurse provided information and resources identified in the care plan. Common topics included: nutrition, parenting, risky behaviors, health conditions and practices, pregnancy, infant development, and infant care. Information provision not based on a specific documented curriculum.

[1] Examples of curriculum content included the following: *maternal life skills* (e.g., budgeting and finance, cooking and nutrition, personal goal setting), *maternal mental health* (e.g., postpartum blues and depression, anxiety, stress), *pregnancy issues* (e.g., fetal growth and development, emotional changes, rest, diet, and exercise), *childbirth issues* (e.g., preterm labor, when to go to the hospital, birthing plan), *health behaviors and risky behaviors* (e.g., pregnancy do's and don'ts, tobacco, drugs, sexually transmitted diseases), *service use* (e.g., prenatal care, telephone tips, WIC, when to call your doctor, baby's health care, community resources), *social relationships* (e.g., conflict resolution, relationships and support, communication through nurturing and touch, getting to know your baby), and *infant care and development* (e.g., bathing your baby, care of belly button, feeding your baby, playing to learn, baby's growth and develop-ment) and *parenting* (e.g., things you'll need for baby, SIDS, crying and colic, helping your child learn, parenting young children, accident prevention, health and hygiene, smoke free baby and me).

Table 1. (Cont.) Comparison of treatment characteristics across study intervention groups.

Characteristic	Nurse-CHW Team Care	Standard of Care
Referral mechanism	Professional provider referral not necessary. Program directly initiated contact with women served by the health clinics.	Primarily professional provider referral through the health clinic providers
Frequency of visits according to clinical path – prenatal	CHW: *First month*: weekly home visits, *Thereafter*: 2 home visits and 2 phone calls per month Nurse: 1 home visit and one phone call per trimester with additional predelivery home visit.	Nurse: Up to 9 home visits from pregnancy until 2 months after delivery. These are typically delivered as one visit per month
Frequency of visits according to clinical path – postnatal	Delivery – 6 Months CHW: 2 home visits and 2 phone calls per month Nurse: postdelivery home visit plus 2 additional home visits and 3 phone calls during the six month period 6 Months – 12 Months CHW: 1 home visit and 1 phone call per month Nurse: 1 home visit and 1 phone call during the six month period, plus additional home visit for transition planning purposes and case closure	2 Months – 12 Months Nurse: Up to 9 home visits during this time period. These are typically delivered as one visit per month.

Table 1. (Cont.) Comparison of treatment characteristics across study intervention groups.

Characteristic	Nurse-CHW Team Care	Standard of Care
Appointment persistence	Appointments were scheduled around client's needs. Considerable effort (phone calls, in-person attempts) expended with repeated attempts in cases of clients who did not keep appointments.	Appointments were scheduled around client's needs. Follow-up phone calls (if had a phone) to clients who did not keep appointments. But it was primarily the client's responsibility to reschedule appointment, if desired.
Process for exceeding recommended visits beyond those outlined on the clinical path	Nurse-CHW Team discuss reasons and adjust treatment plan as needed	Special approval required for agency reimbursement. Nurse provides written justification for necessity of visit(s).

Table 2. Characteristics of Medicaid-eligible mothers in the Michigan Maternal Health Services Study sample (n=613) and in dissertation subsample (n=438) at study enrollment.

Characteristic	Excluded Cases (n=175) n (%)	Subset Selected (n=438) n (%)	Total Sample (n=613) n (%)	Compare (Excluded vs. Selected)
Treatment group				$X^2 = .178$
MOMS Intervention group	90 (51.4)	217 (49.5)	307 (50.1)	df = 1
Standard of Care group	85 (48.6)	221 (50.5)	306 (49.9)	
Age	M = 22.70 SD = 4.75	M = 22.27 SD = 4.73	M = 22.39 SD = 4.74	$t = -1.02$ df = 611
16-19	43 (24.6)	135 (30.8)	178 (29.0)	$X^2 = 3.39$
20-24	85 (48.6)	200 (45.7)	285 (46.5)	df = 3
25-29	32 (18.3)	62 (14.2)	94 (15.3)	
30-39	15 (8.6)	41 (9.4)	56 (9.1)	
Race/Ethnicity				$X^2 = 2.27$
Caucasian	73 (42.0)	182 (41.6)	255 (41.6)	df = 4
African American	54 (31.0)	116 (26.5)	170 (27.7)	
Hispanic	32 (18.4)	101 (23.1)	133 (21.7)	
Native American	4 (2.3)	9 (2.1)	13 (2.1)	
Other	11 (6.3)	30 (6.8)	42 (6.9)	
Marital Status				
Married	21 (12.0)	84 (19.2)	105 (17.1)	$X^2 = 11.15^{**}$
Divorced, Separated, or Widowed	27 (15.4)	34 (7.8)	61 (10.0)	df = 2
Single, Never Married	127 (72.6)	320 (73.1)	447 (72.9)	
Living with father of baby	81 (46.3)	208 (47.5)	289 (47.2)	$X^2 = .086$ df = 1
Education				
Years completed	M = 11.02 SD = 1.93	M = 10.70 SD = 2.37	M = 10.79 SD = 2.26	$t = -1.71^{t}$ df = 611
< 12 years	100 (57.1)	248 (56.6)	348 (56.8)	$X^2 = .014$ df = 1
Employed	77 (44.0)	190 (43.4)	267 (43.6)	$X^2 = .020$ df = 1

^{t} $.05 < p < .10$ ** $p \leq .01$ *** $p \leq .001$

Table 2. (Cont.) Characteristics of Medicaid-eligible mothers in the Maternal Health Services Study (n=613) and in dissertation subsample (n=438) at study enrollment.

Characteristic	Excluded Cases (n=175) n (%)	Subset Selected (n=438) n (%)	Total Sample (n=613) n (%)	Compare (Excluded vs. Selected)
Weeks gestation	M = 10.89 SD = 4.48	M = 12.24 SD = 5.04	M = 11.85 SD = 4.92	t = 3.24*** df = 611
Parity				X^2 = .505
None	72 (41.1)	194 (44.3)	266 (43.4)	df = 1
One or more	103 (58.9)	244 (55.7)	347 (56.6)	
Abuse History				
Ever physically abused	100 (57.5)	223 (50.9)	323 (52.8)	X^2 = 2.15 df = 1
Ever emotionally abused	108 (62.1)	241 (55.1)	349 (57.1)	X^2 = 2.43 df = 1
Ever sexually abused	42 (24.0)	92 (21.1)	134 (22.0)	X^2 = .592 df = 1
Psychological Characteristics				
Perceived Support (MSPSS)	M = 47.93 SD = 6.89	M = 47.32 SD = 7.17	M = 47.50 SD = 7.09	t = -.948 df = 611
Perceived Stress (Cohen)	M = 26.04 SD = 7.67	M = 26.42 SD = 7.86	M = 26.31 SD = 7.80	t = .541 df = 611
Self-Esteem (Rosenberg)	M = 31.06 SD = 4.18	M = 30.75 SD = 3.96	M = 30.84 SD = 4.02	t = -.861 df = 611
Mastery (Pearlin)	M = 20.74 SD = 2.67	M = 20.63 SD = 2.85	M = 20.66 SD = 2.80	t = -.453 df = 611
Depressive Symptoms (CES-D)	M = 19.42 SD = 11.34	M = 19.55 SD = 10.93	M = 19.51 SD = 11.04	t = .137 df = 611
CESD ≥16	102 (58.3)	248 (56.6)	350 (57.1)	X^2 = .141 df = 1

† .05 < p < .10 ** p ≤ .01 *** p≤ .001

Table 3. Author-generated expected and reported need indices.

Note: For expected need, individuals were only given one score per category. So, if multiple characteristics fit the individual's particular situation, then the one with the highest assigned need rating was given to them.

Expected Need	Reported Need
Lack of Information About Pregnancy/Childbirth	
Have you ever been pregnant before? Yes 0 No 2	Since enrollment, did you have a need/concern for pregnancy education? Yes 2 No 0
Have you ever delivered a live birth? Yes 0 No 2	Since enrollment, did you have a need/concern for childbirth education? Yes 2 No 0
Lack of Information on Parenting/Caring for Children	
Is participant currently caring for children (biological or otherwise): Yes 0 No 2	Since enrollment, did you have a need or concern for infant care education? Yes 2 No 0
Caretaking ability confidence[2]: (range 0-2) • I worry that I will not know what to do if my baby gets sick • It will be difficult for me to know what my baby wants. • I often worry that I will be forgetful and cause something bad to happen to my baby. • I am afraid I will be awkward and clumsy when handling my baby. ½ point for each of following questions if answer uncertain, mainly true, or completely true on it.	Since enrollment, did you have a need or concern related to parenting? Yes 2 No 0

[2] Items taken from caretaking ability subscale of the Maternal Self-Report Inventory. Reliability and validity information about this scale are noted under the mothering ability esteem measures section.

Table 3. (Cont.) Author-generated expected and reported need indices.

Expected Need	Reported Need
Education	
<12 years of education & not currently in School 2 <12 years of education & in school currently 1 12 years of education or greater regardless of current school status 0	Since enrollment, did you have a need or concern regarding your own education? Yes 2 No 0
Health Insurance	
At enrollment: Enrolled in neither medicaid nor private insurance 2 Medicaid or private insurance is pending official status 1 Enrolled in either medicaid or private insurance 0	Since enrollment, did you have a need or concern related to getting/using Medicaid or MichCare? Yes 2 No 0
Employment	
Expected need is based on whether or not employed at both enrollment and 34 weeks and if at enrollment mom expressed desire to have job (suggests needed/wanted one) by saying she was looking for work. Not employed both waves & Looking for a job at enrollment 2 Became unemployed between waves 2 Not employed both waves & Not looking for job at enrollment 1 Employed at both waves & Looking for new job at enroll 1 Employed at both waves & Not looking for new job at enrollment 0	Since enrollment, did you have a need or concern about finding a job or work? Yes 2 No 0

Table 3. (Cont.) Author-generated expected and reported need indices.

Expected Need	Reported Need
Housing	
Regardless of number of reported moves between data waves, if living in motel, shelter or if homeless at enrollment 2 2 or more moves between waves & live in home at enrollment 2 1 move between waves & live in a home at enrollment 1 No moves between waves & live In a home at enrollment 0	Since enrollment, did you have a need or concern related to housing? Yes 2 No 0
Food	
Response at enrollment to question: How often do you and your family have the amount of food you need? Sometimes, rarely, or never 2 Most of the time 1 Always 0	Since enrollment, did you have a need or concern about getting food and/or menu planning? Yes 2 No 0
Personal Safety	
If reported physical, sexual, or emotional abuse at any time during pregnancy or since enrollment, then client received 2 points regardless of reported feelings about safety living in home 2 If no abuse reported since enrollment, expected need based on answer at enrollment to the question: How often do you feel safe living in your home? Sometimes, rarely, or never 2 Most of the time 1 Always 0	Since enrollment, did you have a need or concern related to domestic violence? Yes 2 No 0

Table 3. (Cont.) Author-generated expected and reported need indices.

Expected Need	Reported Need
Counseling/Mental Health	
At enrollment individuals were asked to report their feelings about the pregnancy when they first found out and at the time of enrollment. Reported feelings about pregnancy at study enrollment were reportedly: Unhappy or very unhappy 2 Mixed, happy, or very happy feelings 0 Regardless, of feelings about pregnancy, if a participant reports a *history* of or current experience of physical, emotional, or sexual abuse, the expected need for counseling is revised to 2	Since enrollment, have you had a need or concern for counseling or mental health assistance? Yes 2 No 0
Drug Use	
Self-reported use of pcp, crack, cocaine, heroin, uppers, downers, LSD, or marijuana during current pregnancy (based on enrollment & 34 wk info) 2 Self-reported history of using pcp, crack, cocaine, heroin, uppers, downers, LSD, or marijuana prior to current pregnancy 1 No prior reported illicit drug use 0	Since enrollment, have you had a need or concern related to drug use? Yes 2 No 0
Pregnancy Support	
Participant is not living with any other adult in her household 2 Participant lives with one or more other adults in her household 0	Since enrollment, have you had a need or concern for pregnancy support? Yes 2 No 0

Table 4. Comparison of percentages of participants in each intervention group reporting needs or concerns on each of the reported need index variables.

Reported Need	Nurse-CHW Team Care (n=217) n (%)	Standard of Care (n=221) n (%)	Total Sample (n=438) n (%)	Compare
Pregnancy Education	95 (43.8)	72 (32.6)	167 (38.1)	$\chi^2 = 5.82$*
Pregnancy Education by Age				
16-19	36 (59.0)	25 (33.8)	61 (45.2)	$\chi^2 = 8.60$**
20-24	45 (43.3)	32 (33.3)	77 (38.5)	$\chi^2 = 2.08$
25-29	8 (23.5)	10 (35.7)	18 (29.0)	$\chi^2 = 1.11$
30-39	6 (33.3)	5 (21.7)	11 (26.8)	$\chi^2 = .691$
Childbirth Education	99 (45.6)	95 (43.0)	194 (44.3)	$\chi^2 = .308$
Infant Care Education	58 (26.7)	50 (22.6)	108 (24.7)	$\chi^2 = .993$
Parenting	46 (21.2)	51 (23.1)	97 (22.1)	$\chi^2 = .224$
Education	113 (52.1)	118 (53.4)	231 (52.7)	$\chi^2 = .077$
Health Insurance Coverage	180 (82.9)	178 (80.5)	358 (81.7)	$\chi^2 = .425$
Job/Work Assistance	70 (32.3)	79 (35.7)	149 (34.0)	$\chi^2 = .594$
Housing	86 (39.6)	95 (43.0)	181 (41.3)	$\chi^2 = .508$
Getting Food and/or Menu Planning (nutritious meals)	53 (24.4)	54 (24.4)	107 (24.4)	$\chi^2 = .000$
Domestic Violence	7 (3.2)	11 (5.0)	18 (4.1)	$\chi^2 = .852$
Counseling/ Mental Health	15 (6.9)	20 (9.0)	35 (8.0)	$\chi^2 = .680$
Drug Use	4 (1.8)	5 (2.3)	9 (2.1)	$\chi^2 = .096$
General Pregnancy Support	75 (34.6)	68 (30.8)	143 (32.6)	$\chi^2 = .716$

* $p < .05$ ** $p \leq .01$ Note: degrees of freedom for each Chi-Square assessment = 1

Table 5. Enrollment characteristics of study participants by intervention group (n = 438).

Characteristic	Nurse-CHW Team Care (n = 217) n (%)	Standard Of Care (SOC) (n = 221) n (%)	Total Sample (n = 438) n (%)	Compare
Age	M = 22.26 SD = 4.51	M = 22.27 SD = 4.95	M = 22.27 SD = 4.73	t = -.019 df = 436
16-19	61 (28.1)	74 (33.5)	135 (30.8)	X^2 = 2.73
20-24	104 (52.0)	96 (43.4)	200 (45.7)	df = 3
25-29	34 (15.7)	28 (12.7)	62 (14.2)	
30-39	18 (8.3)	23 (10.4)	41 (9.4)	
Race/Ethnicity				X^2 = 1.64
Caucasian	93 (42.9)	89 (40.3)	182 (41.6)	df = 3
African American	53 (24.4)	63 (28.5)	116 (26.5)	
Hispanic	49 (22.6)	52 (23.5)	101 (23.1)	
Other	22 (10.1)	17 (7.7)	39 (8.9)	
Not Born in USA	33 (15.2)	35 (15.8)	68 (15.5)	X^2= .033 df = 1
Marital Status				
Married	44 (20.3)	40 (18.1)	84 (19.2)	X^2= 3.11
Divorced, Separated, or Widowed	12 (5.5)	22 (10.0)	34 (7.8)	df = 2
Single, Never Married	161 (74.2)	159 (71.9)	320 (73.1)	
Living with father of baby	108 (50.0)	100 (45.2)	208 (47.5)	X^2 = .989 df = 1

Table 5. (Cont.) Enrollment characteristics of study participants by intervention group (n = 438).

Characteristic	Nurse-CHW Team Care (n = 217) n (%)	Standard Of Care (SOC) (n = 221) n (%)	Total Sample (n = 438) n (%)	Compare
Education				
Years completed	M = 10.74 SD = 2.62	M = 10.67 SD = 2.17	M = 10.70 SD = 2.37	t = .318 df = 436
< 12 years	121 (55.8)	127 (57.5)	248 (56.6)	X^2= .130 df = 1
Employed	92 (42.4)	98 (44.3)	190 (43.4)	X^2 = .169 df = 1
Weeks gestation	M = 12.08 SD = 5.11	M = 12.39 SD = 4.97	M = 12.24 SD = 5.04	t = -.646 df = 436
Parity				X^2 = .359
None	93 (42.9)	101 (45.7)	194 (44.3)	df = 1
One or more	124 (57.1)	120 (54.3)	244 (55.7)	
Abuse History				
Ever physically abused	110 (50.7)	113 (51.1)	223 (50.9)	X^2 = .008 df = 1
Ever emotionally abused	119 (54.8)	122 (55.5)	241 (55.1)	X^2 = .017 df = 1
Ever sexually abused	46 (21.4)	46 (20.9)	92 (21.1)	X^2 = .015 df = 1

Table 5. (Cont.) Enrollment characteristics of study participants by intervention group (n = 438).

Characteristic	Nurse-CHW Team Care (n = 217) M (SD)	Standard Of Care (SOC) (n = 221) M (SD)	Total Sample (n = 438) M (SD)	Compare
Psychological Characteristics				
Perceived Support (MSPSS)	47.53 (6.95)	47.13 (7.39)	47.32 (7.17)	t = .581 df = 436
Perceived Stress (Cohen)	26.11 (7.74)	26.72 (7.98)	26.42 (7.86)	t = -.810 df = 436
Self-Esteem (Rosenberg)	30.79 (3.85)	30.71 (4.07)	30.75 (3.96)	t = .205 df = 436
Mastery (Pearlin)	20.65 (2.68)	20.61 (3.02)	20.63 (2.85)	t = .115 df = 436
Depressive Symptoms (CES-D)	19.14 (10.90)	19.95 (10.98)	19.55 (10.93)	t = -.777 df = 436
CESD $\geq$16	n = 119 (54.8%)	n = 129 (58.4%)	n = 248 (56.6%)	X^2 = .556 df = 1

FIGURES

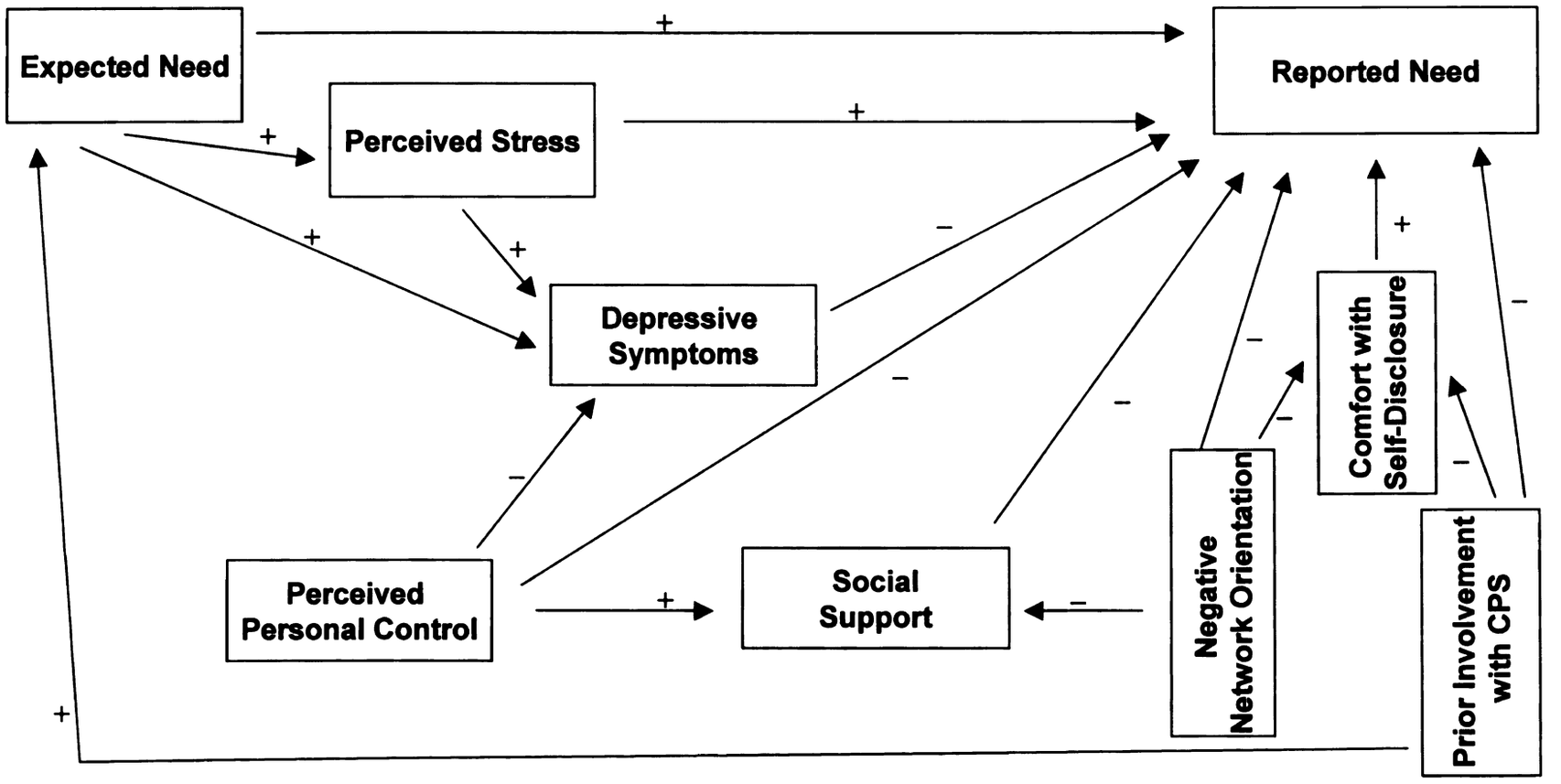
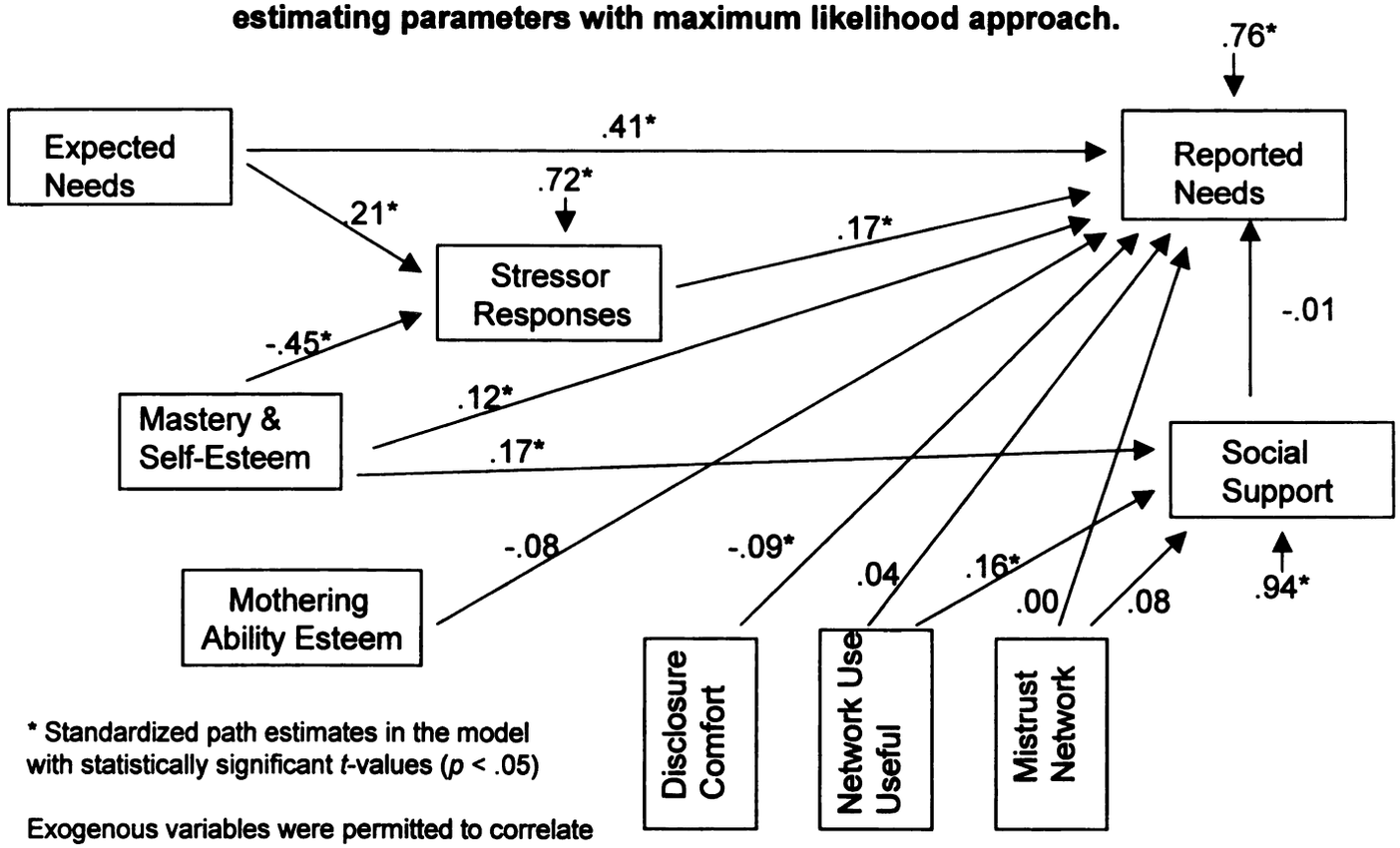


Figure 1. Conceptual Model 1-- Predicting reported needs in low-income pregnant women

Figure 2. Path analysis findings testing conceptual model 1 using manifest variables and estimating parameters with maximum likelihood approach.



* Standardized path estimates in the model with statistically significant *t*-values ($p < .05$)

Exogenous variables were permitted to correlate with one another.

Figure 3. Path analysis findings testing conceptual model 1 using manifest variables and estimating parameters with a generalized least squares approach.

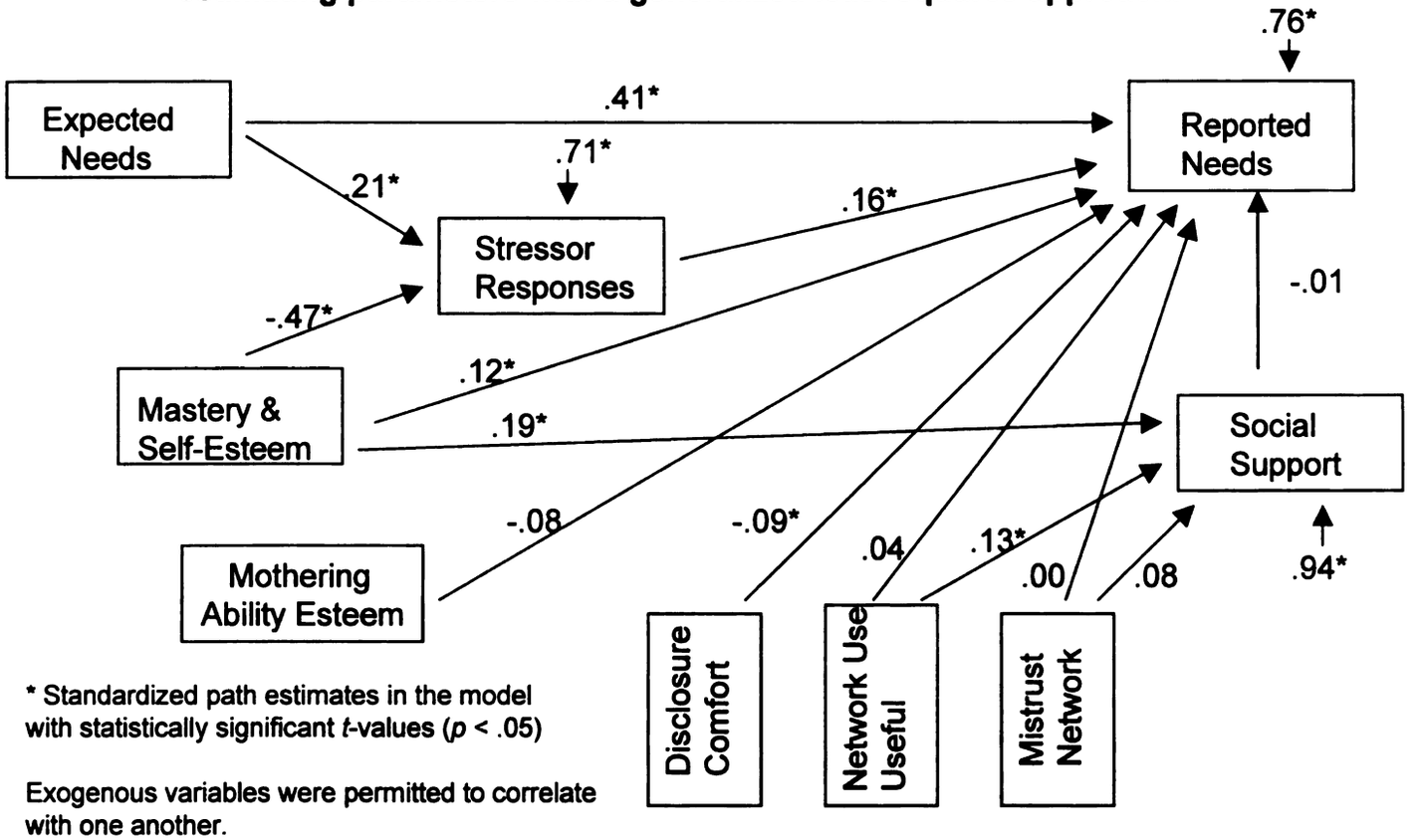


Figure 4. Path analysis findings testing conceptual model 1 using manifest variables and estimating parameters with maximum likelihood approach; model includes path linking all personal control construct variables.

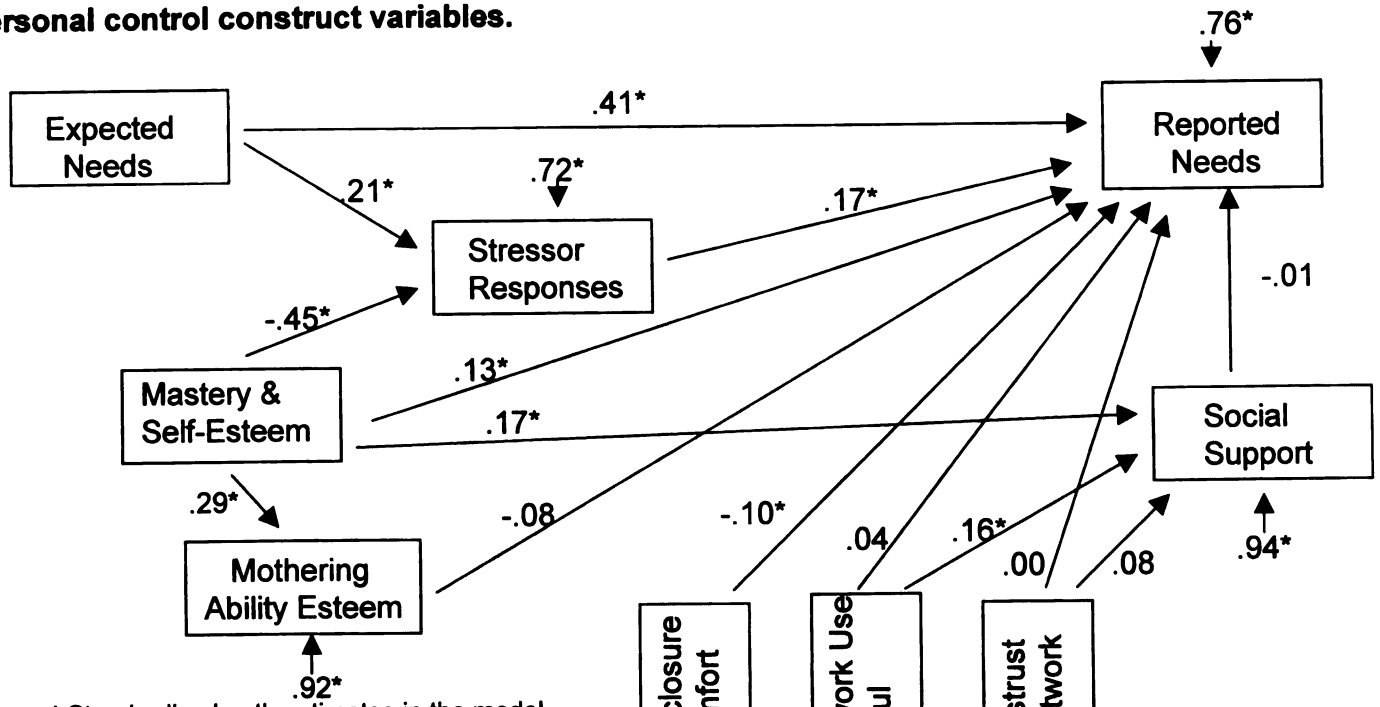
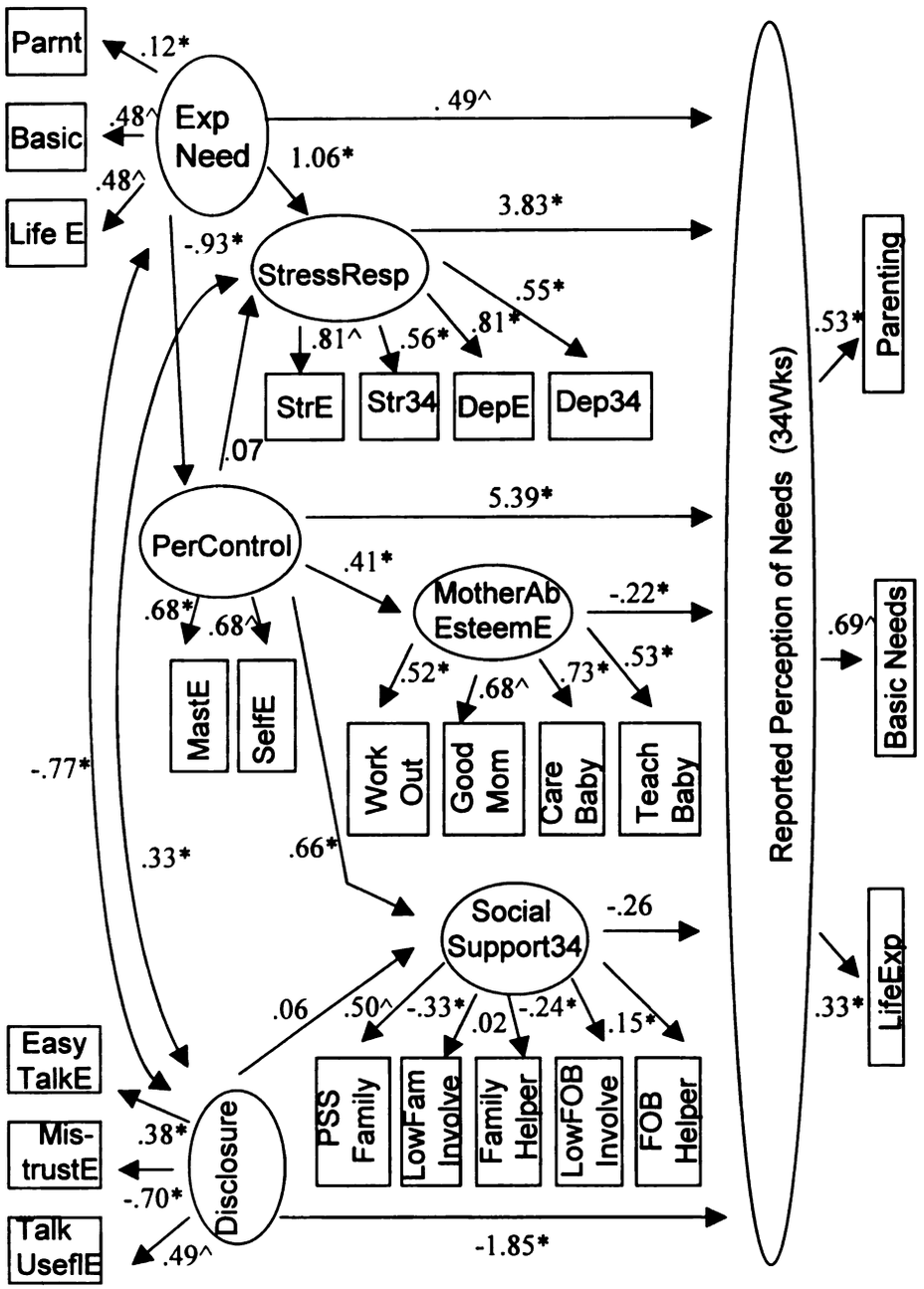


Figure 5. Structural equation model testing latent factor structure of conceptual model 1; Parameters estimated with maximum likelihood methods.



Note: Standardized parameter estimates do not have a maximum value of 1.0
* Path estimates in the model with significant *t*-values, where $p < .05$
^ LISREL uses this path for scaling and as such does not estimate t-values

Figure 6 Conceptual model for predicting the Impact of maternal reporting of needs on subsequent child development outcomes in low-income families

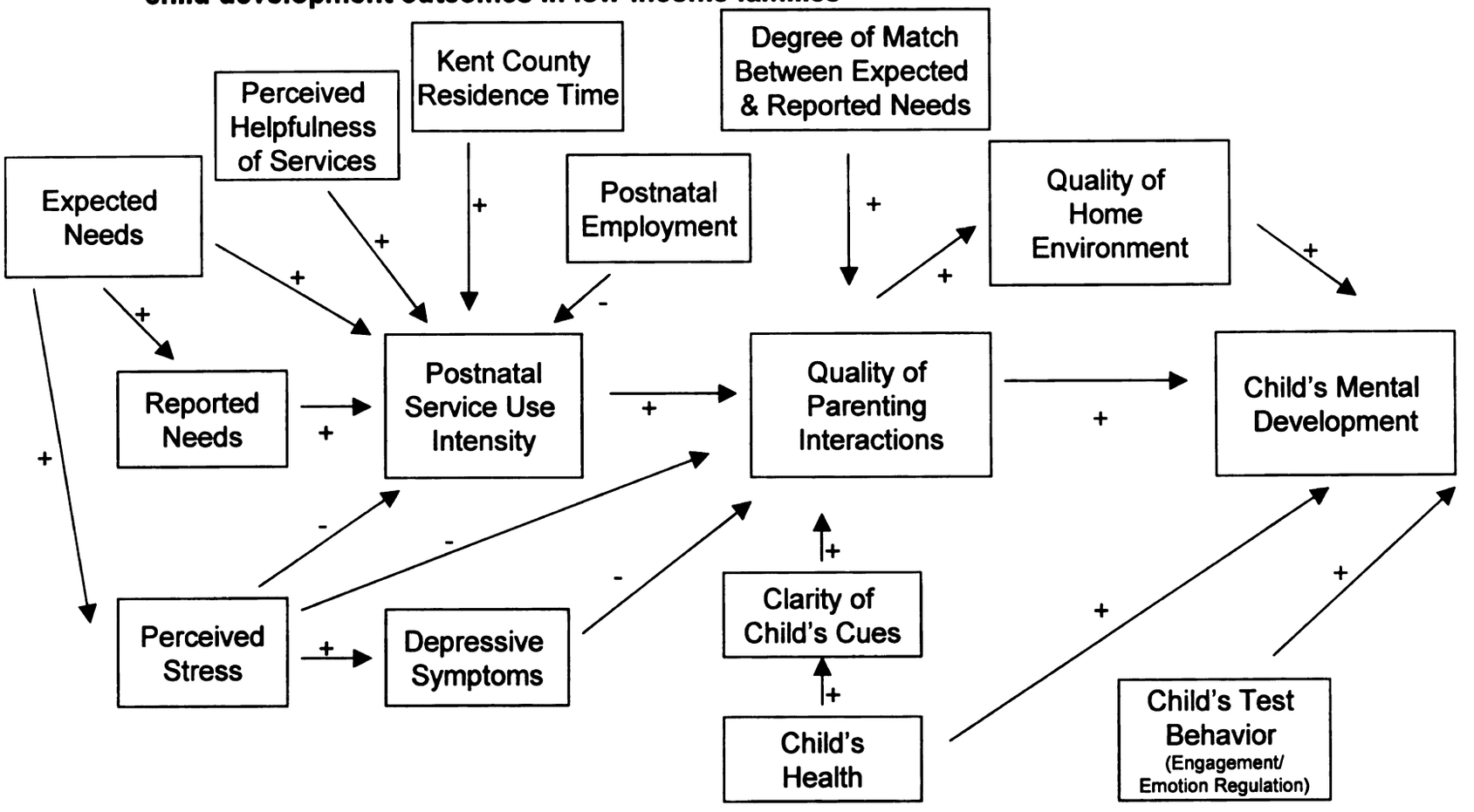


Figure 7. Path analysis findings from testing conceptual model 2 in participants randomized to Nurse- CHW Team Care with maximum likelihood parameter estimation.

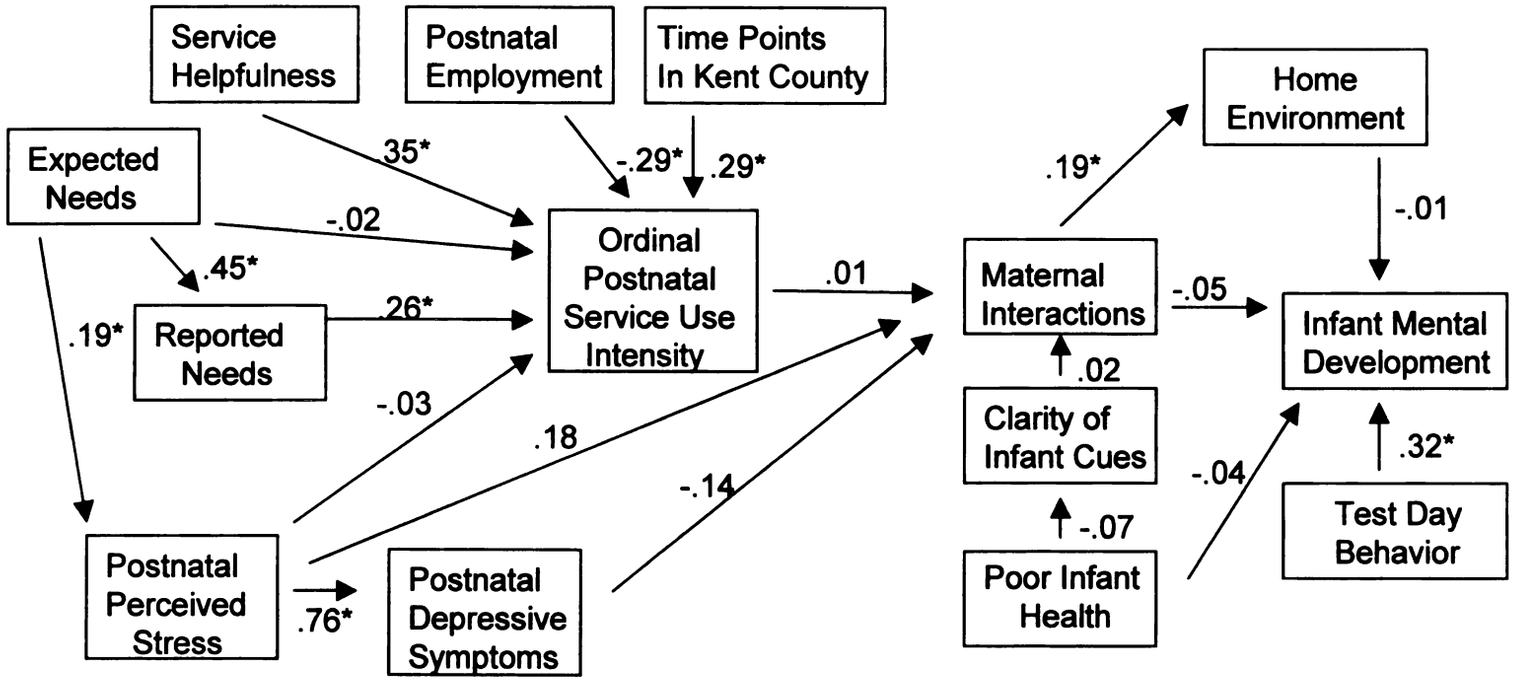
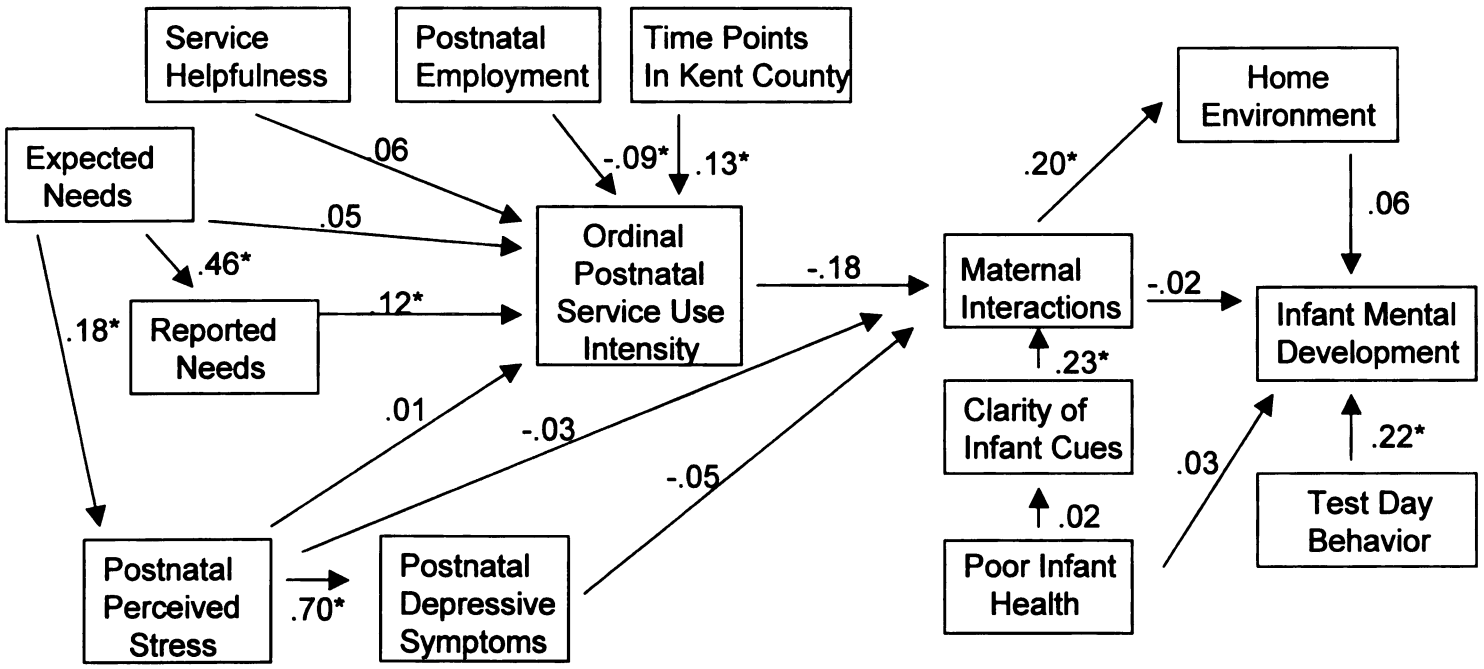


Figure 8. Path analysis findings from testing conceptual model 2 in participants randomized to SOC group with maximum likelihood parameter estimation.



APPENDICES

Appendix A.
Eligibility criteria for enrollment into the Michigan Maternal Health Services Study.

Eligibility Criteria
• 16 years of age or older
• Eligible for Medicaid according to self-reported income and number of dependents
• Resident of Kent County with no stated plans to move out of the county in the next 18 months
• Less than or equal to 24 weeks gestation based on the date of the woman's last menstrual period
• Able to verbally understand either English or Spanish

• In the previous 2 years, no reported participation in mental health therapy from a social worker, psychiatrist, and/or psychologist or use of medications to treat:
  • Depression
  • Bipolar disorder
  • Schizophrenia
  • Delusional disorders
  • Multiple personalities
  • Panic attacks
  • Post-traumatic stress syndrome

• Not currently receiving maternal support services from a nurse at study enrollment

Note: The Michigan Maternal Health Services Study is the large data source (n = 613). The dissertation sample itself is a subset of these participants (n = 438) who met other specific criteria.

Appendix B.
Reasons that Michigan Maternal Health Services Study cases were excluded from data analysis for dissertation study.

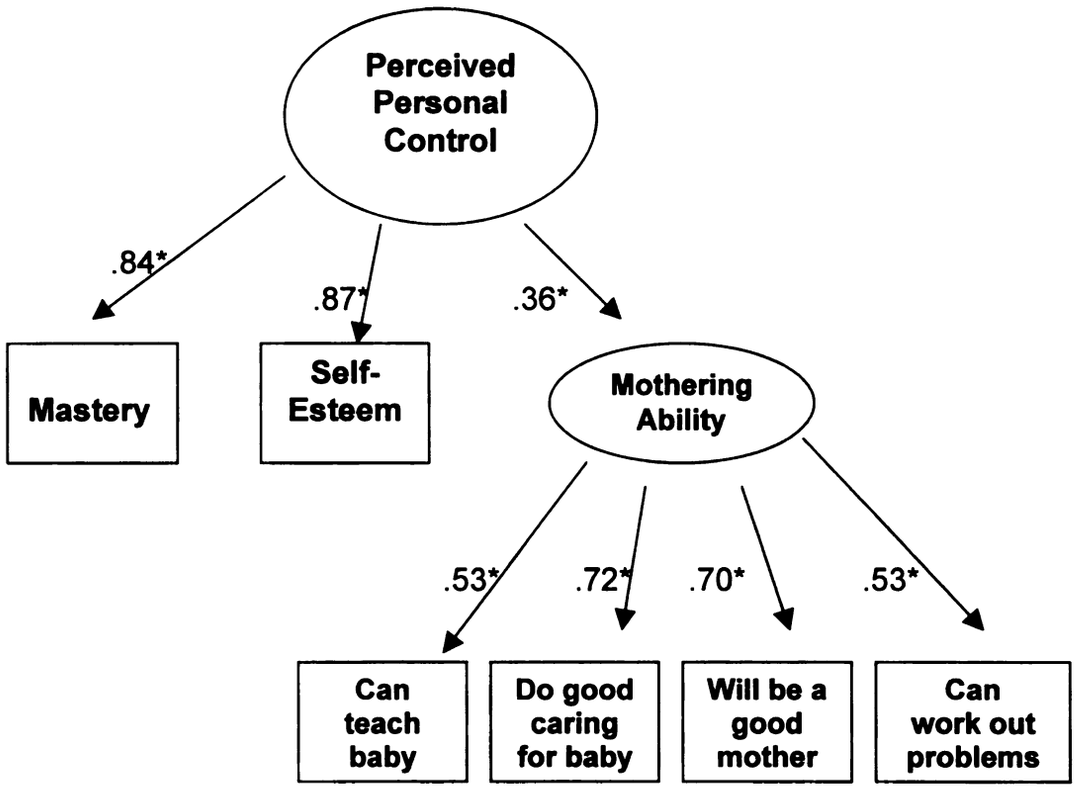
Criteria for Exclusion & Specific Reason	Number of Cases	
No delivery of live birth surviving until 6 months		55
Spontaneous abortion	39	
Elective abortion	7	
Stillbirth delivery	4	
Infant death	5	
No maternal intent to maintain custody of the child following birth		4
Infant given up for adoption	4	

Note: Table continued on following page.

Appendix B. **(Cont.)**
Reasons that Michigan Maternal Health Services Study cases were excluded from data analysis for dissertation study.

Criteria for Exclusion & Specific Reason	Number of Cases	
Completion of both enrollment and late pregnancy research interview		116
Missing 34 wk interview, 6 month interview, MDI, NCATS, and medical abstract	20	
Missing 34 wk interview, 6 month interview, MDI, and NCATS	56	
Missing 34 wk interview, MDI, NCATS and had only partial information on 6 month interview	4	
Missing 34 wk interview and had only partial information on the 6 month interivew	2	
Missing 34 wk interview, MDI, and NCATS	2	
Missing 34 wk and medical abstract	1	
Missing 34 wk interview	31	
Total Cases Excluded		175

Appendix C.
Measurement model of perceived personal control construct.



χ^2 (*df* = 8, *n* = 438) = 13.26; *p* = .103; RMSEA = .039; GFI = .99

* Standardized path estimates with statistically significant ($p < .05$) *t*-values

Appendix D.

Factor analysis and reliability analysis of 13 Network Orientation Scale items.

Descriptive Statistics

	Mean	Std. Deviation
NEVTRUST	2.58	.714
OPINIONS	2.35	.621
ADVANTAG	2.39817	.629399
NEVUNDER	2.23662	.591474
PERSONAL	2.74347	.705893
FIGPROBS	2.24184	.713419
KEEPPROB	2.07	.631
ANGRY	2.99	.529
GETUPSET	2.99928	.488631
HELPOUT	2.92	.687
ADVICE	2.89	.536
ASKFAVOR	2.93	.406
SECRET	3.03	.618

Item Descriptions

8. NEVTRUST: You can never trust people to keep a secret.
13. OPINIONS: In the past, I have rarely found other people's opinions helpful when I've had a problem.
18. ADVANTAG: If you confide in other people, they will take advantage of you.
10. NEVUNDER: Other people never understand my problems.
15. PERSONAL: Some things are too personal to talk to anyone about.
12. FIGPROBS: If you can't figure out your problems, nobody can.
5. KEEPPROB: People should keep their problems to themselves.
14. ANGRY: It really helps when you are angry to tell a friend what happened.
9. GETUPSET: When a person gets upset they should talk it over with a friend.
7. HELPOUT: In the past, friends have really helped me out when I've had a problem.
2. ADVICE: Friends often have good advice to give.
19. ASKFAVOR: It's okay to ask favors of people.
11. SECRET: Almost everyone knows someone they can trust with a personal secret.

Appendix D. (Cont.)
Factor analysis and reliability analysis of 13 Network Orientation Scale items.

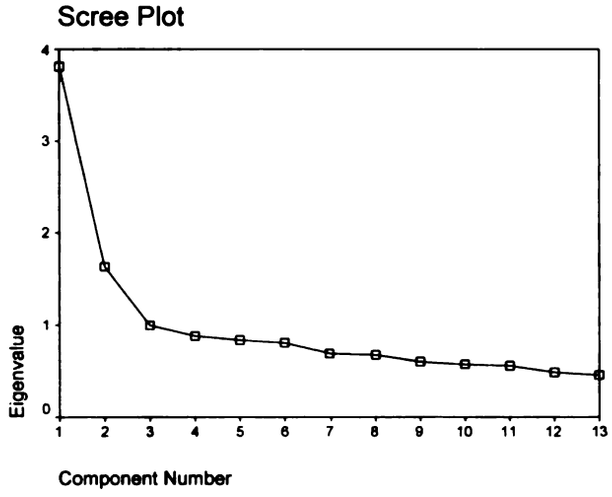
Rotated Factor Component Matrix

Item No.	Item Name	Mistrust (29.29%)*	Usefulness (12.55%)
8	NEVTRUST	**.690**	-.063
13	OPINIONS	**.681**	-.064
18	ADVANTAG	**.677**	-.203
10	NEVUNDER	**.639**	-.126
15	PERSONAL	**.589**	-.146
12	FIGPROBS	**.580**	-.129
5	KEEPPROB	**.477**	-.248
14	ANGRY	-.008	**.723**
9	GETUPSET	-.084	**.719**
7	HELPOUT	-.215	**.667**
2	ADVICE	-.099	**.653**
19	ASKFAVOR	-.226	**.517**
11	SECRET	-.218	**.466**

* Indicates variance explained by the extracted factor. There is a correlation of -.412 between the 2 factors in the sample.

Factors were extracted from the correlation matrix using principal components analysis. Factors were rotated using varimax rotation with Kaiser Normalization.

Appendix D. (Cont.)
Factor analysis and reliability analysis of 13 Network Orientation Scale items.



The extraction of 2 factors accounted for 41.84% of the total variance. Each factor had an eigen value greater than 1.

Reliability Analysis

Network Usefulness

Item No.	Item Name	Corrected Item-Total Correlation	Alpha if Item Deleted
14	ANGRY	.4775	.6614
9	GETUPSET	.5155	.6526
7	HELPOUT	.5046	.6538
2	ADVICE	.4702	.6634
19	ASKFAVOR	.3837	.6907
11	SECRET	.3506	.7044

Alpha = .7107 Standardized Item Alpha = .7179

Appendix D. (Cont.)
Factor analysis and reliability analysis of 13 Network Orientation Scale items.

Reliability Analysis

Network Mistrust

Item No.	Item Name	Corrected Item-Total Correlation	Alpha if Item Deleted
8	NEVTRUST	.5071	.7186
13	OPINIONS	.5090	.7191
18	ADVANTAG	.5338	.7137
10	NEVUNDER	.4771	.7262
15	PERSONAL	.4477	.7324
12	FIGPROBS	.4419	.7340
5	KEEPPROB	.4055	.7402

Alpha = .7560 Standardized Item Alpha = .7581

Appendix D. (Cont.)
Factor analysis and reliability analysis of 13 Network Orientation Scale items.

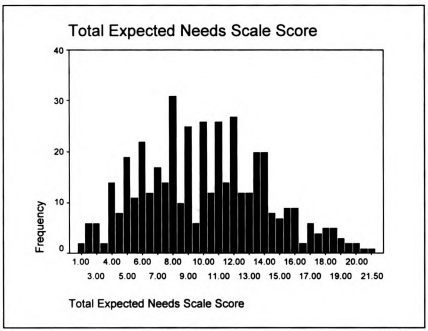
Reliability Analysis

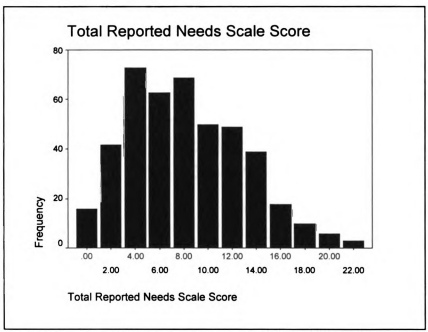
Network Usefulness and Network Mistrust as 2 Subscales of Scale

Item No.	Item Name	Corrected Item-Total Correlation	Alpha if Item Deleted
8	NEVTRUST	.4521	.7762
13	OPINIONS	.4500	.7762
18	ADVANTAG	.5339	.7682
10	NEVUNDER	.4505	.7763
15	PERSONAL	.4329	.7782
12	FIGPROBS	.4107	.7806
5	KEEPPROB	.4161	.7793
14	ANGRY (reversed)	.3545	.7844
9	GETUPSET (reversed)	.4167	.7801
7	HELPOUT (reversed)	.4661	.7746
2	ADVICE (reversed)	.3801	.7824
19	ASKFAVOR (reversed)	.3948	.7828
11	SECRET (reversed)	.3503	.7853

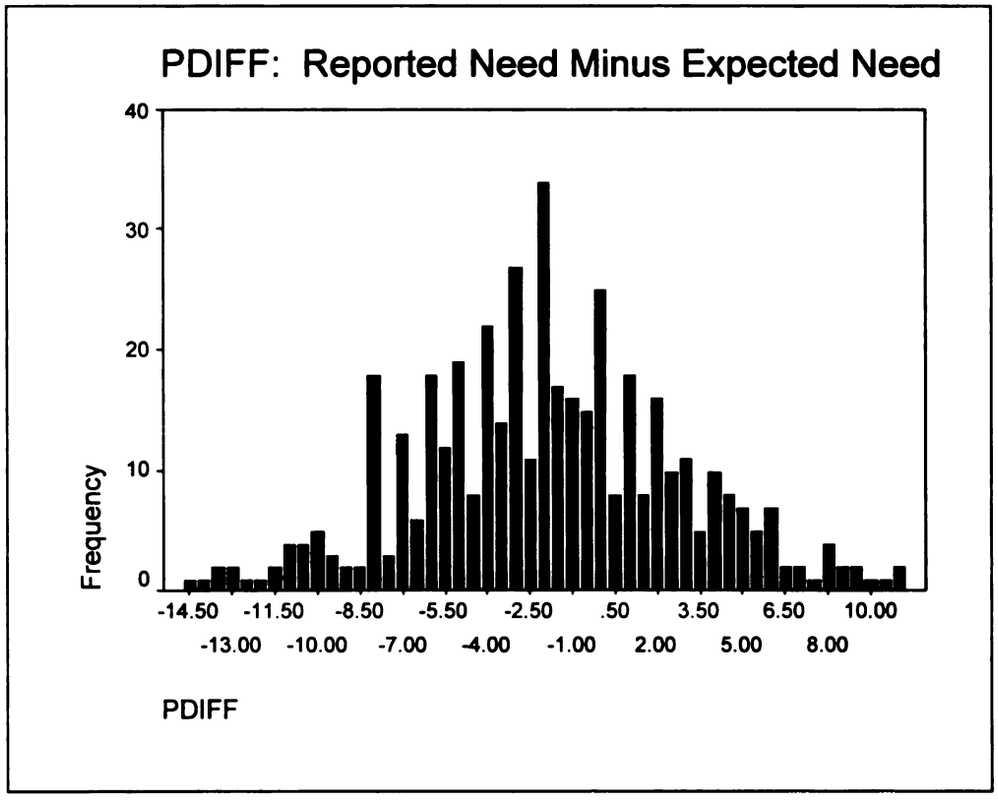
Alpha = .7924 Standardized Item Alpha = .7952

Appendix E.
Distribution of expected needs, reported needs and discrepancies between reported and expected needs among study participants.





Appendix E: (Cont.)
Distribution of expected needs, reported needs and discrepancies between reported and expected needs among study participants.



Appendix F.

Means, standard deviations, and correlations used in path analysis of conceptual model 1.

Descriptive Statistics

	Mean	Std. Deviation
PTOT	8.2055	4.76676
ZSTRSRSP	.000000	3.2264707
FOBFAM34	7.0388	2.09300
ETOT	10.0890	4.08394
ZROSMAST	.000000	1.8604218
EASYTALK	2.54	.677
MISTRUST	16.6270	2.94230
TLKUSEFL	17.7664	2.11820
MOMABIL	18.4087	1.64034
MAGE18	.2055	.40451
MAGE19	.3082	.46229
AGE	22.27	4.731
CPSPARNT	.08	.268

Variable Names

PTOT: Reported Needs
ZSTRSRSP: Stress Responses
FOBFAM34: Social Support
ETOT: Expected Needs
ZROSMAST: Mastery & Self-Esteem
EASYTALK: Disclosure Comfort
MISTRUST: Mistrust Network
TLKUSEFL: Network Use Useful
MOMABIL: Mothering Ability Feelings
MAGE18: Maternal Age $\leq$ 18
MAGE19: Maternal Age $\leq$ 19
AGE: Maternal Age (Continuous Variable)
CPSPARNT: CPS Involvement as a Parent

Appendix F. (Cont.)
Means, standard deviations, and correlations used in path analysis of conceptual model 1.

Correlations

	PTOT	ZSTRSRSP	FOBFAM34	ETOT	ZROSMAST	EASYTALK	MISTRUST	TLKUSEFL	MOMABIL	MAGE18	MAGE19	AGE	CPSPARNT
PTOT	1												
ZSTRSRSP	.248	1											
FOBFAM34	-.061	-.248	1										
ETOT	.452	.285	-.070	1									
ZROSMAST	-.048	-.486	.196	-.157	1								
EASYTALK	-.117	-.152	.035	-.038	.162	1							
MISTRUST	.010	.171	-.046	.007	-.351	-.299	1						
TLKUSEFL	.021	-.210	.184	.059	.317	.351	-.412	1					
MOMABIL	-.145	-.201	.091	-.142	.289	.204	-.127	.171	1				
MAGE18	.137	.000	.077	.312	.049	.016	-.070	.096	-.110	1			
MAGE19	.160	.007	.118	.375	.058	.047	-.073	.116	-.082	.762	1		
AGE	-.162	-.029	-.179	-.357	-.063	-.099	.056	-.156	.072	-.538	-.625	1	
CPSPARNT	.002	.151	-.156	-.048	-.083	.006	.066	-.069	.032	-.148	-.157	.105	1

Appendix G.

Fit indices for path analysis of conceptual model 1 using manifest variables and estimating parameters with maximum likelihood methods.

Degrees of Freedom = 29
Minimum Fit Function Chi-Square = 20.37 (P = 0.88)
Normal Theory Weighted Least Squares Chi-Square = 19.86 (P = 0.90)
Estimated Non-centrality Parameter (NCP) = 0.0
90 Percent Confidence Interval for NCP = (0.0 ; 3.44)
Minimum Fit Function Value = 0.047
Population Discrepancy Function Value (F0) = 0.0
90 Percent Confidence Interval for F0 = (0.0 ; 0.0080)
Root Mean Square Error of Approximation (RMSEA) = 0.0
90 Percent Confidence Interval for RMSEA = (0.0 ; 0.017)
P-Value for Test of Close Fit (RMSEA < 0.05) = 1.00
Expected Cross-Validation Index (ECVI) = 0.14
90 Percent Confidence Interval for ECVI = (0.14 ; 0.15)
ECVI for Saturated Model = 0.21
ECVI for Independence Model = 1.47
Chi-Square for Independence Model with 36 DF = 616.81
Independence AIC = 634.81
Model AIC = 51.86
Saturated AIC = 90.00
Independence CAIC = 680.55
Model CAIC = 133.17
Saturated CAIC = 318.70
Normed Fit Index (NFI) = 0.97
Non-Normed Fit Index (NNFI) = 1.02
Parsimony Normed Fit Index (PNFI) = 0.78
Comparative Fit Index (CFI) = 1.00
Incremental Fit Index (IFI) = 1.01
Relative Fit Index (RFI) = 0.96
Critical N (CN) = 1064.80
Root Mean Square Residual (RMR) = 0.21
Standardized RMR = 0.031
Goodness of Fit Index (GFI) = 0.99
Adjusted Goodness of Fit Index (AGFI) = 0.98
Parsimony Goodness of Fit Index (PGFI) = 0.64

Appendix H.

Fit indices for path analysis of conceptual model 1 using manifest variables and estimating parameters with generalized least squares methods.

Degrees of Freedom = 29
Minimum Fit Function Chi-Square = 19.77 (P = 0.90)
Normal Theory Weighted Least Squares Chi-Square = 22.99 (P = 0.78)
Estimated Non-centrality Parameter (NCP) = 0.0
90 Percent Confidence Interval for NCP = (0.0 ; 8.22)
Minimum Fit Function Value = 0.045
Population Discrepancy Function Value (F0) = 0.0
90 Percent Confidence Interval for F0 = (0.0 ; 0.019)
Root Mean Square Error of Approximation (RMSEA) = 0.0
90 Percent Confidence Interval for RMSEA = (0.0 ; 0.026)
P-Value for Test of Close Fit (RMSEA < 0.05) = 1.00
Expected Cross-Validation Index (ECVI) = 0.14
90 Percent Confidence Interval for ECVI = (0.14 ; 0.16)
ECVI for Saturated Model = 0.21
ECVI for Independence Model = 0.71
Chi-Square for Independence Model with 36 DF = 285.87
Independence AIC = 303.87
Model AIC = 54.99
Saturated AIC = 90.00
Independence CAIC = 349.61
Model CAIC = 136.31
Saturated CAIC = 318.70
Normed Fit Index (NFI) = 0.93
Non-Normed Fit Index (NNFI) = 1.05
Parsimony Normed Fit Index (PNFI) = 0.75
Comparative Fit Index (CFI) = 1.00
Incremental Fit Index (IFI) = 1.04
Relative Fit Index (RFI) = 0.91
Critical N (CN) = 1097.03
Root Mean Square Residual (RMR) = 0.24
Standardized RMR = 0.036
Goodness of Fit Index (GFI) = 0.99
Adjusted Goodness of Fit Index (AGFI) = 0.98
Parsimony Goodness of Fit Index (PGFI) = 0.64

Appendix I.

Fit indices for path analysis of conceptual model 1 that incorporates path from mastery/self-esteem to mothering ability feelings.

Degrees of Freedom = 27
Minimum Fit Function Chi-Square = 38.53 (P = 0.070)
Normal Theory Weighted Least Squares Chi-Square = 38.30 (P = 0.073)
Estimated Non-centrality Parameter (NCP) = 11.30
90 Percent Confidence Interval for NCP = (0.0 ; 31.80)
Minimum Fit Function Value = 0.088
Population Discrepancy Function Value (F0) = 0.026
90 Percent Confidence Interval for F0 = (0.0 ; 0.074)
Root Mean Square Error of Approximation (RMSEA) = 0.031
90 Percent Confidence Interval for RMSEA = (0.0 ; 0.052)
P-Value for Test of Close Fit (RMSEA < 0.05) = 0.93
Expected Cross-Validation Index (ECVI) = 0.17
90 Percent Confidence Interval for ECVI = (0.15 ; 0.22)
ECVI for Saturated Model = 0.21
ECVI for Independence Model = 1.47
Chi-Square for Independence Model with 36 DF = 616.81
Independence AIC = 634.81
Model AIC = 74.30
Saturated AIC = 90.00
Independence CAIC = 680.55
Model CAIC = 165.78
Saturated CAIC = 318.70
Normed Fit Index (NFI) = 0.94
Non-Normed Fit Index (NNFI) = 0.97
Parsimony Normed Fit Index (PNFI) = 0.70
Comparative Fit Index (CFI) = 0.98
Incremental Fit Index (IFI) = 0.98
Relative Fit Index (RFI) = 0.92
Critical N (CN) = 533.64
Root Mean Square Residual (RMR) = 0.25
Standardized RMR = 0.045
Goodness of Fit Index (GFI) = 0.98
Adjusted Goodness of Fit Index (AGFI) = 0.97
Parsimony Goodness of Fit Index (PGFI) = 0.59

Appendix J.
Standardized estimates of error terms modeled in latent factor model of conceptual model 1.

Error Term	Value
Latent Variable Error - Psi Matrix	
1. ExpNeed	Fixed at 1.0
2. Reported Need[1]	-.74
3. StressResp	.02
4. Social Support	.51
5. Disclosure	Fixed at 1.0
6. PerControl	.13
7. Mothering Abilities	.84
Manifest Variable Error –Theta Epsilon Matrix	
1. Parnt	.99
2. Basic	.77
3. Life E	1.0
4. Parenting	.72
5. Basic Needs	.52
6. Life Exp	.89
7. StrsE	.35
8. Str34	.69

[1] See footnote related to this unusual value in text section on measurement model fit in chapter one.

Appendix J. (Cont.)
Standardized estimates of error terms modeled in latent factor model of conceptual model 1.

Error Term	Value
Manifest Variable Error –Theta Epsilon Matrix	
9. DepE	.35
10. Dep34	.70
11. PSS Fam	.75
12. Low Fam Involve	.89
13. Fam Helper	1.0
14. Low FOB Involve	.94
15. FOB Helper	.98
16. Easy Talk E	.86
17. Mistrust E	.51
18. Talk Usefl E	.76
19. MastE	.54
20 SelfE	.53
21. Teach Baby	.72
22. Care Baby	.47
23. Good Mom	.54
24. Work Out	.72

Appendix K.

Standardized estimates of covariation in error terms modeled in structural equation model of conceptual model 1.

Error Terms	Value
Modeled Covariation in Errors	
18-1 Talk Useful E & Parnt	.17*
14-3 Low FOB Involve & Life E	.13*
17-3 Mistrust E & Life E	-.11*
21-4 Teach Baby & Parenting	-.17*
23-4 Good Mom & Parenting	-.11*
22-3 Care Baby & Basic Nds	.12*
8-7 StrE & Str34	.14*
10-8 Dep34 & Str34	.36*
10-9 Dep34 & DepE	.06*
17-10 MistrustE & Dep34	.12*
12-11 Low Fam Involve & PSS Family	-.53*
13-11 Fam Helper & PSS Family	.31*

Appendix K. (Cont.)
Standardized estimates of covariation in error terms modeled in structural equation model of conceptual model 1.

Error Terms	Value
Modeled Covariation in Errors	
13-12 Fam Helper & Low Fam Involve	-.26*
14-13 Low FOB involve & Fam Helper	.17*
15-13 FOB Helper & Fam Helper	-.30*
19-13 Mastery & Fam Helper	.06*
15-14 FOB Helper & Low FOB Involve	-.39*
18-16 Talk Usefl E & Easy Talk E	.15*
19-18 Mastery & Talk Usefl E	.01
20-19 Self E & Mast E	.28*
21-19 Teach Baby & Mast E	.07*

Appendix L.
Fit indices for conceptual model 1 latent factor model.

Degrees of Freedom = 224
Minimum Fit Function Chi-Square = 592.13 (P = 0.0)
Normal Theory Weighted Least Squares Chi-Square = 547.72 (P = 0.0)
Estimated Non-centrality Parameter (NCP) = 323.72
90 Percent Confidence Interval for NCP = (258.86 ; 396.27)
Minimum Fit Function Value = 1.35
Population Discrepancy Function Value (F0) = 0.74
90 Percent Confidence Interval for F0 = (0.59 ; 0.91)
Root Mean Square Error of Approximation (RMSEA) = 0.058
90 Percent Confidence Interval for RMSEA = (0.051 ; 0.064)
P-Value for Test of Close Fit (RMSEA < 0.05) = 0.022
Expected Cross-Validation Index (ECVI) = 1.60
90 Percent Confidence Interval for ECVI = (1.45 ; 1.77)
ECVI for Saturated Model = 1.37
ECVI for Independence Model = 7.26
Chi-Square for Independence Model with 276 DF= 3123.31
Independence AIC = 3171.31
Model AIC = 699.72
Saturated AIC = 600.00
Independence CAIC = 3293.28
Model CAIC = 1085.97
Saturated CAIC = 2124.67
Normed Fit Index (NFI) = 0.81
Non-Normed Fit Index (NNFI) = 0.84
Parsimony Normed Fit Index (PNFI) = 0.66
Comparative Fit Index (CFI) = 0.87
Incremental Fit Index (IFI) = 0.87
Relative Fit Index (RFI) = 0.77
Critical N (CN) = 204.81
Root Mean Square Residual (RMR) = 1.47
Standardized RMR = 0.087
Goodness of Fit Index (GFI) = 0.90
Adjusted Goodness of Fit Index (AGFI) = 0.87
Parsimony Goodness of Fit Index (PGFI) = 0.68

Appendix M.
Conceptual model 2 variable means and standard deviations for Nurse-CHW Team care group before and after missing data imputation.

Variable[2]	Pre-Imputation M (SD) (n)	Post-Imputation M (SD) (n)
Nurse-CHW Team Care (n=217)		
Expected needs	9.72 (4.11) (217)	9.72 (4.11) (217)
Reported needs	8.30 (4.76) (217)	8.30 (4.76) (217)
Service helpfulness-34 wks	8.46 (1.89) (213)	8.49 (1.88) (217)
Service helpfulness-6 mo	8.21 (2.04) (187)	8.20 (2.04) (217)
Service helpfulness-Composite	16.75 (3.27) (185)	16.69 (3.27) (217)
Perceived stress-6 wks	19.98 (7.79) (205)	20.05 (7.71) (217)

[2] Items not requiring imputation included: 13 individual items and total scores for expected needs and reported needs, time points in Kent county, infant sex, pre and postnatal service use, occurrence of major and/or minor medical condition. Also, "composite" variables, while listed in the table and utilized in analyses, were not actually imputed. Scores at each wave were imputed and then transformed to create the final composite variable.

Appendix M. (Cont.)
Conceptual model 2 variable means and standard deviations for Nurse-CHW Team care group before and after missing data imputation.

Variable	Pre-Imputation M (SD) (n)	Post-Imputation M (SD) (n)
Perceived stress-6 mo	22.28 (7.90) (192)	22.53 (8.03) (217)
Perceived stress-Composite	42.36 (13.93) (188)	42.58 (13.80) (217)
Depressive symptoms-6 wks	12.60 (9.13) (205)	12.63 (9.03) (217)
Depressive symptoms-6 mo	12.36 (9.28) (191)	12.02 (9.08) (217)
Depressive symptoms – Composite	24.91 (16.21) (187)	24.65 (15.77) (217)
Time points in Kent County	2.73 (.663) (217)	2.73 (.663) (217)
Employment-6 weeks	.40 (.490) (205)	.38 (.486) (217)
Employment-6 months	.59 (.494) (194)	.59 (.493) (217)
Employment -Composite	.67 (.471) (189)	.67 (.470) (217)

Appendix M. (Cont.)
Conceptual model 2 variable means and standard deviations for Nurse-CHW Team care group before and after missing data imputation.

Variable	Pre-Imputation M (SD) (n)	Post-Imputation M (SD) (n)
NCATS Caregiver Total (Maternal interactions)	31.64 (4.45) (186)	31.54 (4.41) (217)
Clarity of Child's Cues	7.32 (1.24) (186)	7.30 (1.19) (217)
HOME Total Score (Home Environment)	34.38 (5.17) (180)	34.16 (5.08) (217)
Mental Development Index Score	95.68 (7.15) (188)	95.83 (7.12) (217)
Behavior Rating Scale Total Score (Test Day Behavior)	123.61 (9.67) (183)	124.00 (9.44) (217)
Infant Sex	.52 (.501) (217)	.52 (.501) (217)
Postnatal Service Use (visits)	13.85 (10.46) (217)	13.85 (10.46) (217)
Pre & Postnatal Service Use	26.87 (16.24) (217)	26.87 (16.24) (217)

Appendix M. (Cont.)
Conceptual model 2 variable means and standard deviations for Nurse-CHW Team care group before and after missing data imputation.

Variable	Pre-Imputation M (SD) (n)	Post-Imputation M (SD) (n)
Days gestation at birth	277.3 (12.39) (216)	277.3 (12.36) (217)
Birth weight (in grams)	3348.6 (600.9) (216)	3351.7 (601.3) (217)
Hospital days prior to discharge of infant	2.69 (3.5) (216)	2.69 (3.5) (217)
NICU days	.79 (3.72) (216)	.79 (3.71) (217)
Child Cold at 6 months	.44 (.497) (185)	.43 (.496) (217)
Maternal rating of child health at 6 months	2.13 (1.03) (190)	2.10 (1.01) (217)
Infant health index (6 item composite)	.639 (1.03) (216)	.636 (1.03) (217)
Proximal infant health index (2 item composite)	.797 (.741) (182)	.788 (.734) (217)

Appendix N.
Conceptual model 2 variable means and standard deviations for Standard of Care group before and after missing data imputation.

Variable[3]	Pre-Imputation M (SD) (n)	Post-Imputation M (SD) (n)
Expected needs	10.45 (4.04) (221)	10.45 (4.04) (221)
Reported needs	8.11 (4.79) (221)	8.11 (4.79) (221)
Service helpfulness-34 wks	7.79 (2.23) (219)	7.78 (2.22) (221)
Service helpfulness-6 mo	7.61 (2.48) (187)	7.59 (2.48) (221)
Service helpfulness-Composite	15.39 (3.55) (186)	15.37 (3.45) (221)
Perceived stress-6 wks	20.47 (8.05) (204)	20.48 (7.96) (221)
Perceived stress-6 mo	22.39 (8.52) (194)	22.63 (8.39) (221)

[3] Items not requiring imputation included: 13 individual items and total scores for expected needs and reported needs, time points in Kent county, infant sex, pre and postnatal service use, occurrence of major and/or minor medical condition. Also, "composite" variables, while listed in the table and utilized in analyses, were not actually imputed. Scores at each wave were imputed and then transformed to create the final composite variable.

Appendix N. (Cont.)
Conceptual model 2 variable means and standard deviations for Standard of Care group before and after missing data imputation.

Variable	Pre-Imputation M (SD) (n)	Post-Imputation M (SD) (n)
Perceived stress-Composite	42.65 (14.50) (185)	43.10 (14.12) (221)
Depressive symptoms-6 wks	12.95 (8.75) (206)	13.09 (8.71) (221)
Depressive symptoms-6 mo	12.38 (9.20) (196)	12.74 (9.38) (221)
Depressive symptoms – Composite	25.08 (15.74) (189)	25.83 (15.80) (221)
Time points in Kent County	2.77 (.642) (221)	2.77 (.642) (221)
Employment-6 weeks	.36 (.481) (206)	.37 (.483) (221)
Employment-6 months	.56 (.498) (195)	.56 (.498) (221)
Employment-Composite	.63 (.483) (188)	.64 (.482) (221)

Appendix N. (Cont.)
Conceptual model 2 variable means and standard deviations for Standard of Care group before and after missing data imputation.

Variable	Pre-Imputation M (SD) (n)	Post-Imputation M (SD) (n)
NCATS Caregiver Total (Maternal interactions)	31.90 (4.82) (188)	31.93 (4.87) (221)
Clarity of Child's Cues	7.64 (1.28) (188)	7.65 (1.25) (221)
HOME Total Score (Home Environment)	33.93 (5.67) (185)	33.96 (5.60) (221)
Mental Development Index Score	96.14 (6.83) (190)	96.10 (6.71) (221)
Behavior Rating Scale Total Score (Test Day Behavior)	122.80 (11.2) (189)	122.95 (10.84) (221)
Infant Sex	.50 (.501) (221)	.50 (.501) (221)
Postnatal Service Use (visits)	5.66 (6.81) (221)	5.66 (6.81) (221)
Pre & Postnatal Service Use	9.13 (9.37) (221)	9.13 (9.37) (221)

Appendix N. (Cont.)
Conceptual model 2 variable means and standard deviations for Standard of Care group before and after missing data imputation.

Variable	Pre-Imputation M (SD) (n)	Post-Imputation M (SD) (n)
Days gestation at birth	277.9 (10.62) (220)	277.9 (10.60) (221)
Birth weight (in grams)	3406.8 (503.1) (220)	3407.0 (502.0) (221)
Hospital days prior to discharge of infant	2.69 (3.6) (220)	2.69 (3.6) (221)
NICU days	.69 (3.68) (220)	.68 (3.68) (221)
Child Cold at 6 months	.35 (.477) (185)	.35 (.478) (221)
Maternal rating of child health at 6 months	2.05 (.972) (193)	2.02 (.974) (221)
Infant health index (6 item composite)	.559 (.917) (220)	.557 (.916) (221)
Proximal infant health index (2 item composite)	.678 (.719) (183)	.683 (.723) (221)

Appendix O.
Fit indices for path analysis of conceptual model 2 using manifest variables and estimating parameter with maximum likelihood methods.

OVERALL FIT INDICES

Degrees of Freedom = 156
Minimum Fit Function Chi-Square = 122.69 (P = 0.98)
Normal Theory Weighted Least Squares Chi-Square = 117.73 (P = 0.99)
Estimated Non-centrality Parameter (NCP) = 0.0
90 Percent Confidence Interval for NCP = (0.0 ; 0.0)
Minimum Fit Function Value = 0.28
Population Discrepancy Function Value (F0) = 0.0
90 Percent Confidence Interval for F0 = (0.0 ; 0.0)
Root Mean Square Error of Approximation (RMSEA) = 0.0
90 Percent Confidence Interval for RMSEA = (0.0 ; 0.0)
P-Value for Test of Close Fit (RMSEA < 0.05) = 1.00
Expected Cross-Validation Index (ECVI) = 0.61
90 Percent Confidence Interval for ECVI = (0.61 ; 0.61)
ECVI for Saturated Model = 0.49
ECVI for Independence Model = 1.82
Chi-Square for Independence Model with 182 DF = 755.04
Independence AIC = 811.04
Model AIC = 225.73
Saturated AIC = 420.00
Independence CAIC = 953.34
Model CAIC = 500.17
Saturated CAIC = 1487.27
Normed Fit Index (NFI) = 0.84
Non-Normed Fit Index (NNFI) = 1.07
Parsimony Normed Fit Index (PNFI) = 0.72
Comparative Fit Index (CFI) = 1.00
Incremental Fit Index (IFI) = 1.06
Relative Fit Index (RFI) = 0.81
Critical N (CN) = 711.77

Appendix O. (Cont.)
Fit indices for path analysis of conceptual model 2 using manifest variables and estimating parameter with maximum likelihood methods.

Nurse-CHW Team Care

Contribution to Chi-Square = 69.41
Percentage Contribution to Chi-Square = 56.57
Root Mean Square Residual (RMR) = 3.06
Standardized RMR = 0.055
Goodness of Fit Index (GFI) = 0.96

Standard Of Care

Contribution to Chi-Square = 53.28
Percentage Contribution to Chi-Square = 43.43
Root Mean Square Residual (RMR) = 2.77
Standardized RMR = 0.048
Goodness of Fit Index (GFI) = 0.97

Appendix P.
Standardized estimates of error terms modeled in path analysis of conceptual model 2 – Nurse-CHW Team care intervention group.

Error Term	Value
Manifest Endogenous Variable Error (Theta Epsilon Matrix)	
1. Reported needs	.79
2. Ordinal service use	1.19
3. Maternal interactions	.89
4. Home environment	.87
5. Infant mental development	.97
6. Clarity of infant cues	.94
7. Perceived stress	.94
8. Depressive symptoms	.44
Manifest Exogenous Variable Error (Theta Delta Matrix)	
1. Expected needs	1.02
2. Service helpfulness	.95
3. Poor infant health	1.16
4. Time points in Kent County	1.03
5. Postnatal employment	.98
6. Test day behavior (BRS)	.86

Appendix Q.
Standardized estimates of error terms modeled in path analysis of conceptual model 2 – SOC intervention group.

Error Term	Value
Manifest Endogenous Variable Error (Theta Epsilon Matrix)	
1. Reported needs	.79
2. Ordinal service use	.42
3. Maternal interactions	1.02
4. Home environment	1.05
5. Infant mental development	.97
6. Clarity of infant cues	1.06
7. Perceived stress	.99
8. Depressive symptoms	.51
Manifest Exogenous Variable Error (Theta Delta Matrix)	
1. Expected needs	.98
2. Service helpfulness	1.05
3. Poor infant health	.89
4. Time points in Kent County	.97
5. Postnatal employment	1.02
6. Test day behavior (BRS)	1.14

Appendix R.
Descriptive information about service provider turnover for individuals in the Nurse-CHW Team care intervention group (n = 196).

Service Provider Contact Throughout Entire Intervention	n (%)	Total Category n (%)
Consistent Nurse & CHW		43 (21.9)
One Change in Service Provider		45 (23.0)
Consistent Nurse, changed CHW	29 (14.8)	
Consistent CHW, changed Nurse	16 (8.2)	
Two Changes in Service Providers		61 (31.1)
Consistent Nurse, 2 changes in CHWs	21 (10.7)	
Consistent CHW, 2 changes in Nurses	1 (0.5)	
Changed Nurse & changed CHW	39 (20.0)	
Three Changes in Service Providers		36 (18.4)
Had 2 Nurses and 3 CHWs	24 (12.2)	
Had 2 CHWs and 3 Nurses	12 (6.1)	
Four Changes in Service Providers		9 (4.6)
Had 2 Nurses and 4 CHWs	2 (1.0)	
Had 3 Nurses and 3 CHWs	7 (3.6)	
Five Changes in Service Providers		2 (1.0)
Had 3 Nurses and 4 CHWs	1 (0.5)	
Had 3 CHWs and 4 Nurses	1 (0.5)	

Note: 2 cases missing data and 19 cases excluded because, although randomized to care, they never accepted/received services from program staff.

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