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Socio-demographic factors have been consistently linked to parenting practices during children's first years of life. However, less is known about the unique contribution and interactive effects of key factors such as maternal education, income, and partner status. The purpose of the current study was to examine group differences in maternal sensitivity and cognitive stimulation based on maternal education, income, and partner status in a sample of 1,364 mothers with young children. Drawing from family stress theory, main effects of education, income, and partner status were examined, and income and partner status were examined as moderators of differences in maternal behavior based on education. A secondary goal was to examine group differences in maternal behavior based on education and partner status among low-income mothers and group differences based on education and cumulative income.

Results of a series of analyses of covariance revealed that income and partner status did moderate education-based differences on maternal behavior, but in varying ways. The primary results indicated that there were larger group differences based on education among low-income mothers than middle/upper income mothers but for partner status there were larger education-based group differences for partnered mothers than single mothers. For the secondary analyses, group differences based on education were larger for low-income partnered mothers than low-income single mothers. Additionally, there were main effects of cumulative income on maternal behavior, and a significant

interaction between education and cumulative income on maternal sensitivity. Post-hoc tests revealed that there were no differences in maternal behavior based on education for mothers who were chronically low-income, whereas there were differences in maternal behavior based on education for mothers who did not experience low-income, or experienced low-income intermittently (i.e., 1, 2, or 3 times). Taken together, the results indicate that education is an important resource to mothers who experience some aspects of socio-demographic stress (i.e., low income), but not among mothers who experience multiple or chronic sources of economic stress.

LINKS BETWEEN MATERNAL EDUCATION AND PARENTING QUALITY
DURING CHILDREN'S FIRST THREE YEARS: THE MODERATING
ROLE OF INCOME AND PARTNER STATUS

by

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TABLE OF CONTENTS

	Page
LIST OF TABLES.....	v
LIST OF FIGURES.....	vi
CHAPTER	
I. INTRODUCTION.....	1
II. THEORETICAL PERSPECTIVES AND LITERATURE REVIEW	11
III. METHOD.....	31
IV. RESULTS.....	37
V. DISCUSSION	51
REFERENCES	67
APPENDIX A. TABLES AND FIGURES	85

LIST OF TABLES

	Page
Table 1. Sample Characteristics of Analytic Sample at 6, 15, and 36 Months.....	86
Table 2. Descriptive Statistics for Outcome Variables.....	87
Table 3. Correlations Between all Predictor and Outcome Variables	88
Table 4. T-tests for Maternal Minority Status and all Predictor and Outcome Variables	89
Table 5. T-tests for Child Sex and all Predictor and Outcome Variables.....	90
Table 6. Final ANCOVA Model on Maternal Sensitivity at 6 Months	91
Table 7. Final ANCOVA Model on Cognitive Stimulation at 6 Months	92
Table 8. Final ANCOVA Model on Maternal Sensitivity at 15 Months	93
Table 9. Final ANCOVA Model on Cognitive Stimulation at 15 Months	94
Table 10. Final ANCOVA Model on Maternal Sensitivity at 36 Months	95
Table 11. Final ANCOVA Model on Cognitive Stimulation at 36 Months	96
Table 12. Summary of Final Model Results	97
Table 13. Education and Partner Status Among Low-Income Mothers on Maternal Sensitivity at 15 Months	98
Table 14. Education and Partner Status Among Low-Income Mothers on Cognitive Stimulation at 36 Months	99
Table 15. Cumulative Income Analysis on Maternal Sensitivity at 36 Months.....	100
Table 16. Cumulative Income Analysis on Cognitive Stimulation at 36 Months.....	101

LIST OF FIGURES

	Page
Figure 1. Maternal Education and Income on Maternal Sensitivity at 15 Months	102
Figure 2. Maternal Education and Partner Status on Maternal Sensitivity at 15 Months	103
Figure 3. Maternal Education and Income on Cognitive Stimulation at 15 Months	104
Figure 4. Maternal Education and Income on Maternal Sensitivity at 36 Months	105
Figure 5. Income and Partner Status on Maternal Sensitivity at 36 Months	106
Figure 6. Maternal Education and Partner Status on Cognitive Stimulation at 36 Months	107
Figure 7. Maternal Education and Partner Status Among Low-Income Mothers on Maternal Sensitivity at 15 Months	108
Figure 8. Maternal Education and Partner Status Among Low-Income Mothers on Cognitive Stimulation at 36 Months	109
Figure 9. Maternal Education and Cumulative Income on Maternal Sensitivity at 36 Months	110

CHAPTER I

INTRODUCTION

Background and Significance

Maternal sensitivity and cognitive stimulation during infancy are important predictors of children's subsequent social, emotional, and cognitive development. Maternal sensitivity is conceptualized as mothers' timely and contingent responses to their children's cues, depending on children's developmental level and the demands of the situation (Ainsworth, Blehar, Waters, & Wall, 1978). Children whose mothers were highly sensitive toward them as infants and toddlers have better behavioral and emotion regulation skills, are more empathetic and socially responsive, and are more likely to have a secure infant-mother attachment than children whose mothers were less sensitive (Belsky & Fearon, 2002; de Wolff & van IJzendoorn, 1997). Cognitive stimulation is conceptualized as the extent to which mothers provide materials and experiences inside and outside of the home that promote learning, enrichment, and intellectual development (Crosnoe et al., 2010). Children whose mothers provided more cognitive stimulation to them as infants and toddlers have better cognitive, language, and academic outcomes during the preschool period and throughout childhood (Crosnoe et al.; Hoff, 2003; Hart & Risley, 1995; Hubbs-Tait, Culp, Culp, & Miller, 2002). Given the importance of maternal sensitivity and cognitive stimulation in relation to children's subsequent

developmental outcomes, identifying the factors that predict sensitive and cognitively stimulating maternal behavior is of importance. Socio-demographic factors have an important influence on maternal behavior. Two socio-demographic indicators that are associated with maternal behavior are maternal education and income (Bornstein & Bradley, 2003; Hoff, Laursen, & Tardif, 2002). Research indicates that higher levels of education and income are linked with greater maternal sensitivity and cognitive stimulation (Duncan & Magnuson, 2003; McLoyd, 1990; NICHD, 1999a). However, both maternal education and income are highly correlated with one another and few investigators have attempted to disentangle the effects of education and income on maternal behavior (Bornstein & Bradley, 2003; Hoff, Laursen, & Tardif, 2002). Researchers often include education and income in SES composites, and sometimes include other socio-demographic indicators (e.g., employment status) in these composites. This approach obscures the ability to assess the incremental effects of maternal education and income and the interaction between the two in predicting maternal behavior during early childhood. Examining the possibility that the relationship between maternal education and maternal behavior differs depending on level of income could shed light as to whether or not education is a resource that helps mothers parent more effectively in the context of low income.

Additionally, whether or not mothers have a spouse or partner is another socio-demographic characteristic that is associated with both education and income and with maternal behavior (Bornstein et al., 2003; Hoff et al., 2002; Weinraub, Horvath, & Gringlas, 2002; Weinraub & Wolf, 1982). The possibility that the effects of education

and income on maternal behavior vary for single versus partnered mothers has been investigated rarely in the literature, and studies of this type mostly focus on African American mothers (Brody, Flor, & Gibson, 1999; McGroder, 2000; McLoyd, 1990; McLoyd, Jayaratne, Ceballo, & Borquez, 1994). Single partner status is associated with higher levels of parental stress, lower levels of parental efficacy, and higher rates of depression which may undermine maternal sensitivity and cognitive stimulation (Copeland et al., 2010; Hilton, Desrochers, & Devall, 2001; Weinraub, 1983). It is likely that single mothers with low income may be the lowest in sensitivity and cognitive stimulation, but higher levels of education may attenuate this relationship. The knowledge and experiences that education provides could help mothers who experience other socio-demographic stress behave in ways that are more positive because they recognize the importance of their behavior on their children's development (Benasich & Brooks-Gunn, 1996). To further understand the influence of socio-demographic factors on maternal behavior, researchers must examine more than the main effects of maternal education and income. Specifically, it may be helpful to examine interactive effects of education, income, and partner status on maternal behavior to identify if differences based on education are larger for single and/or low-income mothers. In sum, this study will examine the incremental and joint effects of maternal education, income, and partner status on maternal sensitivity and cognitive stimulation during children's first three years.

Maternal Sensitivity Defined

Sensitive mothers respond to their children's displays of negative emotions with timely, appropriate, and contingent behaviors that are well-matched to their children's

cues and developmental level and to the demands of the situation (Ainsworth, Blehar, Waters, & Wall, 1978). Sensitive mothers are adept at recognizing their infants' emotional states, matching their own emotions and behaviors to their infants', and interpreting their infants' cues in a manner that does not misinterpret their infants' needs based on their own needs and wishes (Ainsworth et al.; Dix, 1991; Dix et al., 2004). Additionally, sensitive mothers respond to their infants' displays of positive emotions with their own positive emotions and affirmation of the infant's experience (Lohaus et al., 2004). For example, when infants smile, laugh, and show enjoyment, sensitive mothers respond to their infants by acknowledging their positive emotions and showing their own displays of positive and warm affect and behaviors (Sroufe, 2000). Likewise, when infants cry because they are frightened, such as hearing a loud noise or the approach of a stranger, sensitive mothers respond by holding and comforting their infant, talking to and reassuring their infant that they are there to protect and comfort them, and helping the infant become acclimated to the experience. Similarly, sensitive mothers respond to their infants' experiences of frustration, such as being strapped into a car seat or being unable to reach a toy, by acknowledging the frustrating experience, comforting and reassuring the infant verbally and physically, and alleviating the discomfort as soon as possible. Sensitive mothers respond to their infants' crying quickly and with warm, empathetic responses (Lohaus et al., 2004).

During toddlerhood, sensitive mothers respond similarly as they do during infancy, but they adapt their behavior according to their child's developmental level (e.g., emerging cognitive, language, and motor skills) and because they recognize their

children's growing need for autonomy and emerging ability to self-regulate their emotions (Ainsworth et al., 1978; Sroufe, 2005; Sroufe & Waters, 1977). For example, as toddlers increasingly gain independence in exploring their environment, sensitive mothers respond by encouraging this exploration but also setting appropriate limits and redirecting their toddlers' undesirable or dangerous behavior (e.g., touching an outlet) with engagement or distraction. Additionally, sensitive mothers recognize their children's increasing ability to regulate their own emotions and help teach their children strategies for dealing with emotions in a variety of situations (Bernier, Carlson, & Whipple, 2010; Spangler, Schieche, Ilg, & Maier, 1994; Sroufe, 1989; 2000). Sensitive mothers may provide more distal support than is typical during infancy. For example, sensitive mothers may respond verbally rather than physically and may wait longer to intervene when children are frustrated in order to give toddlers an opportunity to problem solve or regulate their emotions on their own. Additionally, sensitive mothers talk to their children about frightening or frustrating situations and help them learn how to cope with the difficult emotions associated with these situations (Dix, 1991; Dix et al., 2004).

Furthermore, sensitive mothers recognize that their children use them as sources of social and emotional information and therefore respond in ways that teach children what is expected and how to respond in certain situations, while helping them to increasingly handle emotionally arousing situations on their own. For example, when children are exposed to potentially frightening situations or people, sensitive mothers respond to their children's displays of anxiety and distress by acknowledging their children's emotional distress, reassuring them through their own facial expressions,

language, and behavior, and encouraging their children to explore the new environment, if appropriate (Propper & Moore, 2006; Sroufe, 2000). Sensitive mothers respond to their children with warm and affectionate behaviors in an effort to comfort and reassure their children and alleviate negative emotions (Davidov & Grusec, 2006).

Cognitive Stimulation Defined

Cognitive stimulation refers to the extent to which mothers provide materials and experiences inside and outside of the home that promote children's learning, enrichment, and intellectual development (Crosnoe et al., 2010). Mothers who are cognitively stimulating promote their children's exploration of the environment and provide the opportunity to do so. Cognitively stimulating mothers are also adept at recognizing how to promote their children's learning experiences depending on their children's developmental level. During infancy cognitively stimulating mothers interact with their children in ways that encourage and promote infants developing cognitive capabilities. For example, cognitively stimulating mothers promote their infants' sensorimotor stimulation by creating environments in which infants are able to move around and that are visually stimulating and by providing toys and objects that make different sounds and have different textures that infants can manipulate with ease. Cognitively stimulating mothers expose their infants to novel settings, by taking them on outings, and providing access to novel and increasingly complex play materials. Also, cognitively stimulating mothers may purposefully direct their infant's attention to, identify and name objects in a direct attempt to promote joint attention, which is associated with children's subsequent

language acquisition and object learning (Cleveland, Schug, & Striano, 2007; Tomasello, 1995).

Even though their children are not yet verbal, cognitively stimulating mothers recognize and value this period of development when infants are learning the foundations for later language development and promote this by exposing their children to language, a richer vocabulary, reading and developmentally appropriate books (Hart & Rislet, 1995; Karrass, & Braungart-Rieker, 2005). For example, they may talk to their children about what they are doing during daily routines such as changing, feeding, and bath time and respond to their infants' vocalizations in a way that encourages conversational turn-taking (Haden, Ornstein, Rudek, & Cameron, 2009; Hart & Risley, 1995).

When infants become toddlers, cognitively stimulating mothers engage in similar but increasingly complex behaviors in response to children's enhanced cognitive, language, motor and emotional development (Haden et al., 2009). For example, cognitively stimulating mothers of toddlers adjust their own language use in ways that promote toddlers' verbal skills by making more direct attempts to identify and label objects, emphasizing pronunciation, introducing increasingly complex vocabulary and attempting to elicit verbal rather than gestural responses (e.g., pointing) from children (Hart & Risley, 1995). Cognitively stimulating mothers of toddlers provide their children with objects, materials, and activities that promote children's more advanced problem solving skills, independent thinking, and representational thought. For example, mothers may provide access to art supplies and materials, toys and puzzles with parts that can be manipulated, and items that can be used for symbolic play (Hubbs-Tait, Culp, Culp, &

Miller, 2002; Damast, Tamis-LeMonda, & Bornstein, 1996). Cognitively stimulating mothers of toddlers go beyond merely telling their children about what they are doing by involving their toddlers more in daily routines such as cooking or cleaning and encouraging toddlers to participate in tasks when developmentally appropriate, such as helping to put dishes away or cleaning. Mothers of toddlers may foster cognitive stimulation outside of the home by exposing their children to hands-on museums, libraries, and parks and participating in other activities that further support children's learning experiences (e.g., playing with other children at the playground). Finally, cognitively stimulating mothers of toddlers continue to read to their children, but read increasingly complex books and make greater efforts to increase their child's participation by asking them to point to pictures and guess what will happen next. Across these settings and activities, cognitively stimulating mothers talk to their children about what they are seeing and doing and relate the information to other things that are relevant to the child's own experiences (Crosnoe et al., 2010; Hart & Risley, 1995; Smith, Landry, & Swank, 2000).

Maternal Sensitivity and Cognitive Stimulation as Related and Distinct Constructs

Maternal sensitivity and cognitive stimulation are distinct, but inter-related maternal behaviors (Grusec & Davidov, 2010). They are distinct because they serve different socialization goals and rely on different practices. That is, sensitivity serves the goal of comfort, protection, and support, and is based primarily on responding appropriately to children's bids for attention and emotional needs. In contrast, cognitive stimulation serves the goal of providing information to and guiding a less experienced

child to acquire advanced knowledge and skills, and consists primarily of mothers' talking to their children, relaying information, and engaging with them in ways that further advance their thinking and cognitive capabilities. Thus, sensitive and cognitively stimulating behaviors require somewhat different abilities and resources (Grusec & Davidov), and it is possible for mothers to be more effective in one domain than another. For example, mothers may provide their children with cognitively stimulating objects or materials, but not engage their children in ways that are sensitive or contingent on their emotional needs. On the other hand, mothers may be more adept at responding to their children when they are experiencing distress, but may not actively engage their children in ways that are cognitively stimulating when they are alert.

However, maternal sensitivity and cognitive stimulation are somewhat related because these behaviors are enacted by the same individual within the same parent-child relationship. Some of mothers' global beliefs, motivations, and goals about parenting are likely to cut across domains and influence maternal behavior to promote both sensitive responses and cognitively stimulating behavior towards children (Grusec & Davidov, 2010). Mothers who prioritize their children's needs in general may be aware of and responsive to both emotional needs and cognitive needs. For example, mothers may respond to their children in a sensitive, contingent manner when engaging in cognitively stimulating activities. Likewise, mothers who are both sensitive and cognitively stimulating are also aware of their children's developmental level and adjust their behavior accordingly. In other words, both dimensions of maternal behavior may draw upon some similar underlying skills and beliefs and be related as a result.

Consistent with the view that maternal sensitivity and cognitive stimulation are distinct but related constructs, they tend to be moderately correlated (Raviv et al., 2004), and they tend to correlate differently with child outcomes (Grusec & Davidov, 2010; Sroufe, 2000). For example, responsiveness to infants' emotional signals, an aspect of sensitivity, predicts children's attachment security (de Wolf & van IJzendoorn; 1997), and responsiveness to children's verbal signals, an aspect of cognitive stimulation, predicts children's subsequent language ability and early literacy skills (Bornstein, Tamis-LeMonda, Hahn, & Haynes, 2008). Given evidence that both maternal sensitivity and cognitive stimulation are important for promoting children's outcomes in different domains, it is important that we identify factors that support or undermine these behaviors. Next, I review key theoretical perspectives and empirical evidence that links education, income, and partner status to parenting with an emphasis on specificity in all measures. That is, I take care to consider education, income, and partner status as separate socio-demographic indicators and sensitivity and cognitive stimulation as separate indices of competent parenting during infancy.

CHAPTER II

THEORETICAL PERSPECTIVES AND LITERATURE REVIEW

Theoretical Perspectives on Socioeconomic Factors in Relation to Maternal Behavior

A theoretical perspective that offers insight for understanding the relation between socio-demographic factors and maternal behavior is family stress theory. Family stress theory elucidates the process by which contextual risk may undermine maternal behavior and provides a framework for understanding the effects of education, income, and partner status in relation to maternal sensitivity and cognitive stimulation. That is, low education (i.e., high school education or less), low income, or single partner status are socio-demographic factors that are associated with stress and can undermine parenting, whereas higher income and levels of education, and a partner in the home are resources that help mothers meet parenting and family demands.

According to family stress theory, the extent to which stress affects mothers and their behavior depends on both the nature of the demands that they face and the resources they have available to meet those demands. Mothers with access to more resources may be able to cope with other stressors more easily and maintain family functioning with less difficulty than families who have fewer resources or experience more socio-demographic stress (Burchinal, Roberts, Hooper, & Zeisel, 2000; McLoyd, 1990; McLoyd & Wilson, 1990). This raises the possibility that specific socio-demographic factors may interact to

predict maternal sensitivity and cognitive stimulation. For example, education may be a more important resource for positive parenting among low-income or single mothers. Also, the negative effect of socio-demographic risk on maternal behavior is exacerbated when stress is experienced with respect to more than one socio-demographic indicator (Whittaker, Harden, See, Meisch, & Westbrook, 2010). Thus, mothers who have low income, limited education, and no partner in the home may be at greatest risk for compromised parenting.

McCubbin and Patterson (1983) extended the family stress perspective to include the concept of the Double ABCX model which introduces the concept of pileup of stressors, the idea that families may experience multiple stressors for prolonged periods of time and adaptation in the face of these multiple and pervasive stressors is more difficult. Specifically, having low income at multiple times can be a pervasive source of stress that affects mothers' ability to meet parenting and other demands successfully. Furthermore, the effect of lower education when mothers have low incomes may be especially detrimental because mothers experience a cumulative effect of lower resources, making it more difficult to meet demands. According to the Double ABCX model this effect may be exacerbated when mothers experience constant stress from different contexts, and mothers who experience constant economic stress or difficulties may consistently interact with their children in a less sensitive manner and cognitively stimulating manner. For example, mothers facing limited access to resources because of low income may experience additional stress in trying to meet the demands of their own and their children's basic physical needs. It may be that meeting the basic needs of shelter

and food may become more important than responding sensitively to or promoting cognitive stimulation with children. Additionally, the extent to which these stressors are experienced together and over an extended period of time can undermine mothers' ability to respond sensitively and provide cognitive stimulation. Stressful events that occur in the lives of families that are experienced in more than one domain characterized as being external, chronic, and cumulative are proposed to affect families more severely because chronic and cumulative stress may make it more difficult for mothers to meet current demands and other stressors that may arise (Conger et al., 2002; Magnuson & Duncan, 2002; McLoyd & Wilson, 1990). The pileup of these stressors, in addition to parenting demands, can accumulate and put mothers at further risk for less sensitive and cognitively stimulating behavior (McCubbin & Patterson, 1983).

In sum, socio-demographic factors, such as maternal education, income, and partner status, are expected to influence parenting either as a proxy for stress that mothers' experience or a resource that helps buffer mothers from stress related to other socio-demographic characteristics. Of particular interest in the proposed study is the extent to which education buffers mothers from the negative effect of low income and single partner status on maternal behavior. Specifically, education may act as a resource in relation to sensitive and cognitively stimulating maternal behavior even in the face of other stressors, such as low income or single partner status.

Literature Review

Maternal Education and Maternal Behavior

Maternal education is expected to provide mothers with the psychological, cognitive, and social capital resources that are important for positive parenting. Specifically, formal education fosters critical, analytical, and reflective thinking skills that are associated with more child-focused beliefs, goals, and behaviors (Baron, 1981; Grusec, 2006; Magnuson et al., 2009; Rosenblum, McDonogh, Sameroff, & Muzik, 2008). A child-focused perspective is important because it helps mothers to identify their children's needs in a manner that does not misinterpret what children are trying to communicate. This allows mothers to empathize with their children and put their children's needs ahead of their own because they want to help their children, which further promotes sensitivity (Ainsworth et al., 1978; Dix, 1991). Additionally, through the experience of obtaining post-secondary education, individuals are exposed to a broad variety of perspectives and must practice adapting their own characteristics (e.g., learning or communication style) to the external demands of their courses, instructors, and diverse classmates (Bornstein et al., 2010; Butler & Deprez, 2002; Magnuson et al., 2009). Having had these experiences may help mothers balance their other demands with the demands of their infant.

Additionally, because education encourages flexible thinking, mothers with more education are likely to have access to multiple strategies for achieving parenting goals, as well as the ability to apply these strategies at appropriate times (Brody, Flor, Gibson, 1999; Coplan, Hastings, Lagacé-Séguin, Moulton, 2002; Hastings & Rubin, 1999).

Specifically, mothers who have higher levels of education are more likely to have had experience setting and meeting goals and feeling successful in meeting those goals. More educated mothers may be better able to set appropriate parenting goals and meet the needs of their children because they have had this experience in other contexts, further promoting sensitive responsiveness.

Maternal education is also associated with more knowledge about child development and appropriate developmental expectations (Bornstein et al., 2010; Huang et al., 2005; Reich, 2005), and this knowledge is associated with more sensitive maternal behavior (Chen & Luster, 1999; Kiang, Moreno, & Robinson, 2004). Mothers with more education may be more likely to seek out information about developmental expectations and positive parenting practices (Bornstein et al., 2010; Magnuson et al., 2009). Mothers who understand children's age-appropriate developmental tasks can objectively recognize and accurately interpret the meaning of children's behavior in a manner that is appropriate to the situation and the needs of the child (Bornstein et al., 2010; Rosenblum, McDonogh, Sameroff, & Muzik, 2008). For example, when infants cry, mothers with more knowledge about development are more likely to recognize crying as a means of communication, whereas mothers with less developmental knowledge may attribute the infant's crying as an attempt to annoy them (Huang et al., 2005; Kiang et al., 2004). Overall, mothers who understand age-appropriate developmental tasks of their children are better able to adapt their behavior in order to promote their children's developmental goals and experiences.

Maternal education is also linked with more cognitive stimulation during early childhood. Mothers own learning experiences and intellectual development provided through post-secondary education are expected to contribute to mothers' valuing learning experiences and cognitive development in their children (Bornstein et al., 2010; Kohn, 1977; Luster, Rhoades, & Haas, 1989). Such a value system is likely to encourage mothers to read and play with their children and provide stimulating experiences both inside and outside of the home that promote children's learning and enrichment.. Furthermore, mothers with more education may talk more to their infants because they recognize the importance of language development and place value on their children's early language experiences (Davis-Kean, 2005; Hart & Risley, 1995). More educated mothers have been exposed to more literary and linguistically stimulating environments through their own educational experiences, which may make them inclined to create such a setting for their own child.

Research findings are consistent with the view that education promotes sensitive and cognitively stimulating maternal behavior. Specifically, the most robust finding in the empirical literature regarding socio-demographic indicators is the association between higher levels of maternal education and more sensitive and cognitively stimulating behavior (Bluestone & Tamis-LeMonda, 1999; Bornstein, 2003; Gutman & Feinstein, 2010; Hoff et al., 2002; Hoff-Ginsberg, 1998 White, 1982). For example, maternal education was found to be a stronger predictor of mothers' dyadic focus and provision of stimulating materials when compared to other socio-demographic indicators (e.g., occupational status). Furthermore, when the effect of education was compared to a

composite measure (i.e., Hollingshead and Socioeconomic Index of Occupations), education was equally predictive of maternal behavior, suggesting that education was accounting for the association between the composite score and maternal behavior (Bornstein et al., 2003). Likewise, education is a moderate and consistent predictor of maternal behavior across early childhood over and above the effect of income (Klebanov, Brooks-Gunn, & Duncan, 1994; Linver, Brooks-Gunn, & Cohen, 2002; Raviv, Kessenich, & Morrison, 2004) and has specifically been linked to parenting quality during infancy and toddlerhood (Lugo-Gill & Tamis-LeMonda, 2008). Additionally, in a study that examined maternal education and income as independent predictors but in the same model, maternal education was a stronger predictor than income in predicting the home learning environment provided to 3 year olds (Son & Morrison, 2010).

Furthermore, mothers with a HS education or less provided less stimulating learning environments and were less verbal with their children, even after income was considered (Klebanov et al., 1994; Linver et al., 2002). It has also been found that increases in maternal education are associated with more provision of learning materials in the home and increased exposure to language (Magnusson, Sexton, Davis-Kean, & Huston, 2009).

Maternal Income and Maternal Behavior

Income is likely linked with maternal behavior for a number of reasons. Specifically, income may be related to cognitive stimulation because low income may restrict mothers' ability to purchase toys and learning materials or provide stimulating experiences for their child. Having children increases the demands for material resources and parents must meet children's basic physical needs for food, clothing, and shelter, in

addition to other materials that promote their development (e.g., toys, experiences outside of the home); this places monetary demands on mothers (Bornstein, 2002; Crosnoe et al, 2010; Hoff et al., 2002). Mothers with low income may have difficulties providing for their children's basic needs and therefore have few remaining resources to invest in play materials, books, and outings.

Income may also influence the overall stress mothers feel in their lives, which can spill over into the mother-child relationship and the quality of care that mothers provide (Burchinal et al., 2008; Dilworth-Bart, Khurshid, & Vandell, 2007; Hoff et al., 2002; Magnuson & Duncan, 2002). Children require time, attention, and sensitive responsiveness, and mothers must allocate psychological resources to their children. However, the extent to which mothers can invest psychologically and emotionally in their children may vary based on income such that mothers who experience economic stress are less sensitive and cognitively stimulating than other mothers (Lee, 2009; McLoyd, 1990). Furthermore, low-income mothers may face many different negative interactions with people outside of the home, such as landlords, bill collectors, and staff at social service agencies. These interactions that take place outside of the home are likely to influence interactions within the family (Bornstein et al., 2003; Klebenov et al., 1994). As a result of these stressors, low-income mothers may respond less sensitively to their children and both speak to and engage with them less frequently than middle/high income mothers (Hart & Risley, 1995).

Research has consistently demonstrated that income is associated with maternal behavior and mothers that have low income or face economic hardship are less sensitive

and cognitively stimulating to their young children than mothers who have higher income. For example, during infancy income has been identified as a significant predictor of maternal sensitivity and cognitive stimulation (Bornstein et al., 2003; Fuertas et al., 2009; Klaus & Owen, 2009; Klebenov et al., 1994; Linver et al., 2002; van Doesum et al., 2007; Yeung, Linver, & Brooks-Gunn, 2002). Specifically, low income was negatively associated with maternal sensitivity across the first two years of children's lives, and this relation was significant after accounting for cohabitation status and mother's relationship quality with her partner (Klaus & Owen, 2009). Furthermore, mothers with the lowest income were the least sensitive to their infants, and mothers without risk variables (e.g., partnered mothers, mothers from middle class homes) displayed more attentive and responsive behavior than mothers with risk variables (Fuertas et al., 2009). Also, it was also found that the strength of the association between income and maternal sensitivity during early childhood became weaker as income exceeded the poverty threshold and income was a more important predictor of maternal sensitivity among low income families than higher income families (Mistry et al., 2004).

Also, the inadequacy of resources (i.e., being unable to provide basic needs or pay bills) during infancy was positively associated with parenting stress, and in turn parenting stress was negatively related to maternal sensitivity (Whitaker et al., 2010). Likewise, it was found that income was a significant predictor over and above the effect of maternal education in relation to maternal sensitivity during the first year of life and mothers who had low income felt insecure about their parenting and subsequently responded less sensitively to their children (van Doesum et al., 2007). During toddlerhood, mothers that

lived in lower per-capita income communities and who experienced more financial stress were less sensitive and more directive in their interactions (Chaudhuri, Easterbrooks, & Davis, 2009). Research has also shown that when low income is experienced over time it has the most negative effects on parenting (Conger & Donnellan, 2007; Duncan & Brooks-Gunn, 1994; NICHD, 2005). That is, when low-income is experienced over time, it is a chronic economic stressor that further diminishes mothers' emotional resources to be able to respond sensitively and to promote cognitive stimulation.

There is also evidence that income is an important predictor of cognitive stimulation; however, the relation between income and cognitive stimulation is not as strong as the association between maternal education and cognitive stimulation. For example, income was positively associated with cognitive stimulation, even when education was considered; however, the effect of income was not as strong as that for education (Raviv et al., 2004). Additionally, when controlling for other factors associated with SES (e.g., race, household size) income had a moderate effect on cognitive stimulation (Son & Morrison, 2010).

When examining income in relation to maternal behavior, it is important to consider the methodological issues associated with measuring income that may partially account for different results across studies. Links between income and parenting are hypothesized to be a function of the short-term variation in income and when income is measured (Bornstein et al; Hoff et al., 2002) and this can be problematic for longitudinal research. Additionally, researchers may conceptualize and measure income in a variety of ways across studies. For example, some studies may examine hourly wage or yearly

salary as an indicator of income, whereas others may use an income-to-needs ratio, which takes into account income relative to family size and the poverty index. This variability in measurement can lead to difficulties when trying to interpret the effect of income across studies. Also, longitudinal studies that examine income at only one time point but examine behavior over time may miss fluctuations of income experienced by families that may have an important impact on the relations between income and parenting (Bornstein & Bradley, 2003; Hoff et al., 2002; Kalil & Ryan, 2010). Furthermore, a closer examination of the relation between income and cognitive stimulation is warranted, as much of current research focuses on the relation between income and maternal sensitivity.

Incremental and Interactive Effects of Education and Income on Maternal Behavior

Research that examines socioeconomic status in relation to maternal behavior often uses a variety of socio-demographic indicators either as a composite measure or as separate indicators (Bornstein & Bradley, 2003; White, 1982). However, variability in SES measurement can obscure findings with respect to identifying group differences based on specific socio-demographic factors, and the effect sizes of these specific factors (Bornstein et al., 2003; White, 1982). For example, a commonly used composite measure of SES is the Hollingshead Four-Factor Index which measures maternal and partner education level and partner status, and family income; whereas, another widely-used measure that is used to indicate socioeconomic status is the Socioeconomic Index of Occupations which is an index of occupational status and income in the family. Additionally, composite measures of maternal education and income have been positively

associated with maternal behavior across early childhood. However, composite variables may mask potential incremental or interactive effects of education and income. For example, research on socioeconomic status indicates that maternal education, income, and occupational status were each moderately positively associated with maternal sensitivity across early childhood (Bornstein et al., 2003); but, in another study that used the same indicators as a composite of SES, there was no association found between SES and sensitivity (Bornstein et al., 2007). That is, composite measures do not consider the possibility that one element in the composite may have most of the effect and account for the relation between the overall measure and the outcome of interest.

Research that examines socio-demographic characteristics separately may control for either education or income and not interpret main effects of control variables when they are significant. Overall, the literature supports the hypothesis that maternal education is more strongly related to maternal sensitivity and cognitive stimulation than is income (Son & Morrison, 2010; Raviv et al., 2004; White, 1982). For example, income was found to be a significant predictor of cognitive stimulation; however, the strength of the association became non-significant after maternal education was entered (Klebanov et al., 1994). Likewise, in other studies, maternal income has been shown to have a moderate association with maternal sensitivity, but this effect is only weak to moderate when maternal education is considered in the model (Lugo-Gil & Tamis-LeMonda, 2008; Raviv, Kessenich, & Morrison, 2004).

Also, only examining main effects does not allow for an examination of how education and income are jointly related to maternal behavior and how the effect of

education may vary in the context of different levels of income. It may be that higher levels of education are particularly important among mothers who face economic risk. Determining if income moderates the association between education and maternal behavior would allow researchers and policy makers to identify whether education is a specific resource that promotes positive maternal behavior, even in the face of socio-economic risk. Specifically, it may be that income moderates the effect of education on maternal sensitivity such that differences in maternal sensitivity and cognitive stimulation based on education will be larger for low-income mothers than middle/upper income mothers. Research indicates that higher levels of maternal education are associated with more knowledge about child development and appropriate developmental expectations (Bornstein et al., 2010; Ertem et al., 2007; Reich, 2005), which in turn are associated with more sensitive maternal behavior (Benasich & Brooks-Gunn, 1996; Chen & Luster, 1999). Among low-income mothers who face the potential for multiple stressors, knowledge of children's age-related needs and abilities and recognition of the importance of maternal behavior on child development may be essential in relation to sensitive responsiveness. In contrast, among middle/upper income mothers, education may have less of an effect on sensitivity because it is easier to behave sensitively when fewer income-related stressors are present.

Examining the interaction between maternal education and income may be particularly salient in relation to mothers' cognitive stimulation. Among low-income mothers, education may be particularly important because education promotes mothers' beliefs in and value of their children's learning and cognitive development (Machida,

Taylor, & Kim, 2002; Parks and Smeriglio, 1986), which may prompt them to prioritize finding ways in which to provide cognitively stimulating materials and experiences for their children, even in the context of having fewer economic resources. Furthermore, low-income mothers who have higher levels of education may be more creative in promoting cognitive stimulation with the limited resources that they do have available and may not be solely focused on providing toys or objects for their children but rather on providing cognitively stimulating experiences. Among higher income mothers, the influence of maternal education on cognitive stimulation may not be as strong because middle/upper income mothers have the monetary resources to provide their children with enriching materials and experiences, which may increase their odds of doing so regardless of the extent to which they value cognitive development.

In this study, the incremental effects of education and income on maternal sensitivity and cognitive stimulation will be examined. I hypothesize that mothers with middle/upper income and higher education will be rated as more sensitive and cognitively stimulating, and the effect of education on sensitivity and cognitive stimulation will be larger than the effect of income. Additionally, I hypothesize that education and income will interact such that group differences based on education will be larger for low-income mothers than middle/upper income mothers.

Considering the Incremental and Interactive Role of Partner Status on Maternal Behavior in the Context of SES

Although education and income are of primary interest in this study, partner status is another socio-demographic factor that is associated with maternal behavior during

children's first three years and must be considered to fully understand the role of education and income (Bornstein et al., 2003; Weinraub & Jaeger, 1988). In 2010, there were approximately 9.9 million single mothers with dependent children in the United States. Furthermore, over 2.2 million of single mothers had children under the age of three (U.S. Census Bureau, 2010). Research indicates that single mothers parent under a different context and face different challenges than partnered mothers (Hilton et al., 2001; Jayakody & Stauffer, 2000; McLoyd, 1990; Weinraub & Wolf, 1982). Single mothers often represent the only source of income for their families and are solely responsible for meeting economic and parenting demands of the family (Hilton & Desrochers, 2000; Hilton, Desrochers, & Devall, 2001; Jackson, Brooks-Gunn, Chien-Chung, & Glassman, 2000; Weinraub & Wolf, 1982). Single mothers often experience more role strain and difficulty in the ability to meet demands when compared to partnered families (Gutman & Eckles, 1999; Hilton & Desrochers, 2000; McLoyd, 1990). Also, single mothers do not have a partner in the household to offer the kinds of instrumental and emotional support that help mothers deal successfully with the demands of parenting and family life (Jackson et al., 2000; McAdoo, 1995; McLoyd, 1990; Weinraub & Wolf, 1982).

Research indicates that single motherhood is associated with less positive parenting behavior. Single mothers have higher rates of depression, lower maternal efficacy, and more inconsistent parenting practices (Copeland & Harbaugh, 2005; Harbaugh, 2010; Hilton et al., 2001; Jackson, Choi, & Bentler, 2009; McGrodder, 2000) which may contribute to less sensitive and cognitively stimulating behaviors among single mothers (McLannahan & Booth, 1989; McGrodder, 2000; McLoyd & Wilson,

1994). Research that has examined links between partner status and maternal behavior has often focused on low-income or African American mothers (McGrodder, 2000; McLoyd, 1990; McLoyd et al., 1994), and consistently demonstrates that low-income single mothers are at the most risk for less positive parenting practices (Bank, Forgatch, Paterson, & Fetrow, 1993). However, less is known regarding the extent to which maternal behavior varies as a function of education and income among single mothers versus partnered mothers. It may be that education is particularly important resource for promoting sensitive and cognitively stimulating maternal behavior among low-income, single mothers through the human and social capital resources it provides mothers, a point I return to later.

Furthermore, the differences in maternal behavior based on education and income may be larger for single than partnered mothers for similar reasons. That is, higher levels of education provide mothers with the social and human capital resources that are related to more sensitive and cognitively stimulating behavior in the face of other socio-demographic risk. Specific to partner status, more educated mothers may be adept at responding to multiple demands, and the experiences encountered while obtaining higher education may be particularly relevant for the multiple demands that single mothers will face (Hilton et al., 2000). Given the different context in which single mothers parent their children when compared to partnered mothers, it may be that education plays a particularly important role in promoting positive maternal behavior.

Likewise, differences based on income may be larger among single versus partnered mothers because income may be a resource that helps single mothers to meet

the additional financial and economic demands of single-parenthood. Thus, I hypothesize that single mothers will be less sensitive and cognitively stimulating than partnered mothers, and that differences in maternal sensitivity and cognitive stimulation based on education and income will be larger for single mothers than partnered mothers.

Consistent with a family stress perspective, it may be that low-income, single mothers face the most risk for negative parenting, and differences based on education may be larger among low-income, single mothers. It may be that the knowledge and skills, as well as the underlying beliefs and values developed through education, promote positive parenting behavior despite the greater contextual risk factors faced by low-income single mothers. I hypothesize that low-income, single mothers will be significantly less sensitive and cognitively stimulating than low-income partnered mothers, and differences in maternal behavior based on education will be larger for low-income single mothers than low-income partnered mothers.

Research Questions and Hypotheses

The present study addresses several research questions. First, are there differences in maternal sensitivity and cognitive stimulation based on maternal education, income, and partner status? Second, does maternal education or income have a stronger effect on maternal behavior? Third, do maternal sensitivity and cognitive stimulation vary as a function of interactions between education, income, and partner status? Two secondary research questions were investigated in addition to the primary hypotheses. First, does the effect of education on maternal sensitivity and cognitive stimulation vary as a function of partner status among low-income women; and second, do maternal sensitivity and

cognitive stimulation at 36 months vary based on the chronicity of low income across the first three years? Given evidence that maternal behavior varies as a function of maternal age, minority status, and depressive symptoms and child sex, these factors were covaried in all analyses (NICHD, 1999b). The specific hypotheses tested are:

1. There will be main effects of maternal education, income status, and partner status on maternal sensitivity and cognitive stimulation. Specifically:
 - a. Mothers with a HS education or less will be significantly less sensitive and cognitively stimulating than mothers with some college or 4 year degree or more, and mothers with a 4 year degree or more will be significantly more sensitive and cognitively stimulating than mothers with some college.
 - b. Low-income mothers will be significantly less sensitive and cognitively stimulating than middle/upper income mothers.
 - c. Mothers who are single will be significantly less sensitive and cognitively stimulating than mothers who are partnered.
 - d. There will be a stronger effect of education than income on maternal sensitivity and cognitive stimulation.
2. There will be a significant interaction between education and income on maternal sensitivity and cognitive stimulation, such that differences based on education will be greater among low-income mothers than among middle/upper income mothers. Further:

a. Mothers who have low income and a HS education or less will be significantly less sensitive and cognitively stimulating than all other groups.

b. Middle/upper income mothers with a college degree will be significantly more sensitive and cognitively stimulating than all other groups, except low-income mothers with a college degree or more.

3. There will be a significant interaction between education and partner status on maternal sensitivity and cognitive stimulation, such that group differences based on education will be larger among single mothers than partnered mothers.

Additionally:

a. Single mothers who have a HS education or less will be significantly less sensitive and cognitively stimulating than all other groups of mothers.

b. Single mothers with a college degree will not differ from partnered mothers with a college degree in sensitivity and cognitive stimulation.

4. There will be a significant interaction between income and partner status on maternal sensitivity and cognitive stimulation, such that differences based on income will be greater among single mothers than among partnered mothers.

Further, mothers who are single and have low income will be significantly less sensitive and cognitively stimulating than all other groups.

Secondary Hypotheses

5. There will be a significant interaction between education and partner status among low-income women on sensitivity and cognitive stimulation, such that

differences based on education will be larger among single mothers than partnered mothers.

6. There will be a significant main effect of cumulative income on maternal sensitivity and cognitive stimulation at 36 months such that mothers who experience low income 3 or 4 times will be less sensitive and cognitively stimulating than mothers who do not experience low income. Further, there will be a significant interaction between education and cumulative income on maternal sensitivity and cognitive stimulation at 36 months, such that education will have a stronger effect among mothers who experience low income 3 or 4 times when compared to mothers who do not experience low income or experience low income intermittently (i.e., 1 or 2 times).

In the current study, measures of maternal sensitivity and cognitive stimulation were available at multiple times during the first three years (6, 15, and 36 months). Given evidence that maternal sensitivity and cognitive stimulation are relatively stable over this time period (Pettit & Bates, 1984; Pianta, Sroufe, & Egeland, 1989), no differences in the pattern of effects were predicted based on the assessment point. But, each hypothesis was tested at each time point.

CHAPTER III

METHOD

Analytic Plan

Participants

This study used data from the NICHD Study of Early Child Care and Youth Development (SECCYD). Participants were recruited throughout 1991 from hospitals in 10 locations across the United States (Little Rock, AK; Irvine, CA; Lawrence, KS; Boston, MA; Philadelphia, PA; Pittsburgh, PA; Charlottesville, VA; Morganton, NC; Seattle WA; and Madison, WI). Women giving birth in selected hospitals were screened during 24-hour recruitment windows, and were excluded from the sample if (a) the mother was under 18, (b) the mother was unable to speak English, (c) the family planned to move, (d) the mother delivered multiple births, (e) the child was hospitalized for more than 7 days following birth or had obvious disabilities, (f) the family lived too far away or in an unsafe neighborhood, or (g) the mother had a known or acknowledged substance-abuse problem. Of the 8,986 mothers visited during the initial sampling periods, 5,265 met the eligibility requirements and agreed to be contacted upon return home from the hospital. From the eligible sample, 3,015 mothers were selected and contacted via phone using a random-sampling technique that was employed in order to identify participants that represented the economic, educational, and ethnic diversity of the specific collection site. A total of 1,364 mothers were enrolled in the study at a home visit when infants

were 1 month old. The recruited families included 25% ethnic-minority families, about 10% of the mothers did not complete high school, and 14% of the mothers were single. Sample characteristics for maternal age, minority status, education, income-to-needs partner status, and child sex for the final analytic sample at each time point (6, 15, and 36 months) appear in *Table 1*. The demographic composition of the analytic samples was highly consistent over time.

Procedure

Data for this study were collected during home visits conducted at 1, 6, 15, 24, and 36 months; mother-child interaction was rated in the lab at 36 months. At the 1 month visit, mothers reported on demographic information, including maternal education. During the subsequent visits, updated demographic information, including income, partner and employment status, was collected; mothers also completed questionnaires about themselves, their child, and their family. Maternal sensitivity was assessed during videotaped free play interactions at 6, 15, and 36 months, and cognitive stimulation was measured by observation and interview during home visits at 6, 15, and 36 months.

Measures

Maternal sensitivity. When children were 6, 15, and 36 months old, mother-child interactions were videotaped in a semi-structured 15-minute observation. At 6 months, mothers interacted with their infants however they would like for the first 7 minutes, using their own toys or none at all. For the remaining 8 minutes, mothers were given a standard set of toys they could use to play with their infants (rattle with faces, rattle with different parts, ball with raised animal forms, a small activity center, a rolling toy, a

stuffed animal, and a book with shapes and faces). At 15 and 36 months, mothers again engaged with their infants however they wished during the first 7 minutes. The remaining 8 minutes followed a three-box procedure, where age-appropriate toys were in three containers (at 15 months: a book, toy stove/objects, and toy house/parts; and at 36 months: markers/paper, dress-up clothes/register, and Duplo blocks/picture of model) and mothers were instructed to have their children play with the toys in a specified order (see Vandell, 1979).

Videotapes of the mother-child interactions were rated at a central site by trained coders who were blind to information about the family. At 6 and 15 months, videotapes were rated on the following dimensions using a 4-point rating scale from 1 (*not at all characteristic*) to 4 (*highly characteristic*): maternal sensitivity to distress, the extent to which mothers responded to their children's negative affect and distress cues; maternal sensitivity to non-distress, the extent to which mothers responded to their children's bids for attention and positive affect; positive regard, the extent to which mothers showed affection to their children; and intrusiveness, the extent to which mothers directed children's behavior or blocked their goals. At 36 months, videotapes were rated in the following dimensions using a 7-point rating scale from 1 (*very low*) to 7 (*very high*): supportive presence, the extent to which mothers are available to support their children; respect for autonomy, the extent to which mothers allow their children to explore their environment without blocking their goals; and hostility, the extent to which mothers display negative or harsh behavior. At 6 and 15 months, a composite score of maternal sensitivity was created from the sum of sensitivity to non-distress, intrusiveness

(reversed), and positive regard. At 36 months, sensitivity was the sum of supportive presence, respect for autonomy, and hostility (reversed). Inter-rater reliability was calculated based on 20% of cases being double-coded by separate raters and ranged from .72 to .87 over the three time points. Cronbach's alphas for the maternal sensitivity composites were .75, .70, and .78 at 6, 15, and 36 months, respectively.

Cognitive stimulation. The HOME Inventory (Caldwell & Bradley, 1984) was used to assess cognitive stimulation at 6, 15, and 36 months. At 6 and 15 months, the Infant-Toddler version of the HOME Inventory was used, and at 36 months the Early Childhood version was used. Raters were trained at a central location and were allowed to collect data only after being certified. To create a measure of cognitive stimulation in the home, 21 items at 6 and 15 months and 23 items at 36 months from the HOME Inventory were used to create a composite. The composite includes items that measured the availability of toys and learning materials, direct attempts by mothers to teach skills and concepts, and outings to places and events that provide enrichment. Inter-rater agreement was calculated from videotaped and live coding assessments every three months during data collection and was greater than 90% at each time point with a master coder. Reliability was calculated by Cronbach's alphas for the cognitive stimulation composites and were .75, .70, and .74 at 6, 15, and 36 months, respectively.

Maternal education. Mothers reported on their number of years of education during the 1-month visit. For purpose of analyses, years of education was divided into three groups. Mothers with a HS diploma or less were coded as 1, mothers with some

college (i.e., 14 years of education) were coded as 2, and mothers with a 4 year degree or more were coded as 3.

Maternal income. Mothers reported on family income during each time point. In order to capture income relative to family size, an income-to-needs ratio was used. The income-to-needs ratio was computed as total family income (including government payments) divided by the appropriate poverty threshold for each household size for that year (U.S. Department of Labor, 1994). Higher scores indicate greater financial resources in the household. Income was reported at 6, 15, 24, and 36 months. For purpose of analyses, income-to-needs was divided into two groups. Mothers with an income-to-needs of a 2.0 or less (i.e., low-income) were coded as 1 and mothers with an income-to-needs of 2.0 or more (i.e., middle/upper-income) were coded as 0. Income at 24 months was only used to create the cumulative income variable. At 24 months, 29% of mothers had low-income.

Maternal partner status. At each time point, mothers reported if they had a husband or partner residing in the home. Partner status was coded as 0 if a partner lived in the home and 1 if there was no partner in the home.

Covariates

Covariates were selected as controls in the subsequent analyses because previous research has indicated that maternal age, minority status, depressive symptoms, and child sex were significantly associated with maternal behavior (NICHD, 1999b).

Demographics. *Maternal minority status* was reported at the 1 month home visit and was dichotomized as European American (0) and non-European American (1), and *maternal age* were reported during the 1-month visit.

Maternal depressive symptoms were measured at 6, 15, and 36 months using the Center for Epidemiological Studies Depression Scale (CES–D; Radloff, 1977). The CES–D is a self-report designed to measure symptoms of depression in nonclinical populations. Mothers rated the frequency of 20 symptoms during the past week on a scale from 0 (rarely or none of the time) to 3 (most or all of the time). Cronbach’s alphas across the three data collection points ranged from .88 to .91. The depression scores had moderately strong correlations over time (.46 - .58).

CHAPTER IV

RESULTS

Hypothesis Testing

Analysis Plan

Data analysis proceeded in several steps. Descriptive statistics for outcome variables were calculated and are shown in *Table 2*. Next, mothers' minority status, age, and depressive symptoms (at each time point), and child sex were examined as potential covariates. Simple correlations were calculated between mothers' age and depressive symptoms and all predictor and outcome variables and are presented in *Table 3*. Both maternal age and depressive symptoms were significantly associated in the expected directions with all predictor and outcome variables at each time point. That is, older mothers and those with fewer depressive symptoms engaged in more sensitive and cognitively stimulating behavior at each time point. Independent *t*-tests and chi squares were conducted to examine if there were mean differences in predictor or outcome variables based on maternal minority status and child sex. Results indicated that European American mothers had higher education and income, and were rated higher on sensitivity and cognitive stimulation than minority mothers (*Table 4*). European American mothers were less likely to have no partner living in the home than minority mothers at 6, $\chi^2(1, N = 1279) = 123.95, p < .001$, 15, $\chi^2(1, N = 1243) = 133.18, p < .001$, and 36 months, $\chi^2(1, N = 1216) = 65.62, p < .001$. Furthermore, mothers of male children

were rated significantly less sensitive and cognitively stimulating at 15 and 36 months than mothers of female children (*Table 5*). Thus, maternal age, minority status, depressive symptoms at each time point, and child sex were controlled in subsequent analyses.

In order to examine mean differences in maternal sensitivity and cognitive stimulation based on maternal education, income, and partner status, a series of analyses of covariance (ANCOVA) were conducted. In all analyses, maternal sensitivity and cognitive stimulation at each age were examined separately as dependent variables, and maternal age, minority status, depressive symptoms (assessed at the same time as the dependent variable), and child sex were covariates. To test the main effects hypotheses, only main effects of maternal education, income, and partner status were entered into the model. To test the interaction hypotheses, a series of six 3 (maternal education) X 2 (income) X 2 (partner status) factorial ANCOVAs were run. Following procedures outlined by Nelder (1977), first all two-way interactions were entered as the full model. Then non-significant interactions were dropped from the full model, and significant interactions were retained to reach the final model. In cases in which no interactions were significant in the full model, each interaction was tested in separate models one by one to ensure they were not significant in reduced models. Results from final models only are tabled. Two-way interactions between maternal education, income, and partner status were tested, but the three-way interaction between education, income, and partner status was not tested in the models given the resulting small and unequal cell sizes. Post-hoc group comparisons were conducted by creating a single variable that represented the

group mothers were in based on both education and income (e.g., low-income mothers with a HS diploma or less, low-income mothers with some college, etc) or education and partner status (e.g., single mothers with a HS diploma or less). This variable was then entered as the independent variable in a series of ANCOVAs in which the relevant covariates were entered and Bonferroni post hoc comparisons were calculated between all pairs of groups. Although all possible comparisons were tested, only differences that were hypothesized are discussed. Results are presented separately for sensitivity and cognitive stimulation at 6, 15, and 36 months below.

Six Month Analyses

Main effects model for maternal sensitivity. Results for the ANCOVA in relation to six month maternal sensitivity are illustrated in *Table 6*. There was a significant main effect of maternal education on maternal sensitivity. All groups were significantly different from one another. Mothers with a HS diploma or less were significantly less sensitive ($M = 8.42$, $SE = .10$, $n = 374$) than mothers with some college ($M = 9.12$, $SE = .10$, $n = 417$) or a 4 year degree or more ($M = 9.72$, $SE = .10$, $n = 456$). There was also a main effect of income on maternal sensitivity, such that low-income mothers ($M = 8.96$, $SE = .10$, $n = 373$) were significantly less sensitive than middle/upper income mothers ($M = 9.21$, $SE = .09$, $n = 874$). There was no main effect of partner status. All main effects were consistent with the hypotheses.

Final model for maternal sensitivity. There were no significant two-way interactions between any variables on sensitivity at 6 months. Therefore, the main effects model is the final model.

Main effects model for cognitive stimulation. There was a significant main effect of maternal education on cognitive stimulation at six months (*Table 7*). All groups were significantly different from one another. Mothers with a HS diploma or less were significantly less cognitively stimulating ($M = 6.95, SE = .08, n = 376$) than mothers with some college ($M = 7.46, SE = .10, n = 421$) or a 4 year degree or more ($M = 7.81, SE = .21, n = 458$). There was a main effect of income, such that low-income mothers ($M = 7.29, SE = .07, n = 377$) were significantly less cognitively stimulating than middle/upper income mothers ($M = 7.49, SE = .08, n = 878$). There was also a main effect for partner status. Mothers who were single ($M = 7.23, SE = .11, n = 175$) were significantly less cognitively stimulating than mothers who were partnered ($M = 7.55, SE = .05, n = 1080$). All main effects were consistent with the hypotheses.

Final model for cognitive stimulation. There were no significant two-way interactions between any variables on cognitive stimulation at 6 months. Therefore, the main effects model is the final model.

Fifteen Month Analyses

Main effects model for maternal sensitivity. There was a significant main effect of education, $F(2, 1203) = 21.86, p < .001, \eta_p^2 = .035$, such that all groups significantly differed from one another. Mothers with a HS diploma or less were less sensitive ($M = 8.75, SE = .10, n = 356$) than mothers with some college ($M = 9.21, SE = .09, n = 413$) or a 4 year degree or more ($M = 9.60, SE = .09, n = 443$). There was a significant main effect of income, $F(2, 1203) = 21.86, p < .001, \eta_p^2 = .013$, such that low-income mothers ($M = 8.97, SE = .09, n = 389$) were significantly less sensitive than middle/upper income

mothers ($M = 9.41$, $SE = .08$, $n = 823$). There was also a main effect of partner status, $F(1, 1246) = 7.19$, $p < .01$, $\eta_p^2 = .004$. Mothers who were single ($M = 9.04$, $SE = .12$, $n = 177$) were significantly less sensitive than mothers who were partnered ($M = 9.33$, $SE = .05$, $n = 1035$). All main effects were consistent with the hypotheses. However, these main effects were qualified by interactions as described below.

Final model for maternal sensitivity. The final model for maternal sensitivity at 15 months included an education by income and an education by partner status interaction (*Table 8*). For the education by income interaction (*Figure 1*), differences in maternal sensitivity based on education were slightly larger among middle/upper income mothers (d ranged from .20 to .43, $M = .29$) than low-income mothers (d ranged from 0 to .37, $M = .24$) which was inconsistent with prediction. The pattern of education group differences in maternal sensitivity varied for low-income and middle/upper income mothers in that low-income mothers who completed some college were rated more sensitive than low-income mothers with a HS diploma or less. This difference was not apparent among middle/upper income mothers. Finally, low-income mothers with a HS diploma or less were less sensitive and middle/upper income mothers with college degree or more were more sensitive than all other groups other than the very small group of low-income mothers with a 4 year degree or more, primarily consistent with the hypotheses.

There was also a significant interaction between partner status and education on maternal sensitivity (*Figure 2*). Among single mothers, maternal sensitivity did not vary across education groups (d ranged from .01 to .04, $M = .02$). In contrast, among partnered mothers, all education groups were significantly different from one another, such that

more educated mothers were rated as more sensitive when compared to mothers with less education (d ranged from .22 to .56, $M = .38$). Additionally, partnered mothers with a 4 year degree or more were rated as significantly more sensitive than all other groups except the very small group of single mothers with a 4 year degree or more. Contrary to prediction, maternal education did not buffer mothers from the negative effect of single partner status on maternal sensitivity.

Main effects model for cognitive stimulation. There was a significant main effect of maternal education on cognitive stimulation at 15 months, $F(2, 1197) = 28.25, p < .001, \eta_p^2 = .045$. All groups were significantly different from one another. Mothers with a HS diploma or less were significantly less cognitively stimulating ($M = 7.80, SE = .07, n = 352$) than mothers with some college ($M = 8.27, SE = .07, n = 411$) or a 4 year degree or higher ($M = 8.53, SE = .07, n = 443$). There was a main effect of income, $F(1, 1197) = 10.91, p < .01, \eta_p^2 = .009$, such that low-income mothers ($M = 8.06, SE = .07, n = 385$) were significantly less cognitively stimulating than middle/upper income mothers ($M = 8.34, SE = .06, n = 821$). Additionally, there was a main effect for partner status in relation to cognitive stimulation at 15 months, $F(1, 1197) = 9.97, p < .01, \eta_p^2 = .008$. Single mothers ($M = 8.04, SE = .09, n = 175$) were less cognitively stimulating than partnered mothers ($M = 8.37, SE = .04, n = 1031$). All main effects were consistent with the hypotheses. However, the main effects of education and income were qualified by their interaction as described below.

Final model for cognitive stimulation. The final model for cognitive stimulation included an education by income interaction (*Table 9*). Follow-up group comparisons

revealed that the effects of education vary based on income, such that education group differences were larger among low-income mothers (d ranged from .45 to .93, $M = .64$) than middle/upper income mothers (d ranged from .19 to .37, $M = .25$; *Figure 3*). Specifically, among low-income mothers, women with some college or a 4 year degree or more were significantly more cognitively stimulating than women with a HS diploma or less, but did not significantly differ from one another. Among middle/upper income mothers, women with a 4 year degree or more were significantly more cognitively stimulating than mothers with some college or less. Furthermore, mothers with low income and a HS diploma or less were rated as less cognitively stimulating when compared to all other groups of mothers. Consistent with prediction, education appeared to buffer mothers from the negative effect of low income on cognitive stimulation, as low-income mothers with a four year degree or more were not significantly different than middle/upper income mothers with a 4 year degree or more.

Thirty-Six Month Analyses

Main effects model for maternal sensitivity. There was a significant main effect of education, $F(2, 1103) = 23.07, p < .001, \eta_p^2 = .040$, such that all groups significantly differed from one another. Mothers with a HS diploma or less were less sensitive ($M = 16.06, SE = .16, n = 327$) than mothers with some college ($M = 16.92, SE = .14, n = 368$) or a 4 year degree or more ($M = 17.51, SE = .15, n = 427$). There was a significant main effect of income, $F(1, 1113) = 11.95, p < .01, \eta_p^2 = .011$, such that low-income mothers ($M = 16.50, SE = .14, n = 360$) were significantly less sensitive than middle/upper income mothers ($M = 17.15, SE = .13, n = 762$). There was also a main effect for partner status,

$F(1, 1113) = 9.93, p < .01, \eta_p^2 = .009$. Single mothers were significantly less sensitive ($M = 16.48, SE = .19, n = 182$) than partnered mothers ($M = 17.17, SE = .09, n = 940$). All main effects were consistent with the hypotheses. These main effects were qualified by interactions as described below.

Final model for maternal sensitivity. The final model included an education by income interaction and an income by partner status interaction (*Table 10*). For the education and income interaction, differences in maternal sensitivity based on education were larger among low-income mothers (d ranged from .32 to .86, $M = .59$) than middle/upper income mothers (d ranged from .16 to .42, $M = .29$; *Figure 4*). Among low-income mothers, the three education groups differed from one another, with more educated mothers being rated as more sensitive when compared to mothers with less education. Among middle/upper income mothers, only women with a HS diploma or less were rated as significantly less sensitive than the other groups. Additionally, mothers who were low-income and had a HS diploma or less were rated as less sensitive when compared to all other groups of mothers. Also, there were no significant group differences between low-income mothers with a 4 year degree or more and middle/upper income mothers with a 4 year degree or more, indicating a protective effect of education among low-income mothers as predicted.

There was also a significant interaction between partner status and income. Among single mothers, maternal sensitivity did not vary based on income ($d = .01$), but sensitivity did vary based on income among partnered mothers ($d = .23$). As illustrated in

Figure 5, middle/upper income partnered mothers were significantly more sensitive than all other groups, and the other groups did not differ from one another.

Main effects model for cognitive stimulation. There was a significant main effect of maternal education on cognitive stimulation at 15 months, $F(2, 1135) = 69.85, p < .001, \eta_p^2 = .110$. All groups were significantly different from one another. Mothers with a HS diploma or less were significantly less cognitively stimulating ($M = 6.74, SE = .11, n = 334$) than mothers with some college ($M = 7.88, SE = .10, n = 379$) or a 4 year degree or more ($M = 8.54, SE = .11, n = 431$). There was a main effect of income, $F(1, 1135) = 19.95, p < .001, \eta_p^2 = .017$, such that low-income mothers ($M = 8.02, SE = .09, n = 367$) were significantly less cognitively stimulating than middle/upper income mothers ($M = 8.34, SE = .06, n = 777$). Additionally, there was a main effect of partner status in relation to cognitive stimulation at 15 months, $F(1, 1135) = 13.14, p < .001, \eta_p^2 = .011$. Single mothers ($M = 7.44, SE = .13, n = 190$) were less cognitively stimulating than partnered mothers ($M = 8.00, SE = .06, n = 954$). All main effects were consistent with the hypotheses. However, the main effects of income and partner status were qualified by their interaction as described below.

Final model for cognitive stimulation. There was a significant interaction between education and partner status (Table 11). However, this significant interaction was only present when the education by income and income by partner status interactions were included in the model, although they were not significant. This indicates a suppressor effect. Therefore, the full model was retained as the final model. The effect of education varied based on partner status (Figure 6). Among single mothers (d ranged from .38 to

1.14, $M = .78$), women with a 4 year degree or more were rated as more cognitively stimulating than both mothers with some college and mothers with a HS diploma or less. Among partnered mothers (d ranged from .29 to .93, $M = .64$), all groups of education were significantly different, such that mothers who had more education were rated as more cognitively stimulating than mothers with less education. Furthermore, there were no significant group differences between single mothers with a 4 year degree or more and partnered mothers with a 4 year degree or more on cognitive stimulation indicating a protective effect of education among single mothers as predicted. There were no main effects for income and no significant interaction between income and education or income and partner status.

Summary of Primary Analyses

A summary of findings across assessment points appears in *Table 12*. Consistent with the hypotheses, when only considering main effects, differences in maternal behavior based on education were larger than differences based on income or partner status. However, the primary goal of this study was to examine the interactive effects of socio-demographic factors in relation to maternal behavior; and main effects were often qualified by significant interactions. The interaction between education and income was significant in 3 out of 6 analyses, and in 2 out of these 3 cases differences in maternal behavior based on education were larger for low-income mothers than middle/upper income mothers, consistent with prediction. Three out of five main effects for partner status were qualified by interactions with either education or income, but the nature of these interactions varied depending on which type of maternal behavior was the outcome

variable. There were no education level differences in sensitivity among single mothers. In contrast, there were education level differences in cognitive stimulation among single mothers. Partnered mothers benefited from higher education for both outcomes. For the income by partner status interaction, there were no differences in sensitivity based on income for single mothers, but there were among partnered mothers.

Secondary Analyses

Education and Partner Status for Low-Income Mothers

In order to examine the joint effect of maternal education and partner status on maternal sensitivity and cognitive stimulation among low-income women, 2 (education) X 2 (partner status) factorial ANCOVA analyses were conducted for only low-income mothers. Given the small number of low-income, single mothers with a 4 year degree or more, the some college and 4 year degree groups were combined, resulting in two education groups: HS diploma or less and some college or more. Elements of these results replicate results reported above. That is, main effects of education and partner status among low-income mothers were presented above when interactions between income and either education or partner status were probed. Thus, only the statistics regarding interactions between partner status and education are presented below. Interaction effects were found for maternal sensitivity at 15 months and for cognitive stimulation at 36 months.

At 15 months, there was a significant interaction between education and partner status (*Table 13*). Differences based on education were larger for partnered mothers ($d =$

.53) than single mothers ($d = .03$; *Figure 7*). Also, partnered mothers with a HS degree or less were significantly less sensitive than partnered mothers with some college or more.

At 36 months, there was a significant main effect of maternal education and partner status on cognitive stimulation, but these main effects were qualified by an interaction (*Table 14*). Group differences based on education were larger among partnered mothers ($d = .89$) than single mothers ($d = .38$; *Figure 8*). Mothers who were partnered and had some college or more were more cognitively stimulating than all other groups of mothers.

In sum, among low-income women, an interaction effect between education and partner status was only apparent in 2 out of 6 analyses. In both cases, differences in maternal behavior based on education were larger for partnered mothers than single mothers. Thus, the hypothesis that differences based on education would be larger among the most at-risk women was not supported.

Cumulative Income Analyses

In order to examine cumulative income status, a 2 (education) X 5 (number of times low income) factorial ANCOVA was conducted. Maternal education was examined as a dichotomous variable (HS and less and some college or more) because some of the group sizes in a 2 X 5 factorial ANCOVA were so small. The cumulative income variable was created by summing the number of data collection points (out of 4: 6, 15, 24, and 36 months) a family's income-to-needs ratio was below 2.0. This variable ranged from never low income (0) to always low income (4). The model included maternal age, ethnicity, and depressive symptoms and partner status at 36 months, and child sex as covariates.

Next, maternal education and cumulative income were entered as main effects. Finally, the two-way interaction between maternal education and cumulative income was entered to examine if differences in maternal behavior based on education were larger depending on the chronicity of low-income status. Maternal sensitivity and cognitive stimulation were entered and run as separate dependent variables in the model. Sensitivity and cognitive stimulation were only examined as 36 month outcomes because number of times poor was calculated to include the 36 month assessment.

Maternal Sensitivity at 36 Months

Results indicate that there were significant main effects for education and cumulative income on maternal sensitivity at 36 months (*Table 15*). There were no significant interactions at the traditional $p < .05$ level; however, there was an interaction between education and cumulative income at the trend level ($p = .06$). Follow-up tests were conducted to examine if there were differences based on education depending on how many times mothers' experienced low income. Sensitivity varied based on education for all groups of mothers except those who were in the low-income category at all four time points (*Figure 9*). In other words, among the most chronically low-income mothers, education did not have a positive effect on sensitivity, whereas higher education did have a positive effect on sensitivity for women who experienced low income never or sometimes.

Cognitive Stimulation at 36 Months

Results indicate that there was a significant main effect of education and cumulative income on cognitive stimulation at 36 months (*Table 16*). For maternal

education, mothers who had some college or more provided significantly more cognitive stimulation ($M = 8.10$, $SE = .10$, $n = 825$) than mothers who had a HS diploma or less ($M = 6.77$, $SE = .11$, $n = 345$). For income, post-hoc analyses revealed that there were significant group differences between mothers who were never in the low income category ($M = 7.94$, $SE = .13$, $n = 639$) and mothers who were in the low income category 3 ($M = 7.18$, $SE = .16$, $n = 134$) or 4 times ($M = 7.02$, $SE = .16$, $n = 147$). In other words, mothers who frequently experienced low income were less likely to be cognitively stimulating than those who never experienced low income. There was no significant interaction between education and cumulative income on cognitive stimulation at 36 months.

CHAPTER V

DISCUSSION

Previous research clearly demonstrates that lower socioeconomic status is linked with compromised parenting (Bornstein & Bradley, 2003; Bradley & Corwyn, 2002; McLoyd 1990). However, prior studies often rely on SES composites, obscuring important information about the relative influence of specific socio-demographic characteristics on early parenting (Bornstein & Bradley, 2003; Hoff et al., 2002). In most studies that have included education and income levels as separate indicators, their potential interactive effects have not been examined. Thus, the primary goal of this study was to examine group differences in sensitivity and cognitive stimulation based on education for low- versus middle/upper income mothers and single versus partnered mothers. Additionally, follow-up analyses examined group differences on maternal behavior based on education for single versus partnered mothers among low-income mothers and as a function of cumulative income.

Primary Analyses

The Relation of Education and Income to Maternal Behavior

Overall, the analyses showed main effects for education and income on maternal sensitivity and cognitive stimulation, a result that was consistent with expectation. More educated and higher income mothers were rated significantly more sensitive and more

cognitively stimulating in all of the main effect analyses. The effect size for differences in maternal behavior based on maternal education across children's first three years of life was consistently higher than the effect size for income, consistent with prior research (Klebenov et al., 1994; White, 1982). The larger effect size for education may be the result of the broader skills and knowledge base that a higher education provides mothers. Specifically, education may enhance positive maternal behavior because maternal education promotes mothers' flexible thinking, ability to meet demands, and child-oriented beliefs and goals (Dix, 1991; Dix et al., 2004; Fonagy et al., 1991; Koren-Karie et al., 2002; Luster et al., 1989). Mothers with higher levels of education may seek out information about parenting and their children's development which enhances parenting quality (Bornstein et al., 2010; Grusec, 2006). More highly educated mothers may respond more sensitively because they recognize the importance of and value their children's emotional experiences (Dix, 1991; Dix, et al., 2004; Hastings & Ruben, 1999) and respond in ways that promote children's emotional needs. Additionally, more highly educated mothers are likely to value children's learning experiences and intellectual development (Kohn, 1963; Luster et al., 1989).

However, the main effects of education and income on maternal behavior were qualified by interactions during the second and third year of life. The hypothesized interaction between education and income was primarily consistent with the prediction that education-based differences in maternal behavior would be larger among low-income women than middle/upper income women. Results indicate that the effect of education on sensitivity (at 36 months) and cognitive stimulation (at 15 months) was nearly twice as

large among low-income mothers when compared to middle/upper income mothers. Higher education may be a particularly salient resource to mothers who have low-income and experience stress in their ability to meet their family's needs. It may be that the broader beliefs and value system associated with higher education, which is associated with more child-oriented and sensitive maternal behavior, exerts its strongest effects when mothers have other socio-demographic risks (Fox, Platz, & Bentley, 1995). Also, the social and human capital that is associated with higher levels of education may be particularly important to low-income mothers because these factors are associated with feelings of increased efficacy and decreased depressive symptoms, which can further help mothers respond sensitively and in enriching ways with their children (Bradley & Corwyn, 2002; Hess, Teti, Hussey-Gardner, 2004; Jackson et al., 2009).

Furthermore, that low-income mothers with some college education were significantly more sensitive than their less well educated counterparts indicates that relatively small incremental increases in education can enhance parenting behavior among low-income mothers. Previous research that has examined changes in maternal education during children's early years supports this idea (Magnuson et al., 2009). Specifically, education had the strongest effect on parenting among mothers who initially had the lowest levels of education and even relatively small incremental increases in maternal education were associated with increases in mothers' responsiveness and provision of more stimulating materials. It may be that even having some education beyond high school is related to more positive parenting among mothers who are facing other socio-demographic risks, such as low income because even short-term exposure to

higher education provides mothers with experiences in meeting multiple demands in diverse contexts and exposes them to sources of knowledge and information that may influence parenting (Bornstein et al., 2010).

The interaction effects indicate that education sometimes buffers mothers from the negative effect of low income, and it is important to understand this relationship to further enhance positive parenting practices. That low-income women with a 4 year degree or more were generally rated equally sensitive and cognitively stimulating as middle/upper income women with at least some college or more suggests that a college degree or the experience accrued while completing a four year college degree may be a resource to mothers who have low-income. That the experience of higher education among low-income mothers is especially important in relation to maternal behavior is of interest because previous research indicates that low-income mothers demonstrate less positive maternal behavior to their children, above the effect of education (Linver et al., 2002; Yeung et al., 2002). Consistent with a family stress perspective, the experiences and skills post-secondary education provides low-income mothers may be particularly important resources when stress in other socio-demographic factors are experienced. Experiences with higher education may help mothers to find resources or seek knowledge about available services to help meet life and family demands, buffering low-income mothers from the negative effect of income in relation to parenting (Bornstein et al., 2010; Grusec, 2006). Likewise, these mothers may be more likely to seek social and instrumental support from other resources and extended networks which may further help

mothers to meet family demands by being able to rely on others for help or emotional support when feeling stressed (Cohen & Wills, 1985).

Also apparent from the primary analyses, mothers facing the least risk were, in most cases, rated the most sensitive and cognitively stimulating, a pattern that is consistent with prior research and theoretical perspectives (Bronfenbrenner & Morris, 1998; Conger et al., 2002; Hill, 1949). Specifically, when mothers have both higher education and middle/upper income they have the necessary resources that enable them to more easily meet the economic and emotional demands that parenting and family life require. Likewise, mothers at the most risk by virtue of simultaneous low education and low income were generally rated the least sensitive and cognitively stimulating. This finding is concerning but also reflective of the reality that mothers with low income and low education face the most challenges as parents of young children. Consistent with previous research (Bradley & Corwyn, 2002; McLoyd, 1990) and family stress theory (Hill, 1949; Conger et al., 2002), this finding indicates that parenting quality is compromised when mothers face risk with respect to more than one socio-demographic factor.

The education and income interactions may be particularly informative to research that conceptualizes socioeconomic status by using only one socio-demographic indicator or a composite measure, and indicates why research also needs to consider education in studies that examine socioeconomic status in relation to parenting (White, 1982; Bornstein et al., 2003; Hoff et al., 2002). Education needs to be accounted for as a socio-demographic indicator along with income because examining only main effects

may mask important relations when both indicators are considered together (Hoff et al., 2002). That is, previous research indicates that as main effects, lower levels of income and education are associated with less positive parenting practices and ignores the fact that among low-income mothers, there is a group of more educated mothers that is doing significantly better when compared to other low-income mothers. Researchers may miss important variations in maternal behavior when only income is examined, and education also needs to be accounted for when examining socioeconomic factors in relation to parenting (Bornstein & Bradley, 2003; Hoff et al., 2002).

The Relation of Partner Status, Education, and Income to Maternal Behavior

Partner status was linked with maternal sensitivity and cognitive stimulation at all three time points. As a main effect, partnered mothers were more sensitive and cognitively stimulating than single mothers, but this main effect was qualified by interactions with education and income. The significant interactions were mostly inconsistent with the hypotheses. When sensitivity was the outcome, differences based on education and income were larger among partnered mothers than single mothers. When cognitive stimulation was the outcome, differences based on education were larger among single mothers, as predicted.

There was the predicted effect of education and income in relation to cognitive stimulation among single mothers. Previous research indicates that higher levels of maternal education are associated with mothers' beliefs and values for their children's learning experiences (Kohn, 1963; Luster et al., 1989) and these results indicate that higher levels of education are associated with more cognitive stimulation even when

mothers have low income. That maternal education is particularly important in relation to cognitive stimulation among single mothers, but does not have the same buffering effect for maternal sensitivity may be because it is primarily the interactive quality, or more specifically the emotional aspects of the interaction, that is affected by single mother-related stress (e.g., depression, anxiety, lower maternal efficacy) and this stress undermines mothers' ability to respond to children's emotional needs, a key feature of sensitivity, more so than their basic developmental need for stimulation. Specifically, the day-to-day demands for parenting and running family life as a single parent, particularly during the toddler phase when there is a normative increase in mother-child conflict and decrease in parenting satisfaction, may overwhelm even mothers with higher education, who value and try to respond sensitively to their children's emotional needs (Dix et al., 2004; Fonagy et al., 1991; Stoneman, Brody, & Burke, 1989). Therefore mothers may not benefit from the positive effects of education when faced with the socio-demographic risk of single partner status. If this is the case, it may take many more supports to buffer mothers from negative effects of single mother status on sensitivity than on cognitive stimulation. Specifically, it may be that single mothers need additional social and instrumental support to help meet the emotional demands of parenting in addition to economic demands (Cooper et al., 2009; Hilton & Desrochers, 2000; Shook et al., 2010).

Follow-up Analyses

The secondary analyses were designed to address two issues. The first was to examine the joint effect of education and partner status on maternal behavior among low-income women. In the reduced sample of only low-income women, the interaction

between education and partner status was significant only for sensitivity at 15 months and cognitive stimulation at 36 months. In both cases, there was no difference in maternal behavior based on education among low-income single mothers, but there was among low-income partnered mothers. This pattern is inconsistent with the hypothesis that maternal education would have the greatest effect on maternal behavior among the most at-risk mothers. It may be that mothers who face multiple sources of socio-demographic risk do not benefit from the protective effect of higher levels of education because the stress experienced from these other socio-demographic factors outweighs the benefits that maternal education affords to mothers (Bradley & Corwyn, 2002; McLoyd, 2004; 1990). That education does act as a buffer against the negative effect of low income for partnered mothers, further indicates the buffering effect of education depends on the nature and presence other socio-demographic factors (Bornstein et al., 2002; Fox et al., 1995; Reed, Habicht, & Niameogo, 1996). Specifically, the positive effect of education on maternal behavior is present when low-income is the socio-demographic risk that is considered, but not when partner status is considered. Consistent with previous research, it may be that the effect of education matters more for low-income mothers, but additional socio-demographic stressors that are experienced attenuate the positive effect of education on maternal behavior (Fox et al., 1995; McLoyd, 1990; Reed et al., 1996).

The second goal of the follow-up analyses was to examine the relation of education and the chronicity of low income on maternal behavior at 36 months. Results indicate that there were significant main effects for education and cumulative income for sensitivity and cognitive stimulation. Mothers with some college or more were

significantly more sensitive and cognitively stimulating than mothers with a HS education, as predicted. The effect of income differed for sensitivity and cognitive stimulation. Specifically, mothers who experienced low income more consistently (i.e., 3 or 4 times) were rated as significantly less cognitively stimulating than mothers who never experienced low income. For maternal sensitivity, there was a significant interaction between maternal education and cumulative income, such that differences based on education were larger for mothers who experienced low income 3 times or less, but not for mothers who consistently experienced low income. This is consistent with previous research that mothers who experienced low-income more often are the least sensitive and cognitively stimulating (Brooks-Gunn & Duncan, 1997; NICHD, 2005).

The cumulative income analysis was also interested in whether the chronicity of poverty had a different effect on maternal behavior at 36 months than did concurrent poverty at 36 months. There appears to be some evidence that it does. Specifically, there was no main effect of concurrent poverty on cognitive stimulation at 36 months, but there was a main effect of the chronicity of poverty that demonstrated that mothers who were consistently low income (i.e., low-income at all 4 time points) were less sensitive than mothers who were intermittently in the low-income category. Additionally, the nature of the interaction between income and education on maternal sensitivity at 36 months varied depending on whether the concurrent or cumulative measure of low income was used. When the concurrent measure of income was used, there was evidence that education had a positive effect on maternal sensitivity among low-income women. However, the cumulative income analyses suggest that this is only the case among women who

experience low income intermittently (1, 2, 3 times), but not among women who experienced low income at every time point. In other words, education did not have a positive effect on maternal behavior at 36 months among women who experienced the most persistent/chronic income pressures. This finding is consistent with previous research (Bradley & Corwyn, 2002; NICHD, 2005) and theoretical perspectives (Conger et al., 2002; Hill, 1949) that mothers who experience low-income over time may need additional supports to help buffer them from the negative effects of chronic low-income.

Patterns of Effects Over Time

A similar pattern of effects was expected across time points given evidence that maternal sensitivity and cognitive stimulation are stable across infancy (Dallaire & Weinraub, 2005). However, one difference did emerge in the pattern of findings across time points. There were no significant interactions between any variables at 6 months. It may be that the effect of education on maternal behavior is not contingent upon other socio-demographic factors during early infancy because the benefits that education provides, such as feelings of increased maternal efficacy, are more salient during this early developmental period (Teti et al., 1991).

Summary of Findings

As predicted, less educated mothers, low-income mothers, and single mothers were rated less sensitive and cognitively stimulating than higher educated mothers, middle/upper income mothers, and partnered mothers, respectively. Differences in maternal behavior were greater based on education than either income or partner status. Moreover, maternal behavior varied based on interactions between education, income,

and partner status. Although the hypotheses regarding these interactions were not fully supported, the results are consistent with prior research and the family stress perspective (Bradley & Corwyn, 2002; Conger et al., 2002; Hill, 1949; McLoyd, 1990). Specifically, as stress accumulates either over time (chronicity of low-income) or by virtue of the number of stressors within a time point being higher for some mothers than others (having low-income and being a single mother), education has less of a positive effect on maternal sensitivity and cognitive stimulation. That is, among the mothers who face the most risk, the positive effects of education on maternal behavior disappear. It may be that in the face of cumulative or multiple risk factors, mothers need additional support to buffer the negative effects of socio-demographic stressors.

Strengths and Limitations

A limitation in this study is that there is no measure of overall life stress or perception of stress available at all three time points in the analyses. Stress is not measured in this study, but rather, lower education, income, and single partner status are socio-demographic factors which serve as proxies for stressors in mothers' lives. A direct measure of stress that mothers experienced would help researchers to further understand how socio-demographic characteristics and maternal behavior are linked, and the mechanisms through which specific socio-demographic aspects are related to parenting.

Although the overall sample size in the NICHD SECCYD is large, once families are broken down by income, education, and partner status, some group sizes were quite small. First, this limits the ability to test higher-order interactions between education, income, and partner status because, for example, the group of single, low-income mothers

with a 4 year degree or higher is too small to test for mean differences in comparison to the other groups. Even in the current analysis, some groups in the 2 X 3 interaction are relatively small and there is limited power to detect significant effects. Furthermore, it is difficult to generalize findings based on small groups of mothers to the larger population. That is, results could be specific to the individuals in the sample rather than reflecting an effect in the population they are intended to represent. However, the distribution of mothers in this sample is reflective of the reality that there are relatively few single, low-income mothers with college degrees in the larger population.

A strength of this study is that the sample reflects the overall population at the time of recruitment with respect to key socio-demographic variables (NICHD, 1997). However, this was a community sample and was not specifically selected for economic risk. The joint effects of education and income may vary if a different threshold is used to indicate low-income families (e.g., income-to-needs less than 1.0). That is, education may have a stronger effect among families who are very low-income when compared to low-income. Specifically, if there was more variability of income in low-income samples, researchers may be able to test effects of education at a more detailed level.

Furthermore, the groups of single mothers in this study may vary in important ways that are unknown. Specifically, there may be important differences between mothers who are single by choice, always single, or newly separated and these reasons for single motherhood can have implications for parenting behavior (Cooper et al., 2009). For example, mothers who are recently separated may face more stress in learning how to balance the demands of a new family structure than mothers who are single by choice.

Likewise, mothers who are always single or do not have a parenting support may experience different demands and stressors than single mothers who have outside support (Shook et al., 2010).

Another limitation in this study is missing data. Specifically, not every participant who was originally enrolled in the study participated at every time point. Additionally, missing data can obscure the results for the cumulative income analysis. That is, the number of times a family is considered to have low income may not be truly represented if they participated in some, but not all, of the data collection points. For example, if participants were low-income during a period they did not provide data, the cumulative score could be artificially low.

Future Directions

An important future direction for this line of research is to examine mediators between specific socio-demographic factors and maternal behavior to identify the process by which maternal behavior is influenced. Identifying specific stressors that mothers encounter, such as overall life stress, parenting-related stress, or stress with regards to lack of social or emotional support, and then linking them to specific socio-demographic factors could further inform researchers as to what socio-demographic characteristics may act as resources or stressors and how they are related to parenting. This future direction could help to further inform researchers and policy makers in terms of how socio-demographic factors are related to parenting through the mechanism of stress and what resources may buffer mothers from the negative effects of other stressors. Likewise, future research should also examine other mediators between socio-demographic

characteristics and parenting. For example, examining maternal psychological characteristics could help researchers further understand how mothers' mental health hinders or helps parenting.

In line with this, future research should also examine other moderators that may support or buffer mothers from the negative effects of socio-demographic risks. For example, perhaps one goal of future research should be to identify the nature of supports, such as social, parenting, financial, and economic support that can help to promote positive parenting among the highest risk mothers. Likewise, examining such factors such as child care subsidies, access to affordable childcare, and high quality child care in relation to parenting behavior could help researchers and policy makers to better understand what government programs help to enhance maternal behavior. It may be that outside child care helps support mothers' ability to work and meet other demands and receipt of child care subsidies helps to relieve mothers of an additional financial strain.

Future work should also examine intervention studies that take an experimental approach to identify causality. For example, a study could examine increases in maternal education among low-income and middle/upper income mothers to identify if changes in maternal education are greater for low-income mothers. Likewise, randomized-control trials can examine the receipt of income supplements and other government subsidies to help identify a causal mechanism between middle/upper income and more positive parenting.

An important future direction is to design a study that oversamples mothers who have socio-demographic risk to examine the associations between education, income, and

partner status among larger groups of women that are often small in community samples. Obtaining sample sizes that are more equal in size will allow for further statistical testing to examine the relations of these important socioeconomic factors, as well as to have confidence that the results are indicative of relationships that occur in real life.

Policy Implications

The results of the present study can be used to inform policies that affect low-income families. That the results indicate a positive effect of post-secondary education in relation to maternal behavior emphasizes the importance of higher education in promoting positive parenting practices. Specifically, this may encourage policymakers to increase funding for education benefits for mothers trying to obtain higher education. That more educated mothers were buffered from the negative effect of low income in relation to maternal behavior further indicates that education subsidies should be made a priority to low-income families or individuals and families who may be on the welfare rolls. Government funding should provide low-income mothers with child care subsidies and income supplements while mothers are continuing their education. It may be that single mothers need more economic and instrumental support in order to meet family demands and promote positive parenting. That is, continuing to provide income supplements, food stamps, and other economic resources is important to help mothers meet the basic needs of their children and to alleviate the stress these mothers may face in being the sole provider of the household (Duncan & Brooks-Gunn, 2000).

Summary

The finding that there were greater differences in maternal behavior based on education among low-income mothers identifies education as an important factor in shaping maternal behavior and is informative to further understanding the influence of socio-demographic factors in relation to maternal behavior across the first three years of life. First, these results indicate the importance of measuring and understanding the influence of maternal education in relation to maternal behavior. Maternal education is a strong and consistent predictor of maternal sensitivity and cognitive stimulation during early childhood. The extent to which the effect of maternal education varies under different socioeconomic conditions begins to shift during toddlerhood. Education becomes more of a buffer against the negative effects of lower income and single partner status as children become toddlers. That education does not consistently buffer mothers from the risks associated with single partner status, as it does for low income status, indicates that income may not be as strongly related to maternal behavior as has often been thought. That is, it appears that other factors, such as education, can promote positive maternal behavior in the face of economic risk. Furthermore, the results indicate that when mothers face both low income and single partner status, education does not buffer against the negative effects of both risk variables in relation to maternal behavior. Overall, education is an important factor that buffers mothers from some aspect of socio-demographic risk, but not others, indicating a need to find additional buffers to support mothers facing multiple sources of socio-demographic risk.

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APPENDIX A.

TABLES AND FIGURES

Table 1. Sample Characteristics of Analytic Sample at 6, 15, and 36 Months

	6 Months			15 Months			36 Months		
	<i>N</i>	%	<i>M (SD)</i>	<i>N</i>	%	<i>M (SD)</i>	<i>N</i>	%	<i>M (SD)</i>
Maternal education									
HS or less	381	30.0		361	29.3		331	29.1	
Some College	424	33.4		413	33.6		375	33.0	
4 yr degree or more	466	36.7		456	37.1		432	38.0	
Maternal age	1271		28.34 (5.60)	1230		28.37 (5.58)	1138		28.45 (5.55)
Maternal minority status									
European American	1025	80.6		996	81.0		931	81.8	
Minority	246	19.4		234	19.0		207	18.2	
Mat depressive symp	1278		8.98 (8.34)	1241		9.05 (8.18)	1202		9.22 (8.31)
Child sex									
Male	657	51.7		630	51.2		585	51.4	
Female	614	48.3		600	48.8		553	48.6	
Partner status									
Partnered	1101	86.1		1060	85.3		1011	83.1	
Single	178	13.9		183	14.7		205	16.9	
Income-to-needs									
Under 2.0	377	30.0		390	32.1		389	32.7	
Above 2.0	879	70.0		826	67.9		799	67.3	

Table 2. Descriptive Statistics for Outcome Variables

	6 months			15 months			36 months		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Maternal sensitivity	9.21	1.78	1272	9.40	1.65	1240	17.19	2.78	1161
Cognitive stimulation	7.57	1.45	1279	8.40	1.30	1233	8.10	2.10	1179

Table 3. Correlations Between all Predictor and Outcome Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Maternal age	--																
2. Mat dep 6M	-.18	--															
3. Mat dep 15M	-.19	.58	--														
4. Mat dep 36M	-.20	.47	.50	--													
5. Mat education	.55	-.21	-.25	-.24	--												
6. Inc-to-needs 6M	.43	-.20	-.18	-.17	.50	--											
7. Inc-to-needs 15M	.42	-.21	-.21	-.17	.47	.83	--										
8. Inc-to-needs 36M	.42	-.18	-.17	-.21	.49	.76	.74	--									
9. Part status 6M	-.30	.19	.15	.16	-.28	-.32	-.29	-.25	--								
10. Part status 15M	-.32	.19	.19	.18	-.27	-.30	-.30	-.25	.79	--							
11. Part status 36M	-.32	.22	.18	.20	-.26	-.25	-.25	-.31	.57	.62	--						
12. Mat sens 6M	.29	-.14	-.13	-.12	<u>.40</u>	<u>.29</u>	<u>.28</u>	<u>.28</u>	<u>-.20</u>	<u>-.22</u>	<u>-.19</u>	--					
13. Mat sens 15M	.27	-.18	-.19	-.17	<u>.36</u>	<u>.28</u>	<u>.27</u>	<u>.25</u>	<u>-.29</u>	<u>-.26</u>	<u>-.23</u>	.39	--				
14. Mat sens 36M	.36	-.20	-.22	-.22	<u>.41</u>	<u>.29</u>	<u>.28</u>	<u>.31</u>	<u>-.26</u>	<u>-.29</u>	<u>-.23</u>	.42	.41	--			
15. Cog stim 6M	.32	-.19	-.17	-.15	<u>.39</u>	<u>.28</u>	<u>.29</u>	<u>.26</u>	<u>-.28</u>	<u>-.31</u>	<u>-.27</u>	.34	.33	.36	--		
16. Cog stim 15M	.32	-.23	-.24	-.21	<u>.39</u>	<u>.31</u>	<u>.30</u>	<u>.29</u>	<u>-.31</u>	<u>-.31</u>	<u>-.27</u>	.30	.32	.36	.54	--	
17. Cog stim 36M	.32	-.20	-.22	-.22	<u>.48</u>	<u>.35</u>	<u>.34</u>	<u>.35</u>	<u>-.29</u>	<u>-.31</u>	<u>-.30</u>	.34	.35	.40	.46	.55	--

Note: All correlations are significant at $p < .01$; Coefficients directly relevant to hypotheses are underlined.

Table 4. T-tests for Maternal Minority Status and all Predictor and Outcome Variables

	6 Months				15 Months				36 Months			
	Minority status		<i>t</i>	<i>df</i>	Minority status		<i>t</i>	<i>df</i>	Minority status		<i>t</i>	<i>df</i>
	European ^b	Minority			European	Minority			European	Minority		
Mat ed ^a	14.48 (2.54)	13.28 (2.17)	7.18*	1361								
Part status	0.09 (0.28)	0.36 (0.48)	11.71*	1277	0.09 (0.29)	0.38 (0.49)	12.20*	1241	0.13 (0.33)	0.35 (0.48)	8.32*	1214
Income	4.01 (3.23)	2.25 (1.94)	8.23*	1268	4.04 (3.35)	2.29 (2.06)	7.70*	1232	3.86 (3.12)	2.51 (2.46)	6.06*	1206
Mat sens	9.43 (1.48)	8.31 (1.81)	9.15*	1270	9.65 (1.48)	8.30 (1.87)	11.98*	1238	17.51 (2.55)	15.73 (3.25)	8.75*	1159
Cog stim	7.80 (1.26)	6.60 (1.75)	12.42*	1277	8.61 (1.06)	7.50 (1.74)	12.59*	1231	8.41 (1.92)	6.71 (2.27)	11.40*	1177

Note: ^a Maternal education measured at 1 month; ^b Values are means with standard deviations in parentheses; **p* < .001.

Table 5. T-tests for Child Sex and all Predictor and Outcome Variables

	6 Months				15 Months				36 Months			
	Child sex		<i>t</i>	<i>df</i>	Child sex		<i>t</i>	<i>df</i>	Child sex		<i>t</i>	<i>df</i>
	Male ^b	Female			Male	Female			Male	Female		
Mat ed ^a	14.15 (2.51)	14.33 (2.51)	1.34	1361								
Part status	0.13 (0.34)	0.14 (0.35)	0.48	1277	0.15 (0.36)	0.15 (0.35)	0.15	1241	0.16 (0.37)	0.17 (0.38)	0.36	1214
Income	3.56 (3.01)	3.77 (3.20)	1.21	1268	3.61 (3.31)	3.80 (3.11)	1.04	1232	3.44 (2.81)	3.79 (3.28)	2.01*	1232
Mat sens	9.15 (1.81)	9.28 (1.75)	1.25	1270	9.31 (1.64)	9.49 (1.65)	1.98*	1238	16.96 (2.89)	17.43 (2.64)	2.91*	1159
Cog stim	7.61 (1.45)	7.53 (1.44)	0.99	1277	8.38 (1.28)	8.42 (1.32)	0.53	1231	7.93 (2.04)	8.26 (2.14)	2.73	1177

Note: ^a Maternal education measured at 1 month; ^b Values are means with standard deviations in parentheses; * $p < .05$.

Table 6. Final ANCOVA Model on Maternal Sensitivity at 6 Months

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	η_p^2
Maternal age	7.46	1	7.46	2.91	.002
Maternal ethnicity	74.71	1	74.71	29.10*	.023
Child sex	3.25	1	3.25	1.26	.001
Mat dep symptoms	5.93	1	5.93	2.31	.002
Maternal education	231.47	2	115.73	45.07*	.068
Income-to-needs	10.72	1	10.72	4.18**	.003
Partner status	0.94	1	0.94	0.37	.000
Error	3178.78	1238	2.57		
Total	109804.00	1247			

Note: * $p < .001$; ** $p < .05$.

Table 7. Final ANCOVA Model on Cognitive Stimulation at 6 Months

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	η_p^2
Maternal age	14.70	1	14.70	9.16*	.007
Maternal ethnicity	103.71	1	103.71	64.61*	.049
Child sex	3.91	1	3.91	2.44	.002
Mat dep symptoms	11.89	1	11.89	7.40*	.006
Maternal education	90.18	2	45.09	28.09*	.043
Income-to-needs	6.14	1	6.14	3.82**	.003
Partner status	11.54	1	11.54	7.19*	.006
Error	2000.04	1246	1.61		
Total	74575.50	1255			

Note: * $p < .01$; ** $p \leq .05$.

Table 8. Final ANCOVA Model on Maternal Sensitivity at 15 Months

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	η_p^2
Maternal age	0.96	1	0.96	0.46	.000
Maternal ethnicity	133.01	1	133.01	63.76*	.050
Child sex	4.58	1	4.58	2.20	.002
Mat dep symptoms	15.34	1	15.34	7.35*	.006
Maternal education	8.37	2	4.18	2.01	.003
Income-to-needs	37.51	1	37.51	17.98*	.015
Partner status	18.24	1	18.24	8.74*	.007
Ed X Income	12.73	2	6.37	3.05**	.005
Ed X Partner	22.87	2	11.43	5.48**	.009
Error	2501.36	1199	2.09		
Total	110411.00	1212			

Note: * $p < .01$; ** $p < .05$.

Table 9. Final ANCOVA Model on Cognitive Stimulation at 15 Months

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	η_p^2
Maternal age	3.60	1	3.60	2.95	.002
Maternal ethnicity	78.88	1	78.88	64.57*	.051
Child sex	0.00	1	0.00	0.00	.000
Mat dep symptoms	19.85	1	19.85	16.25*	.013
Maternal education	66.95	2	33.48	27.40*	.044
Income-to-needs	7.37	1	7.37	6.04**	.005
Partner status	9.97	1	9.97	8.17*	.007
Ed X Income	12.38	2	6.19	5.07*	.008
Error	1459.81	1195	1.22		
Total	87068.25	1206			

Note: * $p < .01$; ** $p < .05$.

Table 10. Final ANCOVA Model on Maternal Sensitivity at 36 Months

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	η_p^2
Maternal age	86.08	1	86.08	15.38*	.014
Maternal ethnicity	124.63	1	124.63	22.27*	.020
Child sex	41.79	1	41.79	7.47*	.007
Mat dep symptoms	77.78	1	77.78	13.90*	.012
Maternal education	284.31	2	142.16	25.40*	.044
Income-to-needs	0.46	1	0.46	0.08	.000
Partner status	69.30	1	69.30	12.38*	.011
Ed X Income	35.38	2	17.69	3.16**	.006
Inc X Partner	40.84	1	40.84	7.30**	.007
Error	6212.69	1110	5.60		
Total	341970.00	1122			

Note: * $p < .01$; ** $p < .05$.

Table 11. Final ANCOVA Model on Cognitive Stimulation at 36 Months

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	η_p^2
Maternal age	0.11	1	0.11	0.04	.000
Maternal ethnicity	174.11	1	174.11	59.39*	.050
Child sex	21.20	1	21.20	7.23*	.006
Mat dep symptoms	34.79	1	34.79	11.87*	.010
Maternal education	198.04	2	99.02	33.78*	.056
Income-to-needs	6.66	1	6.66	2.27	.002
Partner status	23.47	1	23.47	8.01*	.007
Ed X Income	7.74	2	3.87	1.32	.002
Ed X Partner	20.70	2	10.35	3.53**	.006
Income X Partner	4.66	1	4.66	1.60	.001
Error	3312.86	1130	2.93		
Total	79937.25	1144			

Note: * $p < .01$; ** $p < .05$.

Table 12. Summary of Final Model Results

Source	Maternal sensitivity			Cognitive stimulation		
	6M	15M	36M	6M	15M	36M
Mat education	X+	X+	X+	X+	X+	X+
Income-to-needs	X+	X+	X+	X+	X+	X+
Partner status		X+	X+	X+	X+	X+
Ed X Income		X+	X		X+	
Ed X Partner		X+				X+
Inc X Partner			X-			

Note: X+: Significant and hypothesis supported; X: Significant and hypothesis partially supported; X-: Significant and hypothesis not supported.

Table 13. Education and Partner Status Among Low-Income Mothers on Maternal Sensitivity at 15 Months

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	η_p^2
Maternal age	0.90	1	0.90	0.33	.001
Maternal ethnicity	89.02	1	89.02	32.86*	.079
Child gender	0.04	1	0.04	0.02	.000
Maternal depression	5.69	1	5.69	2.10	.005
Maternal education	16.91	1	16.91	6.24**	.016
Partner status	3.46	1	3.46	1.28	.003
Ed X Partner	16.05	1	16.05	5.92**	.015
Error	1032.18	381	2.71		
Total	29953.00	389			

Note: * $p < .01$; ** $p < .05$.

Table 14. Education and Partner Status Among Low-Income Mothers on Cognitive Stimulation at 36 Months

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	η_p^2
Maternal age	2.30	1	2.30	0.59	.002
Maternal ethnicity	135.10	1	135.10	34.85*	.088
Child gender	1.45	1	1.45	0.37	.001
Maternal depression	51.16	1	51.16	13.20*	.035
Maternal education	124.81	1	124.81	32.19*	.082
Partner status	25.61	1	25.61	6.61**	.018
Ed X Partner	22.25	1	22.25	5.74**	.016
Error	1391.85	359	3.88		
Total	19178.25	367			

Note: * $p < .01$; ** $p < .05$.

Table 15. Cumulative Income Analysis on Maternal Sensitivity at 36 Months

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	η_p^2
Maternal age	119.82	1	119.82	20.61*	.018
Maternal ethnicity	125.76	1	125.76	21.63*	.019
Child gender	47.60	1	47.60	8.19*	.007
Maternal depression	101.56	1	101.56	17.47*	.015
Maternal education	192.04	1	192.04	33.03*	.028
Cumulative income	105.77	4	26.44	4.55*	.016
Partner status	48.71	1	48.71	8.38*	.007
Ed X Cum income	53.40	4	13.35	2.30 [†]	.008
Error	6587.36	1133	5.81		
Total	348642.00	1148			

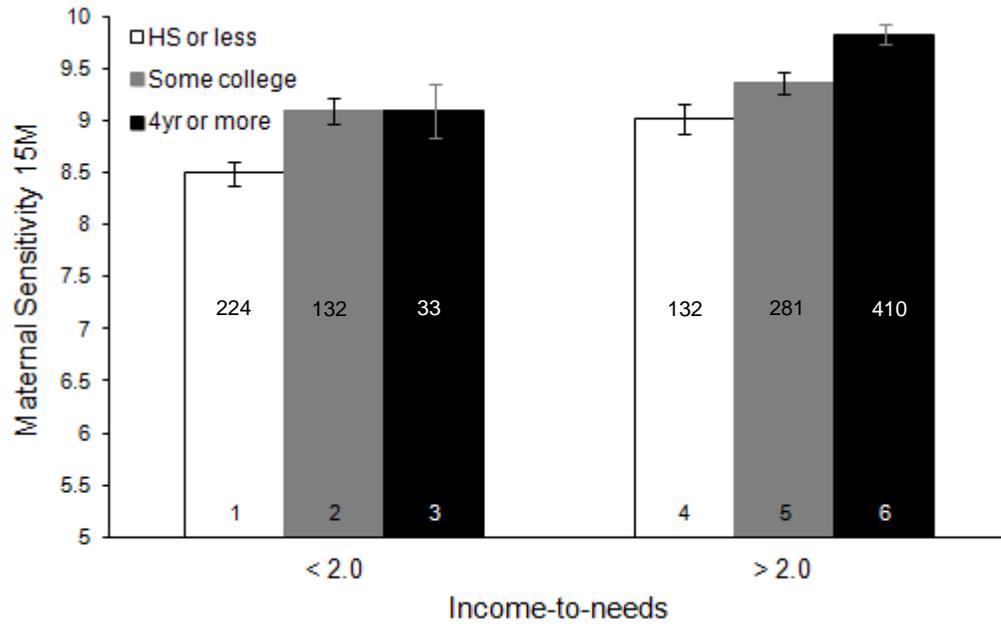
Note: * $p < .01$; [†] $p < .10$.

Table 16. Cumulative Income Analysis on Cognitive Stimulation at 36 Months

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	η_p^2
Maternal age	0.99	1	0.99	0.33	.000
Maternal ethnicity	167.43	1	167.43	55.46*	.046
Child gender	19.78	1	19.78	6.55**	.006
Maternal depression	40.25	1	40.25	13.33*	.011
Maternal education	274.80	1	274.80	91.03*	.073
Cumulative income	76.18	4	19.05	6.31*	.021
Partner status	40.98	1	40.98	13.58	.012
Ed X Cum income	8.68	4	2.17	0.72	.002
Error	3486.54	1155	3.02		
Total	81761.00	1170			

Note: * $p < .01$; ** $p < .05$.

Figure 1. Maternal Education and Income on Maternal Sensitivity at 15 Months



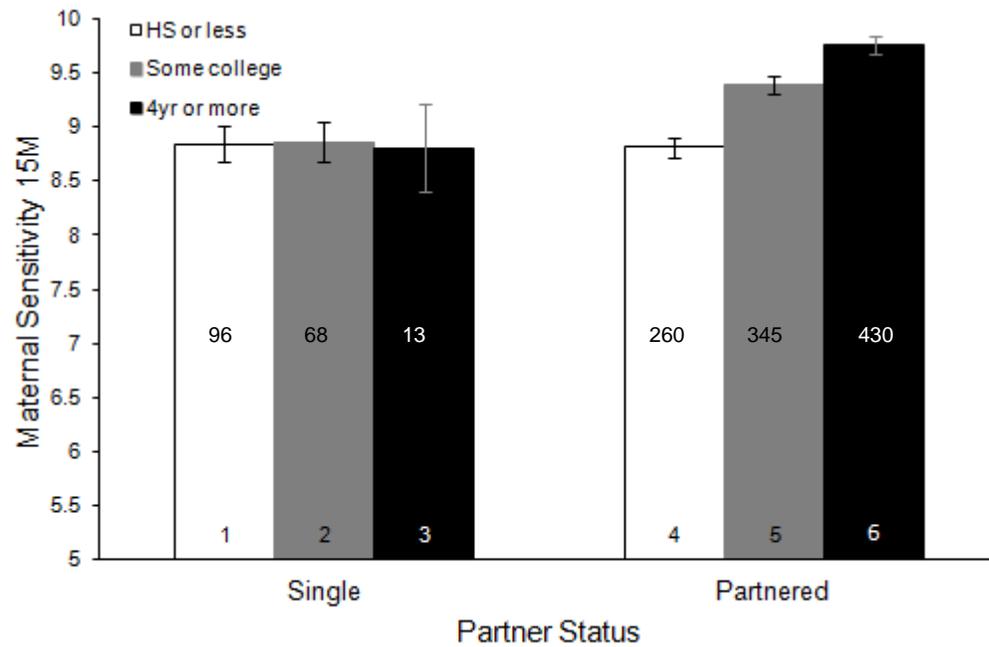
Note: Group *ns* appear within the bar.

Significant group differences:

1 < 2, 4, 5, 6

2, 4, 5 < 6

Figure 2. Maternal Education and Partner Status on Maternal Sensitivity at 15 Months



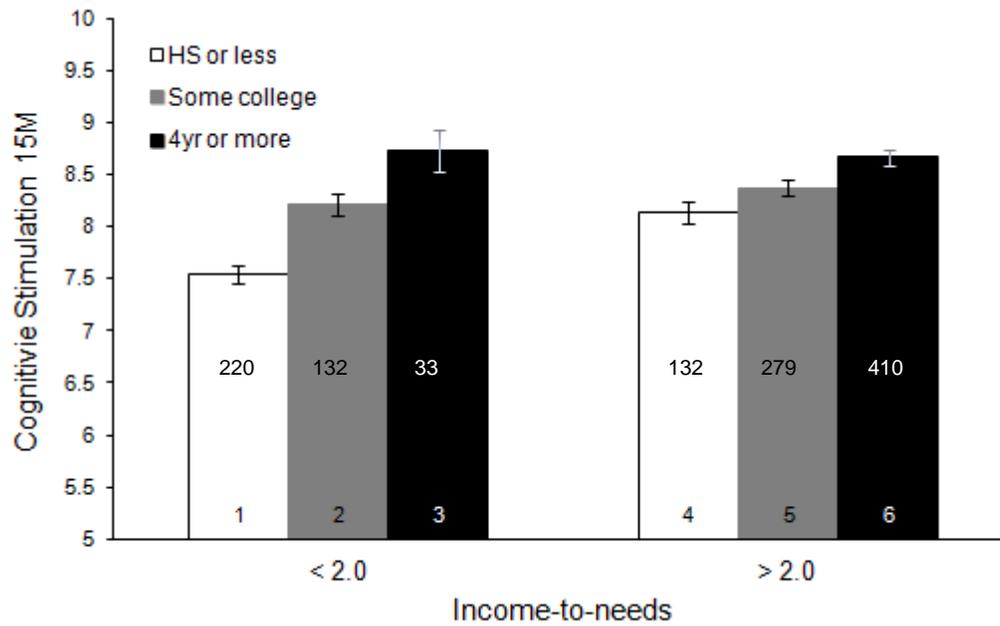
Note: Group *ns* appear within the bar.

Significant group differences:

1, 2, 4, 5 < 6

4 < 5

Figure 3. Maternal Education and Income on Cognitive Stimulation at 15 Months



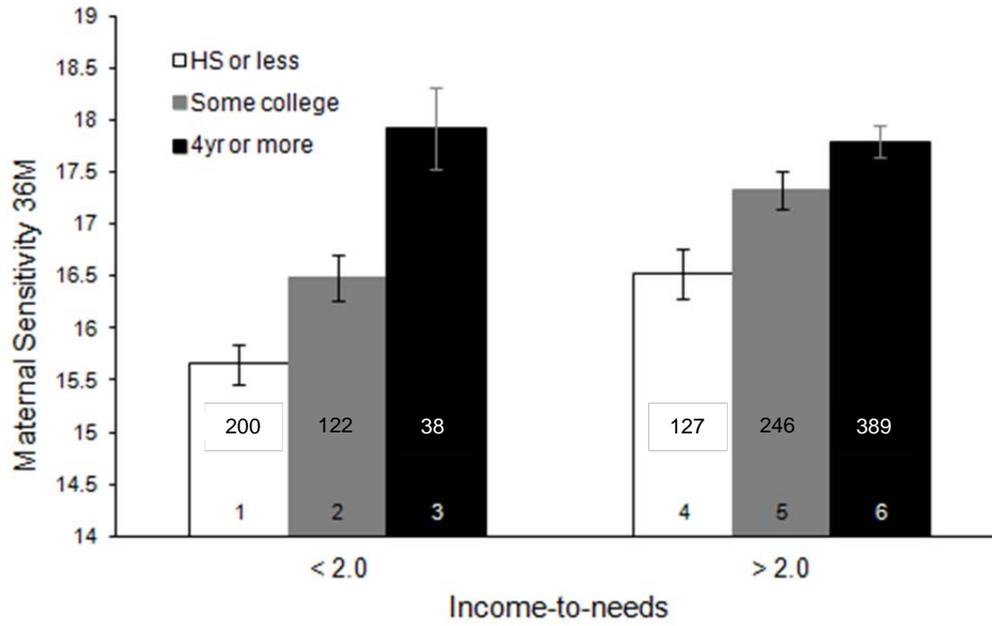
Note: Group *ns* appear within the bar.

Significant group differences:

1 < 2, 3, 4, 5, 6

2, 4, 5 < 6

Figure 4. Maternal Education and Income on Maternal Sensitivity at 36 Months



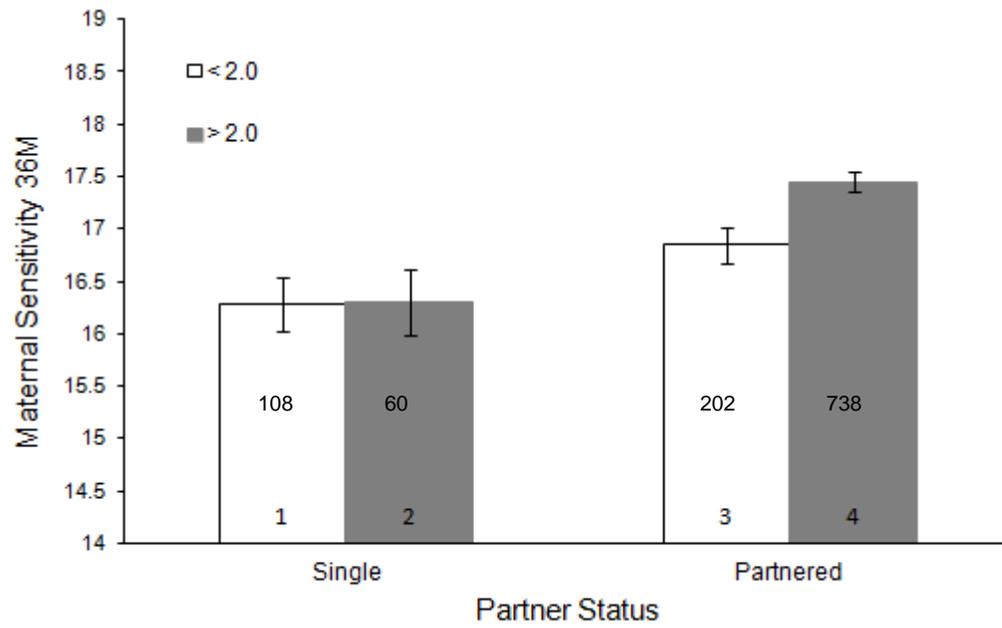
Note: Group *ns* appear within the bar.

Significant group differences:

1 < 2, 3, 4, 5, 6

2, 4 < 3, 5, 6

Figure 5. Income and Partner Status on Maternal Sensitivity at 36 Months

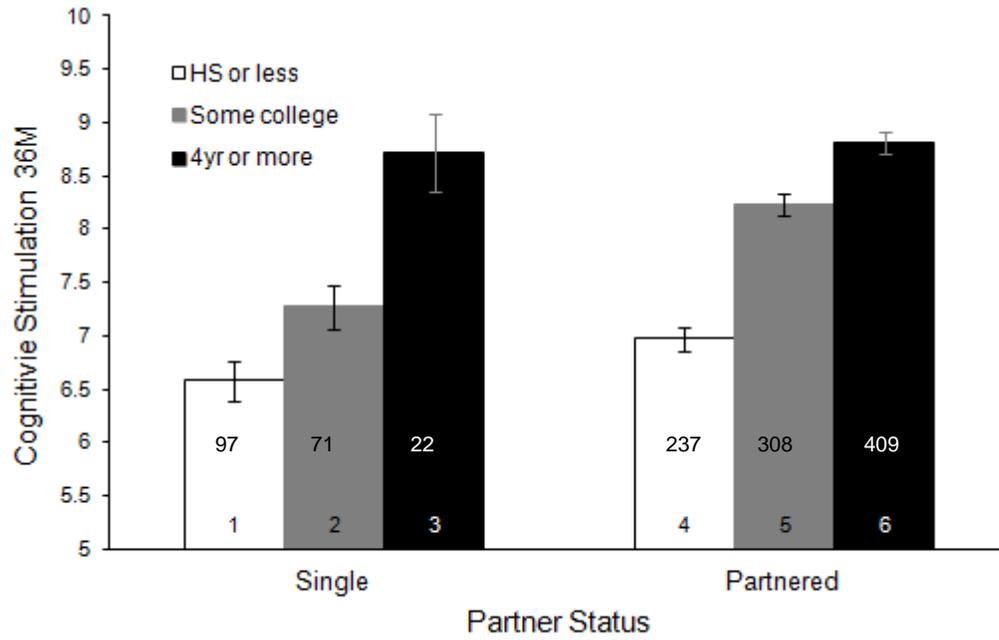


Note: Group *ns* appear within the bar.

Significant group differences:

1, 2, 3 < 4

Figure 6. Maternal Education and Partner Status on Cognitive Stimulation at 36 Months



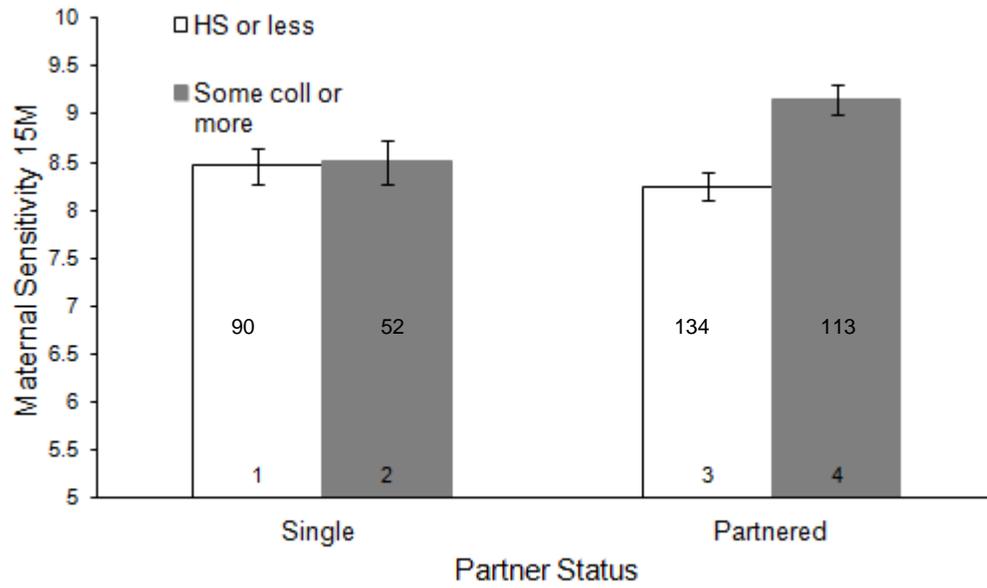
Note: Group *ns* appear within the bar.

Significant group differences:

1, 2, 4 < 3, 5, 6

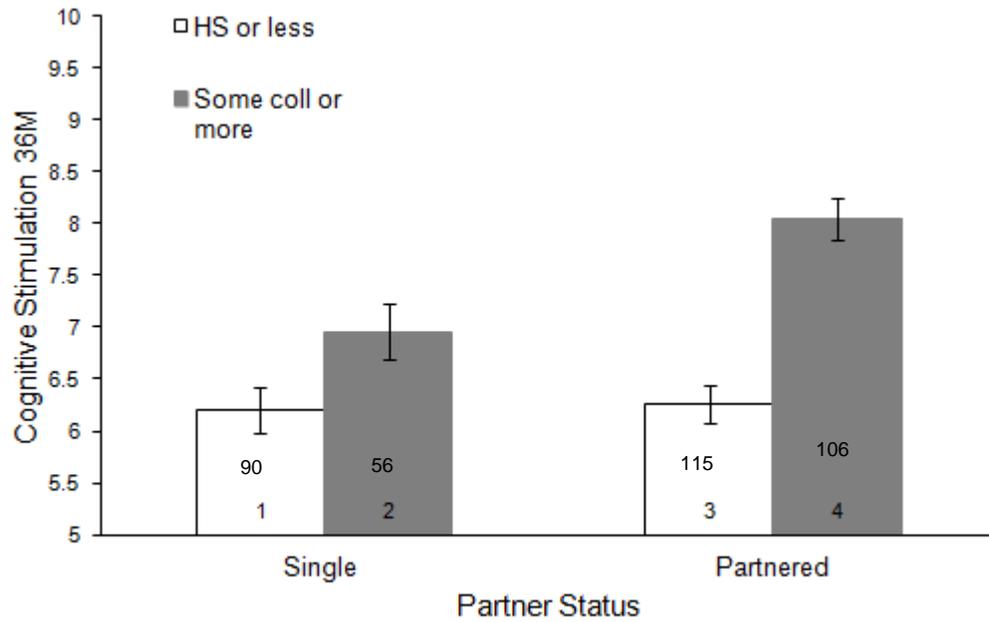
5 < 6

Figure 7. Maternal Education and Partner Status Among Low-Income Mothers on Maternal Sensitivity at 15 Months



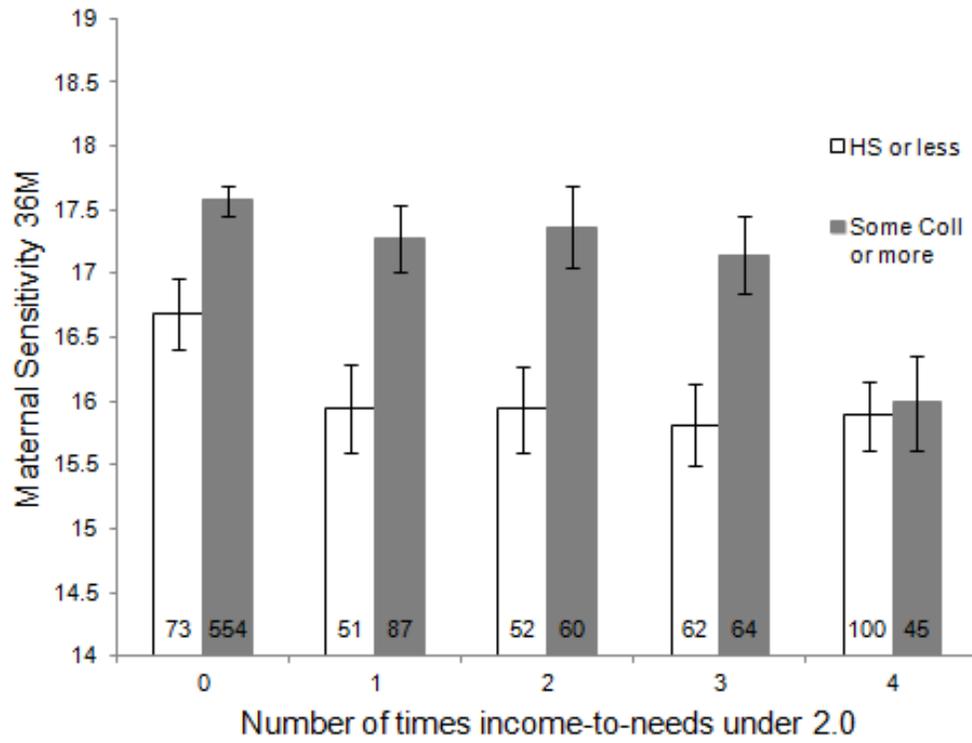
Note: Group *ns* appear within the bar.
 Significant group differences:
 1, 3 < 4

Figure 8. Maternal Education and Partner Status Among Low-Income Mothers on Cognitive Stimulation at 36 Months



Note: Group *ns* appear within the bar.
 Significant group differences:
 1, 2, 3 < 4

Figure 9. Maternal Education and Cumulative Income on Maternal Sensitivity at 36 Months



Note: Group *ns* appear within the bar.