Longitudinal Relations Among Adolescent Mothers' Depression, Negative Parenting,

Social Support and Young Children's Developmental Outcomes

by

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ABSTRACT

Rapidly growing research on mothers' perinatal depression, has demonstrated significant links among mothers' depressive symptoms during pregnancy and the first year postpartum, their parenting, and multiple aspects of children's development. This prospective longitudinal study contributes to research on mothers' perinatal depression by examining the mechanisms by which maternal perinatal depression is associated with children's adjustment early in development in a sample of 204 Mexican-origin adolescent mothers (M_{age} at Wave 1 = 16.80, SD = 1.0) and their children (58% boys). I expected that adolescent mothers' negative parenting behaviors would mediate the associations between mothers' perinatal depressive symptoms and three child outcomes: internalizing symptoms, externalizing behaviors, and cognitive ability. I further hypothesized that mothers' perceived social support from their family would modify the extent to which mothers' perinatal depressive symptoms negatively impact their parenting behaviors and their children's developmental outcomes. Mothers reported on their own depressive symptoms, their perceived social support from their family and their children's internalizing and externalizing problems; negative parenting was assessed using observational methods; and children's cognitive ability was assessed using standardized developmental assessments. In this sample, adolescent mothers' negative parenting behaviors did not significantly mediate the relations between mothers' perinatal depression and children's developmental outcomes. Further, perceived social support did not significantly buffer the effects of mothers' perinatal depression on mothers' negative parenting or children's developmental outcomes. However, in line with hypotheses,

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results indicated that mothers' prenatal depression had a wider impact on children's adjustment outcomes than mothers' postpartum depression, which appeared more specific to children's internalizing problems. Discussion focuses on implications for intervention addressing adolescent mothers' perinatal depression, as well as the need to continue to explore protective factors that have the potential to disrupt the negative intergenerational transmission of risks.

DEDICATION

To Kymberly Lynn who inspired me to begin this journey and Kymberly Amelia who inspired me to finish.

ACKNOWLEDGMENTS

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CHAPTER 1

INTRODUCTION

Maternal depression has been identified as a significant public health concern. It is estimated that between 7.5% and 13% of mothers report high depressive symptoms during the perinatal period (i.e., during pregnancy and the first postpartum year; Bennett, Einarson, Adrienne, Taddio, Koren, & Einarson, 2004; Gavin et al., 2005; O'Hara & Swain, 1996). Maternal depression has negative consequences for mothers including, occupational and financial difficulties, and trouble forming and maintaining sensitive parenting strategies (Ertel, Rich-Edwards, & Koenen, 2011; Murray, Halligan, & Cooper, 2011), and their children's behavioral, socioemotional, and cognitive development (Goodman et al., 2011; Murray et al., 2011; Stein et al., 2014). Moreover, the risk for children's adverse outcomes is especially high when maternal depression occurs during the early childhood period (Bureau, Easterbrooks, & Lyons-Ruth, 2009; Goodman & Gotlib 1999; Goodman et al., 2011). Thus, there is a need to identify the mechanisms by which maternal depression is associated with children's adjustment early in development. Moreover, understanding the unique effects of prenatal and postnatal depression is important for determining the timing and type of intervention that is necessary to prevent children's maladjustment.

Adolescent mothers, in particular, are at risk for high depressive symptoms, with estimates ranging from 13%—48% of adolescent mothers experiencing depression during the perinatal and postpartum periods, which is substantially higher than the rates for their nonpregnant adolescent peers and pregnant/parenting adult mothers (Deal & Holt, 1998;

Hodgkinson, Colantuoni, Roberts, Berg-Cross, Belcher, 2010; Mollborn & Morningstar, 2009). Adolescent mothers' increased risk of depression may be due, in part, to the relatively high financial and social burdens they face (Lanzi, Bert, & Jacobs, 2009). However, research indicates that adolescent mothers' social support systems account for much of the variability in both the onset and severity of depressive symptoms (Edwards et al., 2012; Logsdon, Birkimer, Ratterman, Cahill, & Cahill, 2002). Since children of adolescent mothers are at increased risk for adjustment problems (Pogarsky, Thornberry, & Lizotte, 2006; Whitman, Borkowski, Keogh, Weed, 2001), understanding how maternal depression is associated with children's developmental outcomes is crucial to developing effective preventive intervention programming with this population.

A better understanding of the processes associated with young mothers' depression is particularly warranted in families of Mexican-origin adolescent mothers for several reasons. First, despite the fact that Mexican-origin adolescent mothers have the highest teenage birthrate among all U.S. ethnic groups (National Vital Statistics Report, 2012) and Latina mothers are at elevated risk for depression (Howell, Mora, Horowitz, & Leventhal, 2005; Nadeem, Whaley, & Anthony, 2006), prior studies have not tested the mechanisms of transmission of depression risks from mothers to their children in this vulnerable population. Further, few studies have examined these processes using samples of adult Mexican-origin mothers, thereby making generalizations challenging. Second, prior research suggests that perceived social support is an important protective factor for adolescent mothers (e.g., Edwards et al., 2012), however, few studies have examined social support from families in samples of Mexican-origin adolescent mothers.

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This is surprising given that traditional Mexican values include a strong sense of familism (e.g., family interdependence; reciprocity; obligations; Cauce & Domenech-Rodrıguez, 2002) that make it likely that Mexican-origin adolescent mothers would turn to family members for advice and support. Indeed, not only are Latina adolescent mothers more likely to live with their families than adolescent mothers from other groups, but they also more likely to turn to their family for support in times of stress (Contreras, Mangelsdorf, Rhodes, Diener, & Brunson, 1999; Contreras, Narang, Ikhlas, & Teichman, 2002). Given their presence, examining whether families buffer Mexican-origin adolescent mothers from the risks associated with perinatal depression is important.

In the current longitudinal study, I aimed to explore the extent to which Mexican-origin adolescent mothers' perinatal depressive symptoms are associated with negative parenting behaviors, and in turn, their children's well-being from the prenatal period to three years postpartum (see Figure 1 for a conceptual model). In addition, I examined the associations between severity, chronicity, and timing of Mexican-origin adolescent mothers' perinatal depressive symptoms, their negative parenting and children's adjustment outcomes. A third aim of the current study was to examine whether Mexican-origin adolescent mothers' perceived social support from their families moderates the associations between their depressive symptoms and negative parenting and between their depressive symptoms and children's developmental outcomes. A final aim of the current study was to examine whether negative parenting behaviors mediate the associations between adolescent mothers' perinatal depressive symptoms and

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children's developmental outcomes among Mexican-origin adolescent mothers who perceive low levels of support.

Maternal Prenatal and Postnatal Depression and Children's Developmental Outcomes: Direct Associations

   Children's developmental outcomes. There is evidence that maternal depression is associated with a range of adverse child developmental and adjustment outcomes.   Indeed, maternal depression during the perinatal period has been linked with both homotypic (e.g., depression) and heterotypic (e.g., behavioral problems) child outcomes (see Stein et al., 2014 for review).   This study focuses on three indices of children's adjustment: externalizing problems, internalizing problems, and cognitive development.   An understanding of how maternal depression is differentially associated with diverse aspects of children's functioning could help researchers identify targets for interventions by elucidating the specificity or extent of risk of maladaptation for children exposed to maternal depression.

   From a theoretical perspective, there are several pathways through which mothers' prenatal depressive symptoms are associated with children's internalizing and externalizing problems including, a) a genetic vulnerability such as a predisposition to experience negative moods (e.g., sadness and anger; Plomin, 1990), b) increased negative emotions due to disruption in the developing stress regulation systems during fetal development (Lundy et al., 1999), and c) poor maternal modelling of emotion regulation. Regarding the link between mothers' perinatal depression and children's cognitive development, theoretically we would expect mothers' postnatal depression to be

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associated with children's cognitive development because depressed mothers provide their children with fewer cognitively stimulating materials (e.g., developmentally appropriate toys and books) and opportunities (e.g., reading; storytelling), and they are less likely to construct learning-promoting home environments in early childhood as compared to nondepressed mothers (Sohr-Preston & Scaramella, 2006). Because these early learning experiences are critical for children's cognitive development (Bradley et al., 1989) and predictive of reading and math scores in first grade (Downer & Pianta, 2006), the diminished capacity of depressed mothers to provide these experiences may serve as a risk factor. Regarding the effects of prenatal depression on children's cognitive ability, it is possible that experiencing depression during pregnancy indirectly impacts cognitive development by affecting the fetus's development.

Internalizing problems. It is well established that perinatal depression has negative consequences for children's development of internalizing problems, particularly depression and anxiety (Field, Diego, & Hernandez-Reif, 2006; Goodman et al., 2011; Stein et al., 2014). For example, using data from the Avon Longitudinal Study of Parents and Children, Leis, Heron, Struart, and Mendelson (2014) noted emotional problems at 10-11 years for children of prenatally depressed women. Another longitudinal study in the Netherlands found that maternal depression during the second trimester of pregnancy was associated with children's internalizing symptoms at age three (Velders et al., 2011).

Studies of adult mothers with postnatal depression indicate that maternal depression during the first two years following the birth of the child increases the child's

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risk of internalizing problems in early childhood (Barker, Jaffee, Uher, & Maughan, 2011; Bureau et al., 2009; Conroy et al., 2012) and adolescence (Murray et al., 2011; Naicker, Wickham, & Colman, 2012; Verbeek et al., 2012).   At 18 months, infants of mothers with high levels of depression at two months postpartum showed elevated levels of internalizing problems (Conroy et al., 2012).   In a longitudinal study, Murray and colleagues (2011) showed that by 16 years of age, adolescents whose mothers reported higher levels of depressive symptoms at six-week postpartum displayed higher levels of depression than adolescents of mothers reporting lower postpartum depression.

Externalizing problems.   Externalizing problems describe a set of outwardly directed behaviors that include impulsivity, aggression, and inattention (Achenbach, 1991).   Although some externalizing symptoms (e.g., difficulty controlling impulses) may be normative during early childhood (Tremblay, 2000), externalizing problems with childhood-onset is especially concerning, as children with these problem behaviors are more vulnerable to future maladjustment (e.g., Brennan, Shaw, Dishion, & Wilson, 2012).   In regard to the association between prenatal depression and children's externalizing behaviors, research indicates that maternal depression during pregnancy predicts externalizing problems in early childhood (i.e., age 3; Van Batenburg-Eddes et al., 2013; Velders et al., 2011), in middle childhood (i.e., age 8; Barker et al., 2011) and in adolescence (i.e., age 16; Hay, Pawlby, Waters, Perra, & Sharp, 2010; Korhonen, Luoma, Salmelin, & Tamminen, 2012).   Moreover, among children who were adopted at birth, findings indicate that both birth mothers' prenatal depressive symptoms and adopted mothers' depressive symptoms were associated with higher levels of toddler's

externalizing problems at 27 months (Pemberton et al., 2010). Although this finding supports the important role of shared genetic vulnerability to depression as a biological influence on children's problem behaviors, this finding also suggests that the association between maternal depression and children's adjustment is due to maternal depression as an environmental influence.

Maternal depression during the postpartum period has also been linked to increases in children's aggression, hyperactivity, inattention and behavior problems (Galéra et al., 2011; Hanington 2012; Letourneau, Tramonte, & Willms, 2013). For example, Letourneau and colleagues (2013) noted that between 4 to 5 years old, children of depressed mothers are 3 times more likely to be physically aggressive and 1.5 times more likely to be inattentive than children of nondepressed mothers. In a longitudinal study, Galéra and colleagues (2011) indicated that maternal depression at five months postpartum was associated with high trajectories of children's hyperactivity-impulsivity and inattention symptoms from 17 to 96 months of age.

Cognitive development. Although much less work has considered the association between maternal depression and children's cognitive development, there is some evidence that prenatal depression is associated with children's cognitive ability in infancy and middle childhood (Barker et al., 2011; Koutra et al., 2012). For instance, Koutra and colleagues (2012) found that depressive symptoms during the third trimester were associated with decreases in toddlers cognitive scores at 18 months of age. Researchers have also found that maternal depression in the first year postpartum is associated with infant's cognitive delays (Conroy et al., 2012; Kaplan, Danko, Diaz, & Kalinka, 2011).

In addition, Letourneau and colleagues (2013) demonstrated that children of mothers with postpartum depression scored lower on receptive vocabulary at kindergarten entry than children of nondepressed mothers.

Adolescent mothers.   Although prior studies examining the association between maternal depression and children's adjustment have primarily focused on adult mothers, the limited evidence from research with adolescent mothers paints a similar picture. Specifically, research indicates that adolescent mothers' depressive symptoms are associated with children's internalizing and externalizing behaviors (Black et al., 2002; Lanzi et al., 2009; Leadbeater, Bishop, & Raver, 1996; Rhule, McMahon, Spieker, & Munson, 2006; Sieger & Renk, 2007; Spieker, Larson, Lewis, Keller, & Gilchrist, 1999). For instance, in a sample of 63 adolescent mothers (43% Latina) and their toddlers, Leadbeater and colleagues (1996) showed that maternal depression during the first year postpartum was associated with toddler's problem behaviors (i.e., the sum of internalizing and externalizing symptoms).   In addition, a cross-sectional study of Latina adolescent mothers (82.4% Puerto Rican), found that toddlers whose mothers reported higher levels of depressive symptoms displayed higher levels of internalizing and externalizing behaviors compared to toddlers of mothers reporting lower depressive symptoms (Smith, Grau, Duran, & Castellanos, 2013).   These findings suggest that children of depressed adolescent mothers are at risk for internalizing and externalizing problems; however, only one study to my knowledge has examined the impact of maternal depression on children's cognitive development in a sample of adolescent mothers.   In a sample of 100 adolescent mothers (69% Caucasian) and their children,

Rhule and colleagues (2006) showed that lower levels of maternal depression were associated with more positive child academic adjustment outcomes at grade three.

Timing, severity, and chronicity.   While the links between perinatal depression and children's maladaptive outcomes are well established (see Goodman et al., 2011 for a meta-analysis and Stein et al., 2014 for review), research examining how the timing (i.e., prenatal or postpartum onset of symptoms), severity (i.e., level of symptoms) and chronicity (i.e., whether symptoms reoccur or not) of depression during the perinatal period influences children's development continues to be limited, especially for adolescent mothers.   Given that prenatal depressive symptoms typically persist during the postpartum period, and thus depressive symptoms during this period are highly correlated ($r = .47$ to $.61$; Barker et al., 2011; Leis et al., 2014), research is needed to determine whether prenatal and postnatal depressive symptoms make unique contributions to children's developmental outcomes.

The few studies that have attempted to determine the effects of the timing of adult maternal depression on children's developmental and adjustment outcomes have found that the risks associated with prenatal and postpartum depression are independent of each other (Barker et al., 2011; Leis et al., 2014; Pearson et al., 2013).   For example, Pearson and colleagues (2013) found that mothers' prenatal (i.e., at 18 and 32 weeks) and postnatal (i.e., at 2 and 8 months) depressive symptoms independently predicted their adolescent children's depression at age 18, with a similar magnitude of risks.   However, whereas mothers' prenatal symptoms remained an independent predictor of adolescents' depression after controlling for mothers' postnatal symptoms, the association between

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mothers' postnatal symptoms and adolescents' depression was substantially reduced when controlling for mothers' prenatal symptoms. Pearson and colleagues (2013) also noted that only the association between mothers' postnatal symptoms and adolescents' depression was moderated by mothers' level of education. The authors suggested that the moderation effects of perinatal depression suggest that there may be different pathways leading to children's maladaptation following exposure to prenatal and postnatal depression. No studies, to my knowledge, have examined the effects of the timing, severity, and chronicity of adolescent mothers' depression on children's outcomes during the perinatal period.

From the existing research, it is clear that exposure to maternal perinatal depression increases children's risk of maladjustment across multiple domains and risk is especially increased in families of adolescent mothers. However, what we do not know is the relative importance of the chronicity and severity of adolescent mothers' depressive symptoms for children's adjustment outcomes or whether severity and chronicity interact in their prediction of children's outcomes. Further, no work has examined whether adolescent mothers' prenatal and postpartum depression are differentially related to children's developmental outcomes. Thus, the current study aims to examine how and when exposure to adolescent mothers' depressive symptoms from the third trimester of pregnancy to 10 months postpartum confers risk for her child.

Maternal Negative Parenting and Children's Developmental Outcomes

Both empirical and theoretical work highlight the important role parenting plays in children's development (Belsky, 1984; Bornstein, 2016; Campbell, Shaw, & Gilliom,

2000; Goodman & Gotlib, 1999). Prior studies suggest that mothers' parenting behaviors during early childhood influence the child's developing capacity to regulate emotions and physiological arousal, which is important for future socio-emotional and cognitive development (Kopp, 1989; Kopystynska, Spinrad, Seay, & Eisenberg, 2016). Mothers' sensitive parenting, consisting of warm and responsive interactions with the child, is theorized to contribute to a context where children can learn to effectively regulate their distress (Eisenberg, Cumberland, & Spinrad, 1998; Halligan et al., 2013; Kopp, 1989). Indeed, sensitive, warm, and responsive parenting behaviors have been linked to fewer behavior problems (i.e., externalizing and internalizing symptoms), and higher levels of social competence and cognitive ability during early childhood (Belsky & Fearon, 2002; Leerkes, Blankson, & O'Brien, 2009; Propper, Willoughby, Halpern, Carbone, & Cox, 2007). In contrast, hostile, controlling and intrusive parenting behaviors are believed to challenge young children's developing abilities to regulate emotions by impeding on the child's autonomy and preventing the child from engaging in self-initiated coping. This inability to independently initiate coping leads to future maladjustment (Rubin, Hastings, Stewart, Henderson, & Chen, 1997; Taylor, Eisenberg, Spinrad, & Widaman, 2013), especially in high-risk populations (Belsky, Woodworth, & Crnic, 1996; Campbell et al., 2000).

In line with this theorizing, prior work indicates that when adult mothers are more negative and intrusive in their interactions with their infants, their infants display more negative affect (Field, Healy, Goldstein, & Guthertz, 1990). Exposure to such negative parenting behaviors has also been associated with a range of child difficulties outside of

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mother-child interactions.   For instance, adult mothers' overreactive (e.g., yelling at the child), rejecting, and controlling behaviors in early childhood have been linked to children's behavior problems, including externalizing and internalizing symptoms (Gilliom & Shaw, 2004; McLeod, Weisz, & Wood, 2007; Miller-Lewis, Baghurst, & Sawyer, 2006; Shaw et al., 1998).   In a longitudinal study of adult mothers and their toddlers, Propper and colleagues (2007) found that a composite measure of maternal intrusiveness/low sensitivity during the first year predicted toddlers internalizing and externalizing behaviors.   In another study, maternal intrusiveness at age 4 was associated with increased father and teacher reported inattention when children were 7 years old (Keown, 2012).   Moreover, research with infant and toddlers indicates that negative parenting behaviors early in development have a stronger adverse effect on children's adjustment than later parenting behaviors.

Given the compelling evidence underscoring the importance of parenting for young children's adjustment across multiple domains of development, research on adolescent mothers has begun to focus on these associations.   Research indicates that adolescent mothers are less positive and sensitive in their interactions with their children, and they engage in more intrusive and negative parenting behaviors (e.g., hostility) than adult mothers (Barratt & Roach, 1995; Berlin, Brady-Smith, & Brooks-Gunn, 2002; Ensor & Hughes, 2010).   However, few studies have examined the associations between adolescent mothers' parenting and children's developmental outcomes, and even less is known about these associations in families of Latina adolescent mothers as prior studies typically utilize samples of predominately white and African American mothers.   For

instance, a few studies have noted that adolescent mothers sensitive parenting is associated with lower internalizing and externalizing behaviors, and higher cognitive and language skills in samples of white adolescent mothers (Letourneau, Fedick, Willms, Stewart, & White, 2007) and ethnically diverse samples of primarily white and African American adolescent mothers (Hann, Osofsky, & Culp, 1996; Rafferty, Griffin, & Lodise, 2011).

Research on adolescent mothers has also linked young mothers negative parenting behaviors to more externalizing behaviors and lower social competence and cognitive ability (Ensor & Hughes, 2010; Keown, Woodward, & Field, 2001; Spieker et al., 1999). In a longitudinal study, Spieker and colleagues (1999) examined the association between maternal negative control tactics and changes in children's disruptive behaviors from age 3.5 to 6 in a mixed sample of 183 (51% white; 28% African American) adolescent mothers and their children. High levels of maternal negative control were significantly associated with initial levels of disruptive behaviors, as well as increases in disruptive behaviors over time (Spieker et al., 1999). In a comparison study of adolescent and adult mothers, Keown and colleagues (2001) demonstrated that adolescent mothers' higher levels of intrusive parenting accounted for between-group differences in children's expressive language and language comprehension. This study extends the current literature by examining the links between Mexican-origin adolescent mothers' negative parenting behaviors and children's developmental outcomes a year later.

The Mediating Role of Negative Parenting

Belsky's (1984) process model of determinants of parenting posits that parents' psychological resources inform parenting processes and, in turn, their children's development. Specifically, the model suggests that children's maladjustment occurs when parents' depressive symptoms compromise their ability to engage with their child in a positive, warm and sensitive manner. In fact, according to Belsky (1984), parents' psychological well-being is the most important determinant of parental functioning. Given that Belsky's model (1984) provides a useful framework for understanding the continuity from maternal depression to child maladjustment, the model will serve as the theoretical foundation for this study.

While the effects of negative parenting on children's adjustment are well established, the potential role negative parenting plays as a mechanism of risk requires further examination. Indeed, although empirical and theoretical work suggest that the maladaptive parenting behaviors of depressed mothers act as a mechanism for risk for the transmission of maladjustment to children (Beardslee, Gladstone, & O'Connor, 2011; Cummings & Davies, 1994; Goodman & Gotlib, 1999), few studies to date have examined how negative parenting behaviors may explain maladaptive outcomes of children exposed to maternal depression during childhood in families of adolescent mothers who likely face additional stressors. Prior studies have repeatedly provided support for the link between maternal depression and negative parenting, including more controlling behaviors, increased harsh parenting behaviors, and less sensitive interactions among depressed adult mothers (Beardslee, Versage, & Gladstone, 1998; Campbell, Pierce, March, & Ewing, 1991; Dietz et al., 2008; Field, 2010; Goodman & Gotlib, 1999;

Lovejoy, Graczyk, O'Hare, & Neuman, 2000; Tompson et al., 2010) and suggest that maternal depression is more strongly associated with parenting during infancy and early childhood compared to later in children's development (Letourneau et al., 2013; Lovejoy et al., 2000; Wilson & Durbin, 2010). Meta-analyses indicate that mothers' depressive symptoms have a negative, moderate effect on irritable and hostile parenting behaviors (d = .40 and .22; Lovejoy et al., 2000; Wilson & Durbin, 2010). In addition, studies have found that maternal depression is associated with observed intrusiveness during the first year postpartum (Field et al., 1990; Feldman, 2007; McElwain & Volling, 1999); however, these studies were limited by their cross-sectional design.

It is possible that the degree to which maternal depression relates to negative parenting depends on the timing and course of mothers' perinatal depression. Indeed, evidence suggests that among mothers of young children, chronic maternal depression, as opposed to time specific depression (e.g., postpartum depression), is associated with more maladaptive parenting behaviors such as harsh discipline and hostile interactions (Letourneau, Salmani, & Duffett-Leger, 2010; McLearn, Minkovitz, Strobino, Marks, & Hou, 2006). Consistent with these findings, the current study explores whether chronic depression is associated with a higher likelihood of engaging in negative parenting behaviors.

Prior research has also demonstrated that maternal negative parenting mediates the associations between maternal depression in early childhood and later child maladjustment, including externalizing behaviors, hostility, and inattention (Elgar, Mills, McGrath, Waschbusch, & Brownridge, 2007; Letourneau et al., 2013; Lyons-Ruth,

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Alpern, & Repacholi, 1993; Taraban et al., 2018).   Lyons-Ruth and colleagues (1993)

found that maternal depressive symptoms at 18 months postpartum predicted more

hostile and intrusive parenting when children were 18 months, which in turn predicted

teacher-reported children's hostile behaviors at age 5.   Taraban and colleagues (2018)

also found that associations between maternal depression at 9 months postpartum and

toddlers' risk for externalizing problems was fully mediated by mothers' over-reactive

parenting behaviors at 18 months.   Finally, Letourneau and colleagues (2013) showed

that family functioning and maladaptive parenting fully mediated the association between

depressive symptoms in infancy and children's inattention at 4 to 5 years of age;

however, family functioning and maladaptive parenting did not mediate the effects of

maternal depression at age 4 to 5 or chronic depressive symptoms on children's

inattention (Letourneau et al., 2013).   Conversely, Bureau and colleagues (2009) found

that maternal hostility when 18 months did not mediate the association between mothers'

depressive symptoms during the first year postpartum and children's depressive

symptoms at age 8.   These studies suggest that negative parenting behaviors may

mediate the associations of early maternal depression and some maladaptive child

outcomes.

Although researchers examining the processes by which maternal depression

affects children's development have primarily focused on adult mothers, a smaller body

of research indicates that maternal depressive symptoms may have similar negative

consequences for mother-child interactions in samples of adolescent mothers (Lesser &

Koniak-Griffin, 2000; Malphurs, Raag, Field, Pickens, & Pelaez-Nogueras, 1996;

Panzarine, Slater, & Sharps, 1995). In a study of 95 adolescent mothers (64% Latina), depressive symptoms at 4 to 6 weeks postpartum were associated with fewer positive mother-child interactions (e.g., maternal sensitivity to child cues; Lesser & Koniak-Griffin, 2000). In a sample of young mothers ($M = 19.6$, range 16 to 21; 33% Latina), Malphurs and colleagues (1996) showed that mothers with postpartum depression were more likely to be classified as intrusive and more likely to touch their infant in a negative manner (e.g., rough pulling and poking) than non-depressed mothers. Moreover, in a sample of African American adolescent mothers, Buckingham-Howes, Oberlander, Wang, and Black (2017) demonstrated that maternal nurturance (i.e., child-oriented language) fully mediated the association between a trajectory of high depressive symptoms and children's internalizing problems at age 7. Taken together, these results suggest that maladaptive parenting practices may serve as a mechanism of transmission of risk among families of adolescent mothers. The current study contributes to the existing literature by longitudinally examining the mediating role of Mexican-origin adolescent mothers negative parenting behaviors in the association between maternal depressive symptoms and children's subsequent psychosocial adjustment and cognitive development at 36 months.

Social Support as a Moderator

Given the detrimental effects of maternal depression on children's adjustment and mother's parenting behaviors, it is important to identify factors that can protect these families. Consistent with ideas from Belsky's (1984) model of determinants of parenting that the associations between maternal depression future parenting behaviors and child

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outcomes should be considered within the larger context in which the parent-child relationship is embedded, the current study examines adolescent mothers' perceived social support from their family as a moderator of adolescent mothers' depressive symptoms and their negative parenting, as well as adolescent mothers' depressive symptoms and children's outcomes.   Prior work with adult mothers has shown that high levels of perceived general support (i.e., support from family, friends, and significant other) are associated with more positive parenting behaviors (Green, Furrer, & McAllister, 2007; Kotchick, Dorsey, & Heller, 2005; Respler-Herman, Mowder, Yasik, & Shamah, 2012), fewer problem behaviors, and higher cognitive ability among children of depressed mothers (Anhalt, Telzrow, & Brown, 2007; McManus & Poehlmann, 2012). These results suggest that social support can be protective in families of adult mothers with depression.

It has been suggested that social support is particularly relevant to parenting and child outcomes in families of adolescent mothers given that adolescent mothers often experience higher levels of depression but have less social support than adult mothers (Nunes & Phipps, 2013; Passino & Whitman, 1993). However, evidence has been less consistent regarding the links between social support and future parenting behaviors and child outcomes in the context of adolescent motherhood.   Some evidence suggests that adolescent mothers' perceived social support from their parents fosters more positive parenting outcomes (Clemmens, 2001; Oberlander, Black, Starr, 2007).   Indeed, a meta-analysis showed that social support had a positive, moderate effect on adolescent mothers' parenting behaviors (Clemmens, 2001).   On the other hand, related work has

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shown that adolescent mothers; perceived social support is associated with poorer

parenting outcomes (Chase-Lansdale, Brooks-Gunn, & Zamsky, 1994; Driscoll &

Easterbrooks, 2007; Oyserman, Radin, & Saltz, 1994; Spieker & Bensley, 1994).   Thus,

it is possible that while social support protects some adolescent mothers from engaging in

poor parenting practices, for other adolescent mothers, social support may also be a

stressor that increases relationship conflict and, in turn, leads to parenting difficulties.

Moreover, if support involves assuming some of the adolescent mother's responsibilities

it could reduce parenting self-efficacy, which may, in turn, increase negative parenting

behaviors.   In a sample of Latina adolescent mothers, Contreras (2004) demonstrated

that for adolescent mothers who co-resided with their mothers, higher social support was

associated with more positive parenting behaviors, whereas higher social support was

associated with less positive behaviors among non-co-residing adolescent mothers.

Contreras (2004) argues that these findings are in line with Latinos' endorsement of

values that emphasize interdependence among family members.   However, additional

research is needed to understand when support is beneficial to Latina adolescent mothers.

The current study examines whether Mexican-origin adolescent mothers' perceived

social support from their family during pregnancy and 10 months postpartum is uniquely

associated with lower negative parenting behaviors.

Regarding the effects of social support on children's outcomes in families of

adolescent mothers, the limited research findings are mixed.   Whitson, Martinez, Ayala,

and Kaufman (2011) found no association between perceived general social support from

family, friends, and/or significant other during pregnancy and children's developmental

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outcomes at six months, and Sommer and colleagues (2000) found perceived grandmother and family support during pregnancy to be unrelated to children's socio-emotional problems at age three. In contrast, Leadbeater and Bishop (1994) found that perceived support from family during the first year postpartum was associated with fewer toddler behavior problems (i.e., externalizing and internalizing). Thus, it is possible that perceived support during pregnancy is not as relevant for children's outcomes as perceived support later in the postpartum period.

Furthermore, high levels of perceived social support are theorized to buffer adolescent mothers from the risk of engaging in negative parenting behaviors imposed by adolescent mothers limited financial and psychosocial resources. Conversely, in the context of depression, mothers with low levels of perceived social support may struggle to engage in positive parenting behaviors because they feel isolated and overwhelmed. Although there is theoretical support for the buffering role of social support, few studies have examined whether social support moderates the association between maternal depression and mothers' parenting behaviors, even in samples of adult mothers. Two studies with adult mothers showed that perceived general social support (Lee, Anderson, Horowitz, & August 2009) and mothers' satisfaction with social support (Taraban et al., 2018) did not moderate the association between mothers' depressive symptoms and parenting (positive or negative behaviors). In a sample of adult Black mothers, Jackson, Gyamfi, and Brooks-Gunn (1998) showed that when mothers' perceived more tangible support (e.g., giving a ride) from individuals in their social network they were more likely to spank their children.

Although even less work has examined social support as a moderator of the associations between mothers' depressive symptoms and children's outcomes, the buffering nature of social support in the context of maternal depression may extend to children of adolescent mothers, with those who are protected by social support displaying less maladjustment over time. For instance, McManus and Poehlmann (2012) found that maternal depressive symptoms at 9 months postpartum were related to a 9-point lower cognitive functioning score at 16 months, but only among mothers who reported relatively low levels of perceived family (i.e., baby's father and grandparents) social support. It is possible that adolescent mothers' social support from their family could modify the association between maternal depression and children's outcomes by reducing financial and parenting burdens, thereby enabling adolescent mothers' to better address their children's needs. The current study contributes to the extant literature by examining whether Mexican-origin adolescent mothers' perceived social support from their family influences the extent to which mother's perinatal depressive symptoms negatively impact their parenting behaviors and their children's developmental outcomes.

The Current Study

Using a longitudinal design, in the current study I examined the prospective effects of Mexican-origin adolescent mothers' perinatal depressive symptoms on three child outcomes: internalizing problems, externalizing problems, and cognitive ability (see Figure 1). The goal of the study was to examine the mechanisms that may explain the intergenerational transfer of depression risk from adolescent mothers to their children by using a multi-method (i.e., survey and observational assessments) design in which data

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were collected across four years. Four aims guided the current study. For Aim 1, I explored the extent to which adolescent mothers' perinatal depressive symptoms are associated with negative parenting behaviors, and in turn, their children's well-being. Based on theory and empirical evidence suggesting that maternal depression affects children's adjustment through its effects on parenting (Goodman & Gotlib, 1999; Lovejoy et al., 2000), it is expected that adolescent mothers' negative parenting will partially mediate the association between adolescent mothers' perinatal depressive symptoms (i.e., Wave 1 and Wave 2; W1 and W2) and children's developmental outcomes (W4; see Figure 1), such that greater depressive symptoms will be related to higher levels of negative parenting, which, in turn, will be associated with higher levels of children's externalizing and internalizing problems, and lower levels of children's cognitive ability at 36 months.

Although some researchers have examined the effects of the timing, severity, and chronicity of adult mothers' depression on their parenting and children's outcomes during the perinatal period, there has been no research that has attempted to differentiate these effects in samples of families of adolescent mothers. Thus, a second aim was to examine the associations between severity, chronicity, and timing of adolescent mothers' perinatal depressive symptoms, their negative parenting and children's developmental outcomes. The hypothesis for Aim 2 are as follows: 1) higher levels of adolescent mothers' depressive symptoms will be associated with increases in their negative parenting, their children's externalizing and internalizing behaviors, and decreases in children's cognitive ability, 2) based on research suggesting that mothers with chronic depression during the

perinatal period are less likely to engage in positive parent-child interactions (e.g., Letourneau et al., 2010) and more likely to have children with adjustment problems (Frankel & Harmon, 1996) than mothers with episodic or remitting depression it is expected that as the number of waves adolescent mothers report high levels of depression increases their negative parenting behaviors will increase and children will demonstrate higher externalizing and internalizing behaviors, and lower cognitive ability, and 3) regarding the timing of adolescent mothers' depressive symptoms, it is hypothesized that adolescent mothers' prenatal (W1) and postnatal (W2) depressive symptoms will be independently, positively associated with children's externalizing and internalizing problems, and negatively associated with children's cognitive ability at 36 months (W4). Given that severity and chronicity of maternal depressive symptoms are commonly confounded (Barker et al., 2011; Leis et al., 2014), in the current study I teased apart the unique associations between severity versus chronicity of adolescent mothers' depressive symptoms and children's developmental outcomes by examining whether chronicity of symptoms moderates the effects of severity of symptoms on children's outcomes. I expect that the chronicity of adolescent mothers' depressive symptoms will moderate the association between their perinatal depressive symptoms (i.e., W1 and W2) and children's developmental outcomes at 36 months (i.e., W4). Specifically, I hypothesize that the association between adolescent mothers' depressive symptoms and children's developmental outcomes will be especially strong in families of mothers who have a course of consistently high depressive symptoms across the perinatal period (i.e., prenatal

and postnatal) as compared to families of mothers with no perinatal depression or those with only prenatal or postnatal depression.

A third aim of the current study was to explore the potential buffering effect of perceived social support from the family on adolescent mothers' parenting behaviors in the face of perinatal depressive symptoms. It is expected that the association between adolescent mothers' depressive symptoms and negative behaviors will be stronger for adolescent mothers who perceived that they receive low levels of social support from their families than for adolescent mothers who perceived that they receive high levels of support. In addition, I expect that chronic maternal depression will predict more negative parenting behaviors under conditions of low social support but not when support is high. I also examined the potential protective role of the families' support for children's future adjustment. It is expected that adolescent mothers' depressive symptoms will be positively associated with children's internalizing problems and externalizing problems, and negatively associated with children's cognitive ability and that these associations will be significantly weaker when adolescent mothers reported relatively higher, as compared to lower, levels of perceived social support from their families.

Finally, the study aimed to examine whether negative parenting behaviors mediate the associations between adolescent mothers' perinatal depressive symptoms and children's developmental outcomes differently depending on the level of adolescent mothers' perceived social support. It is expected that adolescent mothers' negative

parenting will mediate the associations between their perinatal depression and children's

outcomes among adolescent mothers who perceive relatively low levels of support.

Considering research indicating that prenatal psychosocial risks (e.g., substance

use, poverty) may partially explain the link between maternal depression and children's

outcomes (e.g., Goodman & Tully, 2009), the current study controlled for maternal

prenatal risk factors (e.g., socioeconomic status, drinking, smoking, and criminal

behavior) in all analyses.   Further, because previous work has found gender differences

in children's externalizing and internalizing problems (e.g., Campbell, Spieker,

Burchinal, & Poe, 2006), I controlled for child's gender.   Given prior work suggesting

negative associations between children's developmental outcomes (e.g., psychological

problems and academic difficulties) and mother's age and educational attainment

(Goodman et al., 2011; Greenberg et al., 1999; Hans & Thullen, 2009; Terry-Humen et

al., 2005), adolescent mother's age and educational level will be included as controls in

all analyses.

CHAPTER 2

METHODS

Participants

This study used data from a larger longitudinal study examining the experiences of Mexican-origin adolescent mothers and their families. Participants included 204 Mexican-origin adolescent mothers, their mother figures, and their children (58% male) in a metropolitan area in the Southwest. Families first participated when the adolescent was in the third trimester of her pregnancy (W1; $M_{weeks} = 30.9$, $SD = 4.52$) and again at 10 months (W2), 24 months (W3), 36 months (W4), 48 months (W5), and 60 months (W6) postpartum. Data for the current study come from assessments that occurred at W1, W2, W3, and W4; 96.1% of families were re-interviewed at W2, 87.75% at W3, and 87.75% at W4. Adolescent mothers were 15 to 19 years old at Wave 1 ($M = 16.80$, $SD = 1.00$) and were primarily born in the United States (64.2% U.S. born, 35.8% Mexico-born). Among the Mexican-born adolescents, years living in the United States ranged from less than 1 year to 18 years ($M = 7.79$, $SD = 4.59$). Adolescents' average level of education at W1 was 9.60 years ($SD = 1.45$; i.e., 9th grade; range 6 to 12 years); and 58.3% were enrolled in high school. Median household income was $22,067 ($SD = $19,839$).

Procedure

Adolescent mothers were initially recruited during pregnancy, from various sources, including high schools, community agencies, health centers serving pregnant women, and resource centers serving families in need. Eligibility criteria included that the adolescent participants had to be between the ages of 15 to 18 at recruitment, identify

as Mexican origin, currently pregnant, unmarried, and have a mother figure willing to participate in the study. At each wave, families participated in 2-3-hour interviews in the family's home. In-home assessments were conducted by a minimum of two female team members (one performed the child's developmental testing while the other interviewed the adolescent mother) who were extensively trained (i.e., a minimum of 30 hours) in global interviewing skills, cultural sensitivity, interview content, protection of human rights (e.g., administering consent and assent forms), and changes in the protocol at each new wave of data collection. Specifically, these assessments consisted of interviews with the adolescent mothers (120 minutes), videotaped observational mother-child interaction tasks, including a teaching task, a free-play task, and a clean-up task (15 minutes) and a child developmental testing session (30 minutes).

The current study utilized a subset of the collected data including assessments of maternal depressive symptoms and social support during the perinatal period (i.e., W1 and W2; negative parenting from the free-play task at 10 (W2) and 24 (W3) months postpartum; maternal reports of children's internalizing and externalizing problems at 36 months (W4); and children's cognitive ability from the child testing session at 36 months (W4). Observational coders (i.e., graduate research assistants and research staff) were trained to code adolescent mothers' parenting behaviors from the videotaped mother-child interaction tasks. Measures used in the current study are described more extensively below.

All assessments were individually administered in the participants preferred language (i.e., English or Spanish), with most (61%, 64%, 65%, and 66% at W1, W2,

W3, and W4, respectively) of the adolescent participants completing the interview in English. Each survey item was read aloud by interviewers to all participants to control for differences in reading ability. For the mother-child interaction task mothers interacted with their child in their language of choice. Finally, children were tested in their dominant language (56% English at W4). Participants and their parent or guardian provided consent/assent prior to data collection. Families who participated in the W1, W2, W3, and W4 assessments were compensated $25, $30, $35, and $40, respectively. The guardian of the child received $25 for the child observational portion of the study and a small gift for the child. The university's Human Subjects Review Board approved all procedures and provided oversight of the parent study.

Measures

All measures were available in English and Spanish. Following the recommendations of Knight, Roosa and Umaña-Taylor (2009) measures were translated to Spanish and back-translated, and inconsistencies were reviewed by a bilingual team of translators.

Adolescent mothers' depressive symptoms. Mothers' depressive symptoms were assessed during their third trimester of pregnancy (W1) and at 10 months postpartum (W2) using the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). The CES-D is a 20-item brief self-report measure that assesses the frequency of depressive symptoms in the past week (e.g., "I had crying spells"). Item responses were measured using a 4-point Likert scale (0 = *rarely or none of the time* to 3 = *most of the time*). Positively worded items were reverse coded. A total score is

calculated as a sum of responses to all 20 questions, with a total possible score of 60.

The CES-D also provides a cutoff score of 16 or greater that reflects individuals at risk

for clinical depression (Radloff, 1977). In the current study, scores on the 20 CES-D

items were *averaged* to assess the severity of adolescent mothers' depressive symptoms,

with higher scores indicating more depressive symptoms. An equivalent cutoff score of

.8 was calculated by multiplying the ratio of the summed cut-off score and total possible

score (i.e., 16/60) by the number of item responses greater than zero (i.e., 3). A

continuous measure of chronicity of adolescent mothers' depressive symptoms was

defined according to the number of CES-D administrations (0 to 2) on which the

adolescent mother scored .8 or greater ($M = 1.01$, $SD = .88$). For timing analysis, the

current study controlled for chronicity and severity of mothers' depressive symptoms by

defining timing within a restricted range of severity and chronicity: adolescent mothers

with a CES-D score of less than .8 during pregnancy and at 10 months postpartum (0 =

never severely depressed) will be compared to adolescent mothers with a CES-D score of

.8 or more during pregnancy only (1 = prenatal onset) and adolescent mothers with a

CES-D score of .8 or more at 10 months postpartum only (2 = postpartum onset).

Adequate reliability coefficients ($\alpha = .90$) for the CES-D were found with other Latino

samples (Umaña-Taylor & Updegraff, 2007) and in studies with adolescent mothers ($\alpha =$

.84-89; Black et al., 2002; Lewin et al., 2015). In the current sample, internal consistency

for the assessments at W1 and W2 were high ($\alpha = .87$ and .89 respectively).

Family social support. The *Family Support* subscale of the Multidimensional

Scale of Perceived Social Support (MSPSS; Canty-Mitchell & Zimet, 2000; Zimet,

Dahlem, Zimet, & Farley, 1988) was used to assess adolescent mothers' perceptions of support received from their family during their third trimester of pregnancy (W1) and at 10 months postpartum (W2). The *Family Support* subscale comprises 4 items (e.g., "My family really tries to help me") measured using a 7-point Likert scale (1 = *strongly disagree* to 7 = *strongly agree*). Item scores were averaged to create a scale score, with higher scores reflecting higher levels of perceived support. In the current study, Cronbach's alpha was .83 and .87 for W1 and W2, respectively.

Adolescent mothers' observed negative parenting. Observations of mother-child interactions during a free play task when the child was 10 (W2) and 24 (W3) months of age were used to assess adolescent mothers' negative parenting. During the 5-minute free-play task, a blanket was placed on the floor and the dyad was presented with a basket of toys. Adolescent mothers were instructed to play with their child as they normally would. Adolescent mothers' behavior during the free-play task was coded for sensitivity (e.g., interaction is child-centered) on a 4-point scale every 15 seconds (1 = *no sensitive behaviors observed* to 4 = *high, mother is very aware of the infant and contingently responsive*) at W2 and a 5-point scale every 60 seconds (1 = *no sensitive behaviors observed* to 5 = *high, mother is very aware of the infant and contingently responsive*) at W3. Scores were averaged across the 5-minute task to create a total sensitivity score at each wave. In the current study, total sensitive scores were reverse coded, and the recoded variable was used as an indicator of negative parenting. Intraclass correlation coefficients (ICCs) were assessed for approximately 15% of the sample and were .84 at W2 and .80 at W3.

Child internalizing and externalizing problems. Children's externalizing and internalizing problems were assessed at 36 months (W4) using adolescent mothers' reports on the Externalizing and Internalizing Syndrome subscales of the Child Behavior Checklist (CBCL; Achenbach, & Rescorla, 2000). The CBCL consists of items (e.g., "Is nervous, high strung, or tense") assessing children's internalizing problems and items (e.g."Defiant, talks back") assessing children's externalizing problems. Responses were scored on a 3-point scale (0 = *not true* to 2 = *very true*), and a sum score was calculated across items, with higher scores reflecting higher externalizing and internalizing problems. In a sample of Latino adolescent mothers, the subscales demonstrated adequate internal consistency (α = .86 for internalizing problems and α = .86 for externalizing problems; Smith et al., 2013). The subscales demonstrated high internal consistency with the current sample (α = .89 for internalizing problems and α = .92 for externalizing problems).

Child cognitive ability. Children's cognitive ability was measured at 36 months (W4) using the Woodcock Johnson III Tests of Achievement (WJ-III; Woodcock, McGrew, & Mather, 2001) in English or the Bateria III Woodcock-Muñoz (Bateria-III; Muñoz-Sandoval, Woodcock, McGrew, & Mather, 2005) in Spanish. The WJ-III and Bateria-III are widely utilized assessment batteries that can be used with individuals from age 2 to adulthood to measure general cognitive abilities and achievement. The current study used standard scores from three subtests of the WJ-III and Bateria-III that were identified as appropriate for preschool-age children: (1) Letter-Word Identification (Identificacion de letras y palabras), to measure children's word identification skills; (2)

Passage Comprehension (Comprension de textos), to measure children's ability to produce mental representations provided by text; and (3) Applied Problems (Problemas aplicados) to measure children's ability to analyze and solve simple math problems. In addition, children's receptive vocabulary skills at 36 months were measured with the Peabody Picture Vocabulary Test-IV (PPVT-IV; Dunn & Dunn, 2007), for children whose primary language was English, and with the *Test de Vocabulario en Imagenes Peabody* (TVIP; Dunn, Padilla, Lugo, & Dunn, 1997), for children whose primary language was Spanish. During the PPVT/TVIP assessment children were presented four pictures at a time and asked to point to a picture that represented a particular word. Raw scores (i.e., correct responses) were converted to standard scores. A multi-indicator latent cognitive ability variable included children's scores from the Letter-Word Identification, Applied Problems, and Passage Comprehension of the WJ-III/Bateria-III, and their scores from the PPVT/TVIP.

  Control variables. Background control variables included adolescent mothers' age, level of education (i.e., years in school completed), and child gender (0 = *Male*, 1 = *Female*). Finally, adolescent mothers' prenatal risk during the third month of pregnancy (W1) was assessed by creating a cumulative prenatal risk index from four indicators of risk. These four indicators were: (1) living in poverty, (2) cigarette smoking, (3) substance use, and (4) engaging in criminal activity. Adolescents received a score of '1' for each indicator if present or a score of '0' if absent. Twenty-nine (14.2%) adolescent mothers had zero risks, 35.8% ($n = 73$) had 1 risk, 17.6% ($n = 36$) had 2 risks, 13.2% ($n = 27$) had 3 risks, and 2.0% ($n = 4$) had 4 risks.

Analytic Plan

First, I examined descriptive statistics (i.e., means, standard deviations, ranges, skewness, and kurtosis), zero-order correlations between the study variables and the control variables, and attrition analysis using SPSS 24 (IBM Corp., 2016). The hypothesized models were tested using path analysis in Mplus version 7.2 (Muthén & Muthén, 1998-2014). Full information maximum likelihood estimation (FIML) was used to account for missing data and maintain an optimal sample size for analysis (Enders, 2013). Separate models were tested for each of the developmental outcomes at W4 (i.e., children's internalizing problems, externalizing problems, and cognitive ability). Mediation analyses were performed using 95% bias-corrected bootstrap confidence intervals based on 4,000 bootstrap samples. Mediation was tested using the model indirect test in Mplus. Significance of the indirect effects was examined by assessing whether zero was included in the confidence interval (MacKinnon & Dwyer, 1993). For moderation analysis, exogenous variables (i.e., adolescent mothers' depressive symptoms and social support) were mean-centered prior to creating interaction terms (Aiken & West, 1991). Interaction terms were created in Mplus. Moderation was examined by including the main effects of the independent variable (i.e., adolescent mothers' depressive symptoms at W1 and W2) and the moderator (e.g., social support at W1 and W2), as well as the interactions on the outcome. The degree of model fit was assessed using multiple fit indices: the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR);

model fit was considered good (acceptable) when RMSEA < .05 (.08), CFI > .95 (.90),

and SRMR < .05 (.08; Hu & Bentler, 1999).

CHAPTER 3

RESULTS

Preliminary Analyses

First, I identified outliers by examining whether scores on each continuous

variable exceeded $z \pm 3.29$ (Tabachnick & Fidell, 2013). The following variables had z-

scores outside of +/- 3.29: W1 depressive symptoms ($n = 1$), W1 social support ($n = 2$),

W2 social support ($n = 3$), W4 children's internalizing problems ($n = 1$), and W4

children's PPVT ($n = 1$). Further examination of these variables did not indicate any data

entry errors or patterns that could explain the outliers; thus, to reduce the influence of

these outliers, outlying cases were assigned the closest value within 3.29 standard

deviations of the mean. Next, skewness and kurtosis were examined, which indicated

that all variables were normally distributed (i.e., skewness less than two and kurtosis less

than seven; Tabachnick & Fidell, 2013). Third, I calculated descriptive statistics for all

study variables (see Table 1). Finally, I computed zero-order correlations among the

study variables (see Table 2). Regarding covariates, adolescent mothers' prenatal risk

was positively associated with perinatal depressive symptoms (i.e., W1 and W2), the

chronicity of adolescent mothers' depressive symptoms, negative parenting behaviors at

W2 and children's internalizing problems, and negatively associated with social support

at W1. Adolescent mothers with more education were older. Girls had significantly

higher applied problem scores and fewer externalizing problems than boys.

Missing Data and Attrition

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Patterns of attrition were as follows: 5 families (2.5%) only participated at W1, 15 families (7.4%) participated at two of the four waves, 28 families (13.7%) participated at three of the four waves, and 156 families (76.5%) participated at all four waves. Using multivariate logistic regression, I examined whether demographic variables at W1, adolescent mothers' depressive symptoms at W1 and W2, adolescent mothers' perceived social support at W1 and W2, and adolescent mothers' negative parenting significantly predicted the likelihood that families had missing data at W3 and W4. Results indicated that none of these variables were associated with an increased likelihood of missing data at either wave. Thus, under the missing at random assumption, all analyses were conducted in Mplus v.7.2 (Muthén, & Muthén, 1998-2014) using full information maximum likelihood to accommodate missing data.

Measurement Model

Prior to examining the hypothesized models, I tested a measurement model using confirmatory factor analyses (CFA) to ensure that the latent construct, cognitive ability, was adequately measured by the observed variables (i.e., Letter-Word Identification, Applied Problems, Passage Comprehension, and PPVT vocabulary). The measurement model demonstrated acceptable fit to the data: $\chi^2(2) = 3.96$, $p = .14$, CFI = .95; SRMR = .08; RMSEA = .08, 90% CI [.00, .21]. All model-estimated loadings were significant and in the expected direction: Applied Problems ($b = .82$, $p = .026$), Passage Comprehension ($b = .36$, $p = .011$), and PPVT vocabulary ($b = .40$, $p = .005$).

Structural Equation Analysis

Aim 1: Explore the extent to which adolescent mothers' perinatal depressive symptoms are associated with negative parenting behaviors, and in turn, their children's well-being.

Children's externalizing behaviors. First, associations between adolescent mothers' perinatal depressive symptoms, their negative parenting behaviors, and their children's externalizing behaviors were examined in two models (see Figure 1 for hypothesized model). In the first model, I examined whether adolescent mothers' depressive symptoms at W1 predicted children's externalizing problems at W4 via adolescent mothers' negative parenting behaviors at W2 (see Table 3, Model 1). This model demonstrated good fit to the data: $\chi^2(3) = 0.18$, $p = .980$; CFI = 1.0; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. Results revealed that adolescent mothers' depressive symptoms at W1 was significantly related to children's externalizing behavior. However, contrary to expectations, adolescent mothers' depressive symptoms at W1 was not significantly related to adolescent mothers' negative parenting behaviors at W2. Further, adolescent mothers' negative parenting behaviors at W2 was not significantly associated with children's externalizing problems. Thus, negative parenting behaviors at W2 was not a significant mediator of the relation between adolescent mothers' depressive symptoms at W1 and children's externalizing behavior at W4 ($b = .001$, $p = .925$, 95% CI [-.007, .008]). In the second model, I examined whether adolescent mothers' depressive symptoms at W2 predicted children's externalizing problems at W4 via adolescent mothers' negative parenting behaviors at W3 (see Table 3, Model 2). This model demonstrated good fit to the data: $\chi^2(3) = 0.18$, $p = .980$; CFI = 1.0; SRMR = .01;

RMSEA = .00, 90% CI [.00, .00]. Contrary to expectations, results revealed that

adolescent mothers' depressive symptoms at W2 and negative parenting behaviors at W3

were not significantly associated with children's externalizing problems. Further,

adolescent mothers' depressive symptoms at W2 was not significantly related to

adolescent mothers' negative parenting behaviors at W3. Thus, negative parenting

behaviors at W3 was not a significant mediator of the relation between adolescent

mothers' depressive symptoms at W2 and children's externalizing problems at W4($b =$

.01, $p =$.667, 95% CI [-.03, .04]). Regarding covariates in the models, boys had

significantly higher levels of externalizing problems than girls. In addition, adolescent

mothers' prenatal risk was positively associated with their negative parenting behaviors

at W2.

   Children's internalizing behaviors. Next, associations between adolescent

mothers' perinatal depressive symptoms, their negative parenting behaviors, and their

children's internalizing behaviors were examined in two models (see Figure 1 for

hypothesized model). In the first model, I examined whether adolescent mothers'

depressive symptoms at W1 predicted children's internalizing problems at W4 via

adolescent mothers' negative parenting behaviors at W2 (see Table 4, Model 1). This

model demonstrated good fit to the data: $\chi^2(3) = 0.27$, $p = .964$; CFI = 1.0; SRMR = .01;

RMSEA = .00, 90% CI [.00, .00]. Results revealed that adolescent mothers' depressive

symptoms at W1 was significantly related to children's internalizing problems.

However, contrary to expectations, adolescent mothers' depressive symptoms at W1 was

not significantly related to adolescent mothers' negative parenting behaviors at W2.

Further, adolescent mothers' negative parenting behaviors at W2 was not significantly associated with children's internalizing problems. Thus, negative parenting behaviors at W2 was not a significant mediator of the relation between adolescent mothers' depressive symptoms at W1 and children's internalizing problems at W4 ($b = .001$, $p = .922$, 95% CI [-.02, .02]). In the second model, I examined whether adolescent mothers' depressive symptoms at W2 predicted children's internalizing problems at W4 via adolescent mothers' negative parenting behaviors at W3 (see Table 4, Model 2). This model demonstrated good fit to the data: $\chi^2(3) = 0.30$, $p = .959$; CFI = 1.0; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. Results revealed that adolescent mothers' depressive symptoms at W2 was significantly related to children's internalizing problems. However, contrary to expectations, adolescent mothers' depressive symptoms at W2 was not significantly related to adolescent mothers' negative parenting behaviors at W3. Further, adolescent mothers' negative parenting behaviors at W3 was not significantly associated with children's internalizing problems. Thus, negative parenting behaviors at W2 was not a significant mediator of the relation between adolescent mothers' depressive symptoms at W1 and children's internalizing problems at W4 ($b = .002$, $p = .773$, 95% CI [-.01, .01]). Regarding covariates in the models, adolescent mothers' prenatal risk was positively associated with their negative parenting behaviors at W2.

Children's cognitive ability. Finally, associations between adolescent mothers' perinatal depressive symptoms, their negative parenting behaviors, and their children's cognitive ability were examined in two models (see Figure 1 for hypothesized model). In the first model, I examined whether adolescent mothers' depressive symptoms at W1

predicted children's cognitive ability at W4 via adolescent mothers' negative parenting behaviors at W2 (see Table 5, Model 1). This model demonstrated adequate fit to the data: $\chi^2(23) = 23.72$, $p = .420$; CFI = .99; SRMR = .08; RMSEA = .01, 90% CI [.00, .06]. Contrary to expectations, results revealed that adolescent mothers' depressive symptoms at W1 and negative parenting behaviors at W2 were not significantly associated with children's cognitive ability. Further, adolescent mothers' depressive symptoms at W1 was not significantly related to adolescent mothers' negative parenting behaviors at W2. Thus, negative parenting behaviors at W2 was not a significant mediator of the relation between adolescent mothers' depressive symptoms at W1 and children's cognitive ability at W4 ($b = .001$, $p = .925$, 95% CI [-.02, .02]). In the second model, I examined whether adolescent mothers' depressive symptoms at W2 predicted children's cognitive ability at W4 via adolescent mothers' negative parenting behaviors at W3 (see Table 5, Model 2). This model demonstrated good fit to the data: $\chi^2(23) = 18.66$, $p = .721$; CFI = 1.0; SRMR = .07; RMSEA = .00, 90% CI [.00, .04]. Contrary to expectations, results revealed that adolescent mothers' depressive symptoms at W2 and negative parenting behaviors at W3 were not significantly associated with children's cognitive ability. Further, adolescent mothers' depressive symptoms at W2 was not significantly related to adolescent mothers' negative parenting behaviors at W3. Thus, negative parenting behaviors at W3 was not a significant mediator of the relation between adolescent mothers' depressive symptoms at W2 and children's cognitive ability at W4 ($b = .01$, $p = .680$, 95% CI [-.04, .07]). Regarding covariates in the models, girls had significantly higher cognitive ability scores

than boys. In addition, adolescent mothers' prenatal risk was positively associated with their negative parenting behaviors at W2.

Aim 2: Examine the associations between severity, chronicity, and timing of adolescent mothers' perinatal depressive symptoms, their negative parenting and children's developmental outcomes.

Adolescent mothers' negative parenting W2. In the first step, I tested models linking the severity and chronicity of adolescent mothers' perinatal depressive symptoms to their negative parenting behaviors at W2 (see Figure 2 for hypothesized model). In the first model, I examined whether the chronicity of adolescent mothers' perinatal depressive symptoms predicts adolescent mothers' negative parenting behaviors at W2 (see Table 6, Model 1). The model demonstrated good fit to the data: $\chi^2(3) = .22$, $p = .975$; CFI = 1.0; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. Contrary to expectations, chronicity of adolescent mothers' depressive symptoms was not significantly associated with negative parenting behaviors at W2. In the second model, I tested whether the chronicity of adolescent mothers' depressive symptoms and adolescent mothers' depressive symptoms at W1 interact to predict negative parenting behaviors at W2 (see Table 6, Model 2). The model demonstrated good fit to the data: $\chi^2(3) = .20$, $p = .978$; CFI = 1.00; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. Contrary to expectations, chronicity of adolescent mothers' depressive symptoms and adolescent mothers' depressive symptoms at W1 did not interact to predict negative parenting behaviors at 10 months postpartum. Regarding covariates in the models, adolescent

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mothers' prenatal risk was positively associated with their negative parenting behaviors at W2.

Adolescent mothers' negative parenting W3. In the second step, I tested models linking the severity and chronicity of adolescent mothers' perinatal depressive symptoms to their negative parenting behaviors at W3 (see Figure 2 for hypothesized model). In the first model, I examined whether the chronicity of adolescent mothers' perinatal depressive symptoms predicts adolescent mothers' negative parenting behaviors at W3 (see Table 7, Model 1). The model demonstrated good fit to the data: $\chi^2(3) = .26$, $p = .967$; CFI = 1.0; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. Contrary to expectations, chronicity of adolescent mothers' depressive symptoms was not significantly associated with negative parenting behaviors at W3. In the second model, I tested whether the chronicity of adolescent mothers' depressive symptoms and adolescent mothers' depressive symptoms at W2 interact to predict negative parenting behaviors at W3 (see Table 7, Model 2). The model demonstrated good fit to the data: $\chi^2(3) = .25$, $p = .970$; CFI = 1.00; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. Contrary to expectations, chronicity of adolescent mothers' depressive symptoms and adolescent mothers' depressive symptoms at W2 did not interact to predict negative parenting behaviors at W3.

Children's externalizing problems. In the third step, I tested models linking the severity and chronicity of adolescent mothers' perinatal depressive symptoms to their children's externalizing problems at W4 (see Figure 3 for hypothesized model). In the first model, I examined whether the chronicity of adolescent mothers' perinatal

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depressive symptoms predicts children's externalizing problems at W4 (see Table 8, Model 1). The model demonstrated good fit to the data: $\chi^2(3) = .18$, $p = .980$; CFI = 1.0; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. As hypothesized, chronicity of adolescent mothers' depressive symptoms was significantly positively associated with children's externalizing problems at W4. In the second model, I tested whether the chronicity of adolescent mothers' depressive symptoms and adolescent mothers' depressive symptoms at W1 interact to predict children's externalizing problems at W4 (see Table 8, Model 2). The model demonstrated good fit to the data: $\chi^2(3) = .17$, $p = .983$; CFI = 1.00; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. Contrary to expectations, chronicity of adolescent mothers' depressive symptoms and adolescent mothers' depressive symptoms at W1 did not interact to predict children's externalizing problems at W4. In the third model, I examined whether the chronicity of adolescent mothers' depressive symptoms and adolescent mothers' depressive symptoms at W2 interact to predict children's externalizing problems at W4 (see Table 8, Model 3). The model demonstrated good fit to the data: $\chi^2(3) = .18$, $p = .981$; CFI = 1.00; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. Contrary to expectations, chronicity of adolescent mothers' depressive symptoms and adolescent mothers' depressive symptoms at W2 did not interact to predict children's externalizing problems at W4. Regarding covariates in the models, girls had significantly lower levels of externalizing problems than boys.

   Children's internalizing problems. In the fourth step, I tested models linking the severity and chronicity of adolescent mothers' perinatal depressive symptoms to their children's internalizing problems at W4 (see Figure 3 for hypothesized model). In the

first model, I examined whether the chronicity of adolescent mothers' perinatal depressive symptoms predicts children's internalizing problems at W4 (see Table 9, Model 1). The model demonstrated good fit to the data: $\chi^2(3) = .26$, $p = .967$; CFI = 1.0; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. As expected, chronicity of adolescent mothers' depressive symptoms was significantly positively associated with children's internalizing problems at W4. In the second model, I tested whether the chronicity of adolescent mothers' depressive symptoms and adolescent mothers' depressive symptoms at W1 interact to predict children's internalizing problems at W4 (see Table 9, Model 2). The model demonstrated good fit to the data: $\chi^2(2) = .26$, $p = .968$; CFI = 1.00; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. Contrary to expectations, chronicity of adolescent mothers' depressive symptoms and adolescent mothers' depressive symptoms at W1 did not interact to predict children's internalizing problems at W4. In the third model, I tested whether the chronicity of adolescent mothers' depressive symptoms and adolescent mothers' depressive symptoms at W2 interact to predict children's internalizing problems at W4 (see Table 9, Model 3). The model demonstrated good fit to the data: $\chi^2(2) = .26$, $p = .967$; CFI = 1.00; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. Contrary to expectations, chronicity of adolescent mothers' depressive symptoms and adolescent mothers' depressive symptoms at W2 did not interact to predict children's internalizing problems at W4.

Children's cognitive ability. In the fifth step, I tested models linking the severity and chronicity of adolescent mothers' perinatal depressive symptoms to their children's cognitive ability at W4 (see Figure 3 for hypothesized model). In the first model, I

examined whether the chronicity of adolescent mothers' perinatal depressive symptoms predicts children's cognitive ability at W4 (see Table 10, Model 1). The model demonstrated adequate fit to the data: $\chi^2(20) = 20.92$, $p = .402$; CFI = .96; SRMR = .08; RMSEA = .02, 90% CI [.00, .06]. Contrary to expectations, chronicity of adolescent mothers' depressive symptoms was not significantly associated with children's cognitive ability at W4. In the second model, I tested whether the chronicity of adolescent mothers' depressive symptoms and adolescent mothers' depressive symptoms at W1 interact to predict children's cognitive ability at W4 (see Table 10, Model 2). The model demonstrated adequate fit to the data: $\chi^2(26) = 33.35$, $p = .152$; CFI = .87; SRMR = .09; RMSEA = .04, 90% CI [.00, .07]. Contrary to expectations, chronicity of adolescent mothers' depressive symptoms and adolescent mothers' depressive symptoms at W1 did not interact to predict children's cognitive ability at W4. In the third model, I tested whether the chronicity of adolescent mothers' depressive symptoms and adolescent mothers' depressive symptoms at W2 interact to predict children's cognitive ability at W4 (see Table 10, Model 3). The model demonstrated adequate fit to the data: $\chi^2(26) = 31.19$, $p = .221$; CFI = .91; SRMR = .08; RMSEA = .03, 90% CI [.00, .07]. Contrary to expectations, chronicity of adolescent mothers' depressive symptoms and adolescent mothers' depressive symptoms at W2 did not interact to predict children's cognitive ability at W4. Regarding covariates in the models, girls had significantly higher cognitive ability scores than boys.

Timing effects. In the last step, I tested models examining the relations between the timing of adolescent mothers' depressive symptoms, their negative parenting

behaviors, and their children's developmental outcomes. These models demonstrated good fit to the data (see Table 11). In the first two steps, I examined whether the timing of adolescent mothers' depressive symptoms was associated with adolescent mothers' negative parenting behaviors at W2 and W3. Contrary to expectations, adolescent mothers' who experienced severe depression *only* at W1 were not significantly more likely to demonstrate negative parenting behaviors at W2 or W3 than adolescent mothers' who did not experience severe depression at either W1 or W2 (see Table 12, Models 1 and 2). Further, adolescent mothers' who experienced severe depression *only* at W1 were not significantly more likely to demonstrate negative parenting behaviors at W2 or W3 than adolescent mothers' who experienced severe depression *only* at W2 (see Table 12, Models 1 and 2). In the third step, I examined whether the timing of adolescent mothers' depressive symptoms was associated with children's externalizing problems at W4 (see Table 12, Model 3). Contrary to expectations, children of adolescent mothers' who experienced severe depression *only* at W1 were not significantly more likely to demonstrate externalizing problems at W4 than children of adolescent mothers' who did not experience severe depression at either W1 or W2. However, children of adolescent mothers' who experienced severe depression *only* at W1 were significantly more likely to demonstrate externalizing problems at W4 than children of adolescent mothers' who experienced severe depression *only* at W2. In the fourth step, I examined whether the timing of adolescent mothers' depressive symptoms was associated with children's internalizing problems at W4 (see Table 12, Model 4). Contrary to expectations, children of adolescent mothers' who experienced severe depression *only* at W1 were not

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significantly more likely to demonstrate internalizing problems at W4 than children of adolescent mothers' who did not experience severe depression at either W1 or W2. Further, children of adolescent mothers' who experienced severe depression *only* at W1 were not significantly more likely to demonstrate internalizing problems at W4 than children of adolescent mothers' who experienced severe depression *only* at W2. In the last step, I examined whether the timing of adolescent mothers' depressive symptoms was associated with children's cognitive ability at W4 (see Table 12, Model 5). Contrary to expectations, children of adolescent mothers' who experienced severe depression *only* at W1 were not significantly more likely to demonstrate cognitive ability at W4 than children of adolescent mothers' who did not experience severe depression at either W1 or W2. Further, children of adolescent mothers' who experienced severe depression *only* at W1 were not significantly more likely to demonstrate cognitive ability at W4 than children of adolescent mothers' who experienced severe depression *only* at W2.

Aim 3: Examine whether adolescent mothers' perceived social support moderates the associations between their depressive symptoms and negative parenting and between their depressive symptoms and children's developmental outcomes.

Adolescent mothers' negative parenting. In the first step, I tested models examining whether adolescent mothers' perceived social support moderates the association between their perinatal depressive symptoms and their negative parenting behaviors (see Figure 4 for hypothesized model). In the first model, I tested whether adolescent mothers' perceived social support at W1 moderates the association between

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their prenatal depressive symptoms (W1) and their negative parenting behavior at W2 (see Table 13, Model 1). This model demonstrated good fit to the data: $\chi^2(5) = .61$, $p = .988$; CFI = 1.0; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. Contrary to expectations, adolescent mothers' depressive symptoms and perceived social support at W1 did not interact to predict their negative parenting behavior at W2. In the second model, I examined whether adolescent mothers' perceived social support at W2 moderates the association between their depressive symptoms at 10 months postpartum (W2) and their negative parenting behavior at W3 (see Table 13, Model 2). This model demonstrated good fit to the data: $\chi^2(5) = .84$, $p = .974$; CFI = 1.0; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. Contrary to expectations, adolescent mothers' depressive symptoms at W2 and perceived social support at W2 did not interact to predict their negative parenting behavior at W3. In the third model, I examined whether adolescent mothers' perceived social support at W2 moderates the association between the chronicity of their depressive symptoms and their negative parenting behavior at W3 (see Table 13, Model 3). This model demonstrated good fit to the data: $\chi^2(5) = .87$, $p = .972$; CFI = 1.0; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. Contrary to expectations, the chronicity of adolescent mothers' depressive symptoms and perceived social support at W2 did not interact to predict their negative parenting behavior at W3.

Children's externalizing problems. In the second step, I tested models examining whether adolescent mothers' perceived social support moderates the association between their perinatal depressive symptoms and their children's externalizing problems at W4 (see Figure 5 for hypothesized model). In the first model, I

tested whether adolescent mothers' perceived social support at W1 moderates the association between their prenatal depressive symptoms (W1) and their children's externalizing problems at W4 (see Table 14, Model 1). This model demonstrated good fit to the data: $\chi^2(5) = .60$, $p = .988$; CFI = 1.0; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. Contrary to expectations, adolescent mothers' depressive symptoms and perceived social support at W1 did not interact to predict their children's externalizing problems at W4. In the second model, I tested whether adolescent mothers' perceived social support at W2 moderates the association between their depressive symptoms at 10 months postpartum (W2) and their children's externalizing problems at W4 (see Table 14, Model 2). This model demonstrated good fit to the data: $\chi^2(5) = .78$, $p = .988$; CFI = 1.0; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. Contrary to expectations, adolescent mothers' depressive symptoms at W2 and perceived social support at W2 did not interact to predict their children's externalizing problems at W4. In the third model, I examined whether adolescent mothers' perceived social support at W2 moderates the association between the chronicity of their depressive symptoms and their children's externalizing problems at W4 (see Table 14, Model 3). This model demonstrated good fit to the data: $\chi^2(5) = .78$, $p = .978$; CFI = 1.0; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. Contrary to expectations, the chronicity of adolescent mothers' depressive symptoms and perceived social support at W2 did not interact to predict their children's externalizing problems at W4.

Children's internalizing problems. In the third step, I tested models examining whether adolescent mothers' perceived social support moderates the association between

their perinatal depressive symptoms and their children's internalizing problems at W4 (see Figure 5 for hypothesized model). In the first model, I tested whether adolescent mothers' perceived social support at W1 moderates the association between their prenatal depressive symptoms (W1) and their children's internalizing problems at W4 (see Table 15, Model 1). This model demonstrated good fit to the data: $\chi^2(5) = .69$, $p = .984$; CFI = 1.0; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. Contrary to expectations, adolescent mothers' depressive symptoms and perceived social support at W1 did not interact to predict their children's internalizing problems at W4. In the second model, I tested whether adolescent mothers' perceived social support at W2 moderates the association between their depressive symptoms at 10 months postpartum (W2) and their children's internalizing problems at W4 (see Table 15, Model 2). This model demonstrated good fit to the data: $\chi^2(5) = .90$, $p = .971$ CFI = 1.0; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. Contrary to expectations, adolescent mothers' depressive symptoms at W2 and perceived social support at W2 did not interact to predict their children's internalizing problems at W4. In the third model, I tested whether adolescent mothers' perceived social support at W2 moderates the association between the chronicity of their depressive symptoms and their children's internalizing problems at W4 (see Table 15, Model 3). This model demonstrated good fit to the data: $\chi^2(5) = .86$, $p = .973$; CFI = 1.0; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. Contrary to expectations, the chronicity of adolescent mothers' depressive symptoms and perceived social support at W2 did not interact to predict their children's internalizing problems at W4.

Children's cognitive ability. In the fourth step, I tested models examining whether adolescent mothers' perceived social support moderates the association between their perinatal depressive symptoms and their children's cognitive ability at W4 (see Figure 5 for hypothesized model). In the first model, I tested whether adolescent mothers' perceived social support at W1 moderates the association between their prenatal depressive symptoms (W1) and their children's cognitive ability at W4 (see Table 16, Model 1). This model demonstrated good fit to the data: $\chi^2(28) = 27.46$, $p = .493$; CFI = 1.0; SRMR = .07; RMSEA = .00, 90% CI [.00, .05]. Contrary to expectations, adolescent mothers' depressive symptoms and perceived social support at W1 did not interact to predict their children's cognitive ability at W4. In the second model, I tested whether adolescent mothers' perceived social support at W2 moderates the association between their depressive symptoms at 10 months postpartum (W2) and their children's cognitive ability at W4 (see Table 16, Model 2). This model demonstrated good fit to the data: $\chi^2(28) = 22.30$, $p = .767$; CFI = 1.0; SRMR = .07; RMSEA = .00, 90% CI [.00, .04]. Contrary to expectations, adolescent mothers' depressive symptoms and perceived social support at W1 did not interact to predict their children's cognitive ability at W4. In the third model, I tested whether adolescent mothers' perceived social support at W2 moderates the association between the chronicity of their depressive symptoms and their children's cognitive ability at W4 (see Table 16, Model 3). This model demonstrated good fit to the data: $\chi^2(28) = 27.07$, $p = .514$; CFI = 1.0; SRMR = .07; RMSEA = .00, 90% CI [.00, .05]. Contrary to expectations, the chronicity of adolescent mothers'

depressive symptoms and perceived social support at W2 did not interact to predict their children's cognitive ability at W4.

Aim 4: Test moderated mediation models, whereby negative parenting behaviors mediate the associations between adolescent mothers' perinatal depressive symptoms and children's developmental outcomes among adolescent mothers who perceive low levels of support.

Children's externalizing behaviors. First, I examined whether adolescent mothers' negative parenting behaviors mediated the effect of mothers' perinatal depressive symptoms on children's externalizing behaviors depending on the level of adolescent mothers' perceived social support in two models. Beta coefficients for conditional indirect effects and bootstrap confidence intervals are shown in Table 17. In the first model, I examined whether adolescent mothers' perceived social support at W1 moderated the mediational path from mothers' depressive symptoms at W1 to children's externalizing problems at W4 via adolescent mothers' negative parenting behaviors at W2. This model demonstrated good fit to the data: $\chi^2(5) = 4.91$, $p = .428$; CFI = 1.0; SRMR = .02; RMSEA = .00, 90% CI [.00, .10]. Contrary to expectations, there was no evidence of moderated mediation (see Table 17, Model 1). In the second model, I examined whether adolescent mothers' perceived social support at W2 moderated the mediational path from mothers' depressive symptoms at W2 to children's externalizing problems at W4 via adolescent mothers' negative parenting behaviors at W3. This model demonstrated good fit to the data: $\chi^2(5) = 0.24$, $p = .980$; CFI = 1.0; SRMR = .01;

RMSEA = .00, 90% CI [.00, .00]. Contrary to expectations, there was no evidence of moderated mediation (see Table 17, Model 2).

Children's internalizing behaviors. Next, I examined whether adolescent mothers' negative parenting behaviors mediated the effect of mothers' perinatal depressive symptoms on children's internalizing behaviors depending on the level of adolescent mothers' perceived social support in two models. Beta coefficients for conditional indirect effects and bootstrap confidence intervals are shown in Table 18. In the first model, I examined whether adolescent mothers' perceived social support at W1 moderated the mediational path from mothers' depressive symptoms at W1 to children's internalizing problems at W4 via adolescent mothers' negative parenting behaviors at W2. This model demonstrated good fit to the data: $\chi^2(5) = 5.02$, $p = .413$; CFI = 1.0; SRMR = .02; RMSEA = .01, 90% CI [.00, .10]. Contrary to expectations, there was no evidence of moderated mediation (see Table 18, Model 1). In the second model, I examined whether adolescent mothers' perceived social support at W2 moderated the mediational path from mothers' depressive symptoms at W2 to children's internalizing problems at W4 via adolescent mothers' negative parenting behaviors at W3. This model demonstrated good fit to the data: $\chi^2(5) = 0.37$, $p = .996$; CFI = 1.0; SRMR = .01; RMSEA = .00, 90% CI [.00, .00]. Contrary to expectations, there was no evidence of moderated mediation (see Table 18, Model 2).

Children's cognitive ability. Finally, I examined whether adolescent mothers' negative parenting behaviors mediated the effect of mothers' perinatal depressive symptoms on children's cognitive ability depending on the level of adolescent mothers'

perceived social support in two models. Beta coefficients for conditional indirect effects

and bootstrap confidence intervals are shown in Table 19. In the first model, I examined

whether adolescent mothers' perceived social support at W1 moderated the mediational

path from mothers' depressive symptoms at W1 to children's cognitive ability at W4 via

adolescent mothers' negative parenting behaviors at W2. This model demonstrated good

fit to the data: $\chi^2(31) = 32.36$, $p = .399$; CFI = .97; SRMR = .07; RMSEA = .02, 90% CI

[.00, .06]. Contrary to expectations, there was no evidence of moderated mediation (see

Table 19, Model 1). In the second model, I examined whether adolescent mothers'

perceived social support at W2 moderated the mediational path from mothers' depressive

symptoms at W2 to children's cognitive ability at W4 via adolescent mothers' negative

parenting behaviors at W3. This model demonstrated good fit to the data: $\chi^2(31) = 21.69$,

$p = .892$; CFI = 1.0; SRMR = .06; RMSEA = .00, 90% CI [.00, .02]. Contrary to

expectations, there was no evidence of moderated mediation (see Table 19, Model 2).

CHAPTER 4

DISCUSSION

Depressive symptoms during the perinatal period (i.e., during pregnancy and the first postpartum year) are a significant risk factor for mothers' parenting behaviors (Field, 2010; Goodman & Gotlib, 1999; Lovejoy et al., 2000) and their children's behavioral, socio-emotional, and cognitive development (Goodman et al., 2011; Murray et al., 2011; Stein et al., 2014). Importantly, perceived social support is believed to facilitate more positive mother-child interactions (Green et al., 2007; Respler-Herman et al., 2012) and promote children's adjustment in the face of perinatal depression risks (Anhalt et al., 2007; McManus & Poehlmann, 2012). However, prior research examining the associations between perinatal depression, parenting behaviors, social support, and children's adjustment has primarily focused on *adult* mothers, and the limited work with high-risk adolescent mothers has not been specific to Mexican-origin adolescent populations. Examining the mechanisms by which Mexican-origin adolescent mothers' depression is associated with children's adjustment is important, especially given that Mexican-origin adolescent mothers have the highest teenage birthrate among all U.S. ethnic groups (National Vital Statistics Report, 2012) and a high likelihood of experiencing depressive symptoms during the perinatal period (Howell et al., 2005; Nadeem et al., 2006).

Utilizing tenets from Belsky's (1984) process model of determinants of parenting, the current study expands on the existing literature by examining whether Mexican-origin adolescent mothers' negative parenting behaviors mediate the associations between

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mothers' perinatal depressive symptoms and three child outcomes: internalizing symptoms, externalizing behaviors, and cognitive ability. In addition, I tested whether Mexican-origin adolescent mothers' perceived social support from their family modifies the extent to which mothers' perinatal depressive symptoms negatively impact their parenting behaviors and their children's developmental outcomes. Overall, the findings provide limited support for associations between adolescent mothers' perinatal depression, their perceived social support, their negative parenting, and children's developmental outcomes; however, mothers' perinatal depressive symptoms were uniquely related to children's emotional and behavioral problems at age three. The following findings are discussed below (1) relations between severity, chronicity, and timing of adolescent mothers' perinatal depressive symptoms and children's developmental outcomes, (2) nonsignificant indirect effects between adolescent mothers' perinatal depressive symptoms and their children's developmental outcomes through mothers' negative parenting behaviors, and (3) lack of evidence supporting adolescent mothers' perceived social support from their family as a moderator of the relations between mothers' depression and their negative parenting, and mothers' depression and their children's developmental outcomes.

Characteristics of Mexican-Origin Adolescents Mothers' Perinatal Depression

Mexican-origin adolescent mothers in this sample experienced high rates of severe perinatal depressive symptoms. Specifically, prior to the birth of their children, 52.9% of the total sample experienced severe depressive symptoms whereas 45.6 % experienced severe depressive symptoms at 10 months postpartum. These rates of

perinatal depression are similar to rates reported in other samples of ethnic minority

adolescent mothers (e.g., Deal & Holt, 1998), but higher than the prevalence rates

reported in samples of predominately white adolescent mothers and adult mothers (13%

and 7.5-13%, respectively; Bennett et al., 2004; Mollborn & Morningstar, 2009). These

results suggest that the adjustment to motherhood may be particularly difficult for ethnic

minority adolescent mothers. Also consistent with the literature, there was considerable

stability in adolescent mothers' depressive symptoms across the perinatal period ($r = .54$)

in this study. Comparing adolescent mothers who reported severe prenatal depressive

symptoms with those who did not, 37.3% versus 8.3% were rated as severely depressed

at 10-months postpartum. Thus, children in the current study were at high risk of being

repeatedly exposed to maternal depressive symptoms during the first year of their life,

which may help explain the heightened risk for adjustment problems among children of

adolescent mothers (Pogarsky et al., 2006; Whitman et al., 2001).

Relations between Adolescents Mothers' Perinatal Depression and Children's

Outcomes

Severity effects. Building on prior work indicating that children exposed to

maternal depression are at an increased risk of maladaptation (Goodman et al., 2011;

Murray et al., 2011; Stein et al., 2014), it was hypothesized that adolescent mothers'

perinatal depressive symptoms would be related to increases in children's externalizing

and internalizing problems and decreases in children's cognitive ability. As expected,

adolescent mothers' perinatal depressive symptoms were positively related to children's

risk of displaying externalizing and internalizing problems at age 3. Importantly, these

associations remained after controlling for established confounders (i.e., mothers

education level, age, and prenatal risk) suggesting that relations between perinatal

depression and children's outcomes are not due solely to risks associated with adolescent

motherhood. The finding that children exposed to postpartum depressive symptoms had

higher externalizing and internalizing problems at age three is consistent with prior work

linking adolescent mothers' postpartum depression to children's behavioral and

emotional problems (Leadbeater et al., 1996; Sieger & Renk, 2007; Spieker et al., 1999).

Moreover, the current study's longitudinal design enables findings to extend prior work

with Latina adolescent mothers, which showed that mothers' depressive symptoms at 18

months postpartum were concurrently related to children's internalizing and externalizing

problems (Smith et al., 2013). Also consistent with prior work with adult mothers (Van

Batenburg- Eddes et al., 2013; Velders et al., 2011), I found adolescent mothers' prenatal

depressive symptoms to positively predict children's internalizing and externalizing

problems. These findings highlight the negative consequences of adolescent mothers'

perinatal depressive symptoms on the development of children's externalizing and

internalizing problems and, thus provide potential targets to consider for prevention and

intervention programs with families of adolescent mothers.

Contrary to my hypothesis, mothers' perinatal depressive symptoms were only

marginally negatively related to children's cognitive ability at age three. Of note, the

patterns of relations were in the predicted direction in the final models. It is possible that

relations between adolescent mothers' perinatal depressive symptoms and children's

cognitive ability failed to reach statistical significance due at least in part to small sample

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size and low power. Nevertheless, the lack of direct relations was surprising given that

prior research has found that prenatal depression (Barker et al., 2011; Koutra et al., 2012)

and depression in the first year postpartum (Conroy et al., 2012; Letourneau et al., 2013)

are associated with lower cognitive ability in infancy and middle childhood. Moreover,

this hypothesis was based in part on findings that lower levels of adolescent mothers'

postpartum depression was associated with more positive child academic adjustment

outcomes at grade three (Rhule et al., 2006). This inconsistency may be due to

differences in measurement of children's cognitive ability (i.e., Bayley Scales of Infant

Development versus WJ-III/Bateria-III) or due to the fact that two of the three previous

studies compared children of severely or clinically depressed mothers to children of

mothers without depression (Conroy et al., 2012; Letourneau et al., 2013; Koutra et al.,

2012). Thus, it is possible that the adverse effects of perinatal depression on children's

cognitive development are specific to samples with severe, clinically relevant, maternal

depression. Interestingly, in the two studies that used the full range of depressive

symptoms (Barker et al., 2011; Rhule et al., 2006) zero-order correlations between

mothers' depressive symptoms and indicators of children's cognitive functioning were

not significant suggesting that findings from the larger multivariate model may reflect

Type 1 error. Additional research is needed to better understand the influence of

mothers' perinatal depressive symptoms on children's cognitive ability, particularly in

samples of adolescent mothers.

Chronicity effects. Another goal of the current study was to examine

associations between the severity and chronicity of adolescent mothers' perinatal

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depressive symptoms, and their children's developmental outcomes. Based on prior work suggesting that mothers with chronic depression during the perinatal period are more likely to have children with adjustment problems than mothers with episodic or remitting depression (Frankel & Harmon, 1996), I expected that as the number of waves adolescent mothers report high levels of depression increases their children will demonstrate higher levels of externalizing and internalizing behaviors, and lower cognitive ability, but the results only partially supported my hypothesis. With respect to the relation between chronicity of mothers' depressive symptoms and children's externalizing and internalizing problems, findings suggest that children of adolescent mothers with reoccurring depressive symptoms (i.e., severe prenatal and postpartum depression) were significantly more likely to demonstrate externalizing and internalizing problems than children of adolescent mothers without severe perinatal depression or those with relatively short duration symptoms (i.e., either severe prenatal or postpartum depression). This result is consistent with previous research demonstrating that chronic maternal depression is related to poorer emotional and behavioral developmental outcomes (Letourneau et al., 2013; Naicker et al., 2012; Pawlby, Hay, Sharp, Waters & O'Keane, 2009; Turney, 2011). Moreover, this finding is in accordance with the notion that variance in the relations between mothers' perinatal depression and children's developmental outcomes results from the increased likelihood that prenatal depressive symptoms will persistence in the postpartum period (Turney, 2011).

Regarding the relation between chronicity of mothers' depressive symptoms and children's cognitive ability, children of adolescent mothers with elevated symptoms of

both prenatal and postpartum depression were not more likely to have decreased cognitive ability than children of mothers with no episodes of severe depression or those with severe depression only at one time point. These findings are in contrast to previous studies that examined relations between chronicity of mothers' depression and children's cognitive functioning in infancy and early childhood (Evans et al., 2012; Kaplan et al., 2011; Letourneau et al., 2013). For example, Letourneau and colleagues (2013) showed that between 4 to 5 years old, children of mothers with reoccurring depression were 1.8 times more likely to score low on receptive vocabulary than children of nondepressed mothers. Similarly, poorer learning in response to an infant-directed speech task was found in 12-month-old infants of chronically depressed mothers relative to infants of mothers who had a shorter duration of depressive episodes (Kaplan et al., 2011). It may be that the effects of mothers' depressive symptoms are specific to certain domains of children's cognitive functioning (i.e., reasoning, receptive language) as opposed to global cognitive ability.

Finally, I expected that the combination of severity and chronically of adolescent mothers' perinatal depressive symptoms would be significant in relation to children's adjustment. Specifically, I hypothesized that children of mothers who were characterized as having both severe and chronic depressive symptoms would have the highest levels of externalizing and internalizing problems and the lowest levels of cognitive ability in the sample. However, when chronicity and severity were examined together, a significant interaction did not occur for any of the child developmental outcomes. Small sample size

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and multicollinearity likely limited the current study's ability to find statistically significant interactions. Future, studies should examine these effects with larger samples.

     Timing effects. The third goal of this study was to examine when exposure to adolescent mothers' depressive symptoms from the third trimester of pregnancy to 10 months postpartum confers risk for her child. It was expected that adolescent mothers' prenatal (W1) and postnatal (W2) depressive symptoms would be independently, positively associated with children's externalizing and internalizing problems, and negatively associated with children's cognitive ability at 36 months. The unadjusted effects indicated that adolescent mothers' prenatal depression had a stronger effect on children's externalizing and internalizing problems than mothers' depressive symptoms at 10 months postpartum. Further, when considering prenatal and postpartum depression in the same model and controlling for confounding variables mothers' prenatal depressive symptoms remained a significant predictor of children's problems, while the effect of mothers' postpartum depressive symptoms was reduced to nonsignificance. However, in analyses controlling for the severity (i.e., level of symptoms) of mothers' perinatal depressive symptoms, the timing of depressive symptoms was only modestly related to children's externalizing problems and unrelated to children's internalizing problems or cognitive ability. For externalizing problems, results suggested that children of mothers with prenatal depression were at higher risk of developing problems than children of mothers with postpartum depression, but not children of mothers without perinatal depression. Given small sample sizes for the timing analysis (i.e., $n = 127$) it is possible that differences in internalizing problems and cognitive ability between children exposed

to prenatal versus postpartum depressive symptoms are real and the current study is underpowered.

Nevertheless, results from the timing analysis provide support for the notion that the prenatal period may be more important for a range of children's health and developmental outcomes than the postpartum period (Hay et al., 2010; Talge, Neal, & Glover, 2007). Specifically, the current study findings suggest that prenatal depression may be particularly detrimental to children's emotional and behavioral adjustment, which supports previous contentions that fetal developmental may be a sensitive period for exposure to maternal depressive symptoms. Moreover, findings indicate that part of the pathway from adolescent mothers' prenatal depression to children's outcomes does not operate through prenatal depression persisting in the postpartum period. This finding is consistent with adult literature that showed that prenatal depression was related to adolescents' externalizing problems even after controlling for later exposure to maternal depression (Hay et al., 2010). Together, these findings signify that preventive interventions geared at identifying and treating mothers' depressive symptoms during pregnancy would be particularly beneficial in reducing children's risk for maladaptation.

There are several possible mechanisms that may underly the impact of mothers' prenatal depression on children's emotional and behavioral problems. First, children exposed to stress hormones in utero (e.g., cortisol) may be at risk for developing dysregulated stress responses systems, which in turn, may lead to a poor emotional and behavioral regulation (Goodman & Gotlib, 1999; Lundy et al., 1999). It is also possible that these children have a genetic predisposition to developing externalizing and

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internalizing problems (Goodman & Gotlib, 1999; Plomin, 1990). Future studies should try to distinguish among these possible explanations. For instance, researchers could collect physiological measures of stress concurrent with assessments of depressive symptoms and uses these measures as controls in tests of associations between prenatal depression and children's functioning.

Maternal Negative Parenting as a Mediator between Maternal Depression and Children's Outcomes

Adolescent mothers' perinatal depressive symptoms were expected to be positively associated with mothers' negative parenting behaviors and, in turn, higher levels of children's externalizing and internalizing problems, and lower levels of children's cognitive ability at 36 months. However, evidence of mediation was not found in the present study. Moreover, although there has been consistent empirical support for the association between mothers' depressive symptoms and their parenting behavior in samples of both adult (e.g., Lovejoy et al., 2000; Wilson & Durbin, 2010) and adolescent mothers (Lesser & Koniak-Griffin, 2000; Malphurs et al.,1996), adolescent mothers' perinatal depressive symptoms were not related to their parenting behaviors in the current study. These findings contrast with theoretical and empirical work suggesting that maternal depression adversely affects children's adjustment through alterations in mothers' parenting behaviors (Beardslee, et al., 2011; Cummings & Davies, 1994; Goodman & Gotlib, 1999).

To my knowledge, there is only one study that found that adolescent mothers' parenting behaviors mediated the relation between their depressive symptoms and their

children's developmental outcomes (Buckingham-Howes et al., 2017). Although

Buckingham-Howes and colleagues (2017) examined a similar process as the current

study, there are important methodological differences that could explain the inconsistent

findings. First, in the current study severe depression was defined as having scores above

the clinical cutoffs for the CES-D, in the study conducted by Buckingham-Howes and

colleagues (2017), mothers above the cutoff were split into two groups: 1) a medium

depressive symptom trajectory composed of mothers with scores that decreased over time

and 2) a high depressive symptom trajectory group composed of mothers who scored

higher than 10 points above the cutoff at baseline and whose scores increased over time.

Importantly, mothers' parenting did not mediate the relations between medium and low

depressive symptoms trajectories and children's internalizing or externalizing problems

(Buckingham-Howes et al., 2017). It is possible that adolescent mothers' negative

parenting behaviors only mediate the relation between *severe* maternal depressive

symptoms and children's outcomes and not the relation between less severe depressive

symptoms and children's outcomes because the negative parenting behaviors of severely

depressed mothers exceed that found in less severely depressed mothers. The current

study results may have been different if I utilized a clinical evaluation of maternal

depressive symptoms.

Second, Buckingham-Howes and colleagues (2017) utilized two parenting

measures: 1)   nurturance (i.e., child-oriented language) and control (i.e., intrusiveness).

In their study, maternal control did not mediate the relation between any of the depressive

symptom trajectories and children's internalizing or externalizing behaviors

(Buckingham-Howes et al., 2017). The fact that negative parenting behaviors did not

mediate the relation between adolescent mothers' depressive symptoms and children's

outcomes in the current study or Buckingham-Howes and colleagues (2017) study

indicates that observational measures of negative parenting behaviors may have limited

variability, which reduces their predictive value. Indeed, at each of the time points in

Buckingham-Howes and colleagues (2017) study maternal control had less variability

that maternal nurturance. It is also possible that variability in the negative parenting

behaviors of adolescent mothers' that is not captured with a single measure. For

example, Jones and Field (2003) suggest that while some depressed mothers engage in

more overt negative parenting behaviors, others withdrawal during interactions with their

children, thereby reducing the likelihood that negative parenting behaviors will be

observed. Thus, the current study findings should not be interpreted as supporting the

notion that adolescent mothers' negative parenting behaviors are not a mechanism of risk.

Rather, they suggest that the etiology of negative parenting behaviors in samples of

adolescent mothers needs to be further explored. Moreover, a clearer understanding of

how negative parenting behaviors drive some of the intergenerational effects of maternal

depressive symptoms likely requires conceptualizing adolescent mothers' negative

parenting behaviors as multidimensional. Given that research has shown that

intervention programs effectively reduce negative parenting behaviors (Chen & Chan,

2016; Letourneau, Dennis, Cosic, & Linder, 2017; Thomas & Zimmer-Gembeck, 2007),

future research should examine how with-in group differences in parenting behaviors are

associated with adolescent mothers' depressive symptoms and their children's adjustment

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outcomes. For instance, using a person-oriented approach, researchers could examine how depressive symptoms contribute to profiles of parenting behaviors and the consequences these profiles have for children's adjustment.

The Role of Social Support

      Direct effects. It was expected that adolescent mothers' perceived social support from their family would be negatively associated with mothers' maladaptive parenting behaviors, children's internalizing and externalizing problems, and positively associated with children's cognitive ability. Interestingly, perceived social support was not significantly related to adolescent mothers' negative parenting behaviors at either wave. This finding is in contrast with Belsky's (1984) contention that high levels of social support would be related to more positive parenting behaviors, as well as several studies that have demonstrated positive relations between *adult* mothers' social support and their positive parenting (e.g., Green et al., 2007; Kotchick et al., 2005; Respler-Herman et al., 2012). Moreover, the current study results add to the debate about whether social support is protective in families of adolescent mothers with depression. Specifically, whereas some work has found that adolescent mothers' perceived social support is related with less optimal parenting behaviors (Chase-Lansdale et al., 1994; Driscoll & Easterbrooks, 2007; Oyserman et al., 1994; Spieker & Bensley, 1994) other work, including a meta-analysis, demonstrate that perceived social support fosters more positive parenting behaviors (Clemmens, 2001; Oberlander et al., 2007). Although the relation between social support and negative parenting was not statistically significant in the current study, it is noteworthy that the patterns of association were in the predicted direction. This

suggests the potential for social support from family to positively influence Mexican-origin adolescent mothers' parenting behaviors. However, future research is needed to systematically differentiate the types of support that are beneficial to adolescent mothers and the conditions under which social support is not beneficial. This work could lead to more efficacious intervention programs for adolescent mothers and their families by targeting important sources of support. For example, it is possible that some forms of support (e.g., advice giving) foster positive parenting behaviors by serving as a source of learning whereas other types of support (e.g., caregiving) led to an over-reliance on others and fewer parenting experiences, which in turn, limits the adolescent mother from gaining key parenting skills that may prevent her from engaging in negative parenting behaviors. Further, it may be that for adolescent mothers, other factors, such as satisfaction with social support may be more important to informing parenting behaviors. Future research is needed to examine this possible effect.

Regarding the effect of social support on children's developmental outcomes, contrary to my hypothesis, adolescent mothers' perceived social support from the family was not related to children's developmental outcomes. The current study finding that perceived support from family during pregnancy was not related to children's outcomes is consistent with other work indicating that adolescent mothers' perceived support during pregnancy may not relevant for children's cognitive or socio-emotional outcomes (Sommer et al., 2000; Whitson et al., 2011). However, the absence of a significant relation between perceived support from family during the first year postpartum and children's adjustment is interesting. Specifically, this finding is contrary to prior studies

that have demonstrated positive relations between perceived support during the postpartum period and children's adjustment outcomes in samples of adult (Anhalt et al., 2007; McManus & Poehlmann, 2012) and adolescent mothers (Leadbeater & Bishop, 1994). However, it should be noted that the prior studies with adult mothers assessed mothers' perceived support from multiple sources (i.e., partner, family, friends; Anhalt et al., 2007; McManus & Poehlmann, 2012). Consequently, it may be that the observed relations between mothers' perceived social support and children's outcomes are an artifact of the availability of supportive adult persons in the children's lives, which may serve as a protective factor for children. This may explain the lack of statistically significant relations in the current study. Future studies ought to include assessments of the size of mothers' social network to more thoroughly examine these relationships. On the other hand, the current sample consisted of Mexican-origin adolescent mothers who primarily lived with their families. One might expect that as a result of living with their families there are not only more opportunities for these adolescent mothers to be supported but as a result of endorsing traditional Mexican values such as a sense of familism (e.g., family interdependence; reciprocity; obligations) these mothers likely experience a high degree of support from their family. This may have decreased the observed variability in perceived social support from the family, which reduced the likelihood of finding a statistically significant relation with parenting behaviors and children's developmental outcomes.

Buffering effect. It was expected that adolescent mothers' perinatal depressive symptoms would be positively associated with their negative parenting behaviors, their

children's internalizing and externalizing problems, and negatively associated with

children's cognitive ability and that these associations would be significantly weaker

when adolescent mothers reported relatively higher, as compared to lower, levels of

perceived social support from their families. Results from the current study suggested

that **t**he association between adolescent mothers' perinatal depressive symptoms and their

negative behaviors at 10 and 24 months postpartum was not moderated by perceived

social support from their families. These findings support results of two of the three

previous studies that examined *adult* mothers' perceived social support as a moderator of

the relation between mothers' depressive symptoms and their parenting behaviors

(Jackson et al., 1998; Lee et al., 2009; Taraban et al., 2018). Specifically, the results are

consistent with prior research demonstrating that high levels of perceived social support

do not decrease depressed mothers risk of engaging in high levels negative parenting

behaviors (Taraban et al., 2018) or low levels negative parenting behaviors (Lee et al.,

2009). However, the findings are also in contrast to those reported by Jackson and

colleagues (1998), who found that when depressed mothers' perceived more tangible

support they were more likely to spank their children than nondepressed mothers. It may

be that depressed mothers view instrumental support such as having someone take care of

their child as intrusive, which could lead to further distress and in turn, less optimal

parenting behaviors. It is possible that the current study's measure of perceived social

support captured more negative aspects of support and thereby obscured the effect of

other forms of support (e.g., emotional support) that may potentially protect depressed

mothers from engaging in negative parenting behaviors. Future studies would benefit

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from differentiating between various forms of adolescent mothers' perceived social support in order to more clearly understand whether social support buffers the effects of depressive symptoms on negative parenting behaviors.

Turning to the potential buffering effect of social support on children's developmental outcomes, results indicated that adolescent mothers' perceived social support from the family did not moderate the relations between their perinatal depressive symptoms and their children's learning, emotional or behavioral outcomes. To my knowledge, only one other study has tested these relations. Specifically, McManus and Poehlmann (2012) found that maternal postpartum depression was related to children's lower cognitive functioning at 16 months, but only among mothers who reported relatively low levels of perceived family social support. The interplay between mothers' depressive symptoms and their perceived social support, however, may be more important for children's cognitive development during infancy and early toddlerhood when there is a substantial increase in cognitive growth. It is possible that the results from the current study would be different had an earlier measure of cognitive ability been utilized. It is also possible that the interaction between perceived social support from the family and mothers' perinatal depressive symptoms failed to reach statistical significance due at least in part to limited variability in both measures and low power.

Moderated mediation effect. It was expected that adolescent mothers' negative parenting would mediate the associations between their perinatal depression and children's outcomes among adolescent mothers who perceive relatively low levels of support; however, this hypothesis was not supported. This result was not surprising

given that the associations between adolescent mothers' perinatal depressive symptoms and their negative behaviors at 10 and 24 months postpartum were not moderated by perceived social support from their families. More research is necessary that examines the mediating role of both observational and self-reported parenting between perinatal maternal depression and children's adjustment outcomes at various levels of perceived social support.

Strengths and Limitations

A major strength of the current study is that it was the first to examine the effects of Mexican-origin adolescent mothers' prenatal and postpartum depressive symptoms on children's emotional, behavioral and cognitive outcomes. The current study also utilized multiple methods, including adolescent mothers' reports, observations of parenting and a child developmental screening. Additional strengths include the four-wave longitudinal design, testing the same constructs at multiple times, and controlling for co-occurring socio-demographic risks. Despite adding to the literature, this study has some limitations that should be noted. First, given that the sample was composed of single Mexican-origin adolescent mothers the results cannot be generalized to other groups of adolescent mothers. However, this understudied group is at risk for depression, and therefore, this study makes an important contribution to the knowledge in the field. Future research should attempt to replicate these findings with other groups of Latina adolescent mothers as well as adolescent mothers of other ethnic backgrounds. Generalizability was also limited by the current study's exclusive focus on perceived social support from the family, without attention to additional sources of support (e.g., partner and friends)

outside their family that contribute to adolescent mothers' parenting behaviors and children's developmental outcomes. Further, eligibility criteria for the current study included having a mother figure willing to participate in the study which may have reduced external validity by increasing self-selection effects. Specifically, because mother figures agreed to participate the sample may have overrepresented adolescent mothers with high levels of perceived support. Findings from the current study should be replicated using samples of adolescent mothers that are recruited without requiring a family member to participate.

Another limitation was a reliance on adolescent mothers' reports, with no objective ratings of children's externalizing and internalizing symptoms. It is possible that there may have been over-reporting of children's internalizing and externalizing symptoms (i.e., scores inflated) because of depressed mothers negative perceptual bias (Gartstein, Bridgett, Dishion, & Kaufman, 2009), which may be reflected in the reported associations between maternal depression and children's emotional and behavioral outcomes. However, some research suggests that mothers with depression may be more accurate reporters of their child's behavior than non-depressed mothers (see Ackermann and DeRubeis 1991 for a review). Nevertheless, measuring children's problem behaviors using observational tasks or another reporter would have enhanced the validity of the current study findings. Finally, due to the relatively small sample size, the current study had limited power to detect relations with smaller effect sizes that have been documented in studies with large samples, suggesting the need for replication.

Summary

This is the first study to examine associations between perinatal depressive symptoms, social support, negative parenting and children's adjustment outcomes in a sample of Mexican-origin adolescent mothers and their children. Results from the current study have several implications, particularly for preventive programs that focus on altering the emotional and behavioral developmental outcomes of this vulnerable group of children. I found that adolescent mother's prenatal depressive symptoms posed a greater threat to children's adjustment than depressive symptoms in the postpartum period. Moreover, the effects of prenatal depression were not due solely to symptoms persisting in the postpartum period. This study adds to the growing body of research suggesting that children are particularly sensitive to the effects of maternal distress during fetal development. Results suggest that screening and treatment of adolescent mothers' depressive symptoms during pregnancy would have far-reaching implications for disrupting the negative intergenerational transmission of depression risks. This may be critically important for interventions aimed at protecting children of adolescent mothers from the well establish negative consequences of being exposed to maternal depression.

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APPENDIX A

TABLES

Table 1.

Descriptive Statistics for Study Variables

	Mean	*SD*	Minimum	Maximum	Skewness	Kurtosis
Depressive Symptoms W1	.88	.51	.05	2.35	.68	-.08
Depressive Symptoms W2	.87	.56	.00	2.35	.56	-.57
Social Support W1	6.14	.81	3.50	7.00	-1.03	.68
Social Support W2	6.00	1.00	3.25	7.00	-1.03	.34
Negative Parenting W2	3.28	.51	2.00	4.00	-.38	-.24
Negative Parenting W3	2.94	.91	1.00	5.00	.33	-.76
Children's Externalizing Problems W4	14.11	8.87	0	40.00	.76	.37
Children's Internalizing Problems W4	10.56	8.09	0	36.00	.98	.52
Children's PPVT Score W4	89.75	10.74	54.00	123.00	-.70	2.75
Children's Letter/Word Score W4	90.47	11.31	76.00	115.00	.37	-1.02
Children's Applied Problem Score W4	82.97	11.40	65.00	112.00	.48	-.35
Children's Passage Comprehension Score W4	77.58	32.77	21.00	126.00	-.45	-1.23

Note. W1 = Wave 1; W2 = Wave 2; W3 = Wave 3; W4 = Wave 4

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Table 2.

Correlations among Study Variables

	2.	3.	4.	5.	6.	7.	8.	9.	10	11.	12.	13.	14.	15.	16.	17.	18.
1. AM Age	.66***	.05	.05	-.07	.03	-.04	-.04	.00	.03	-.07	-.11	.04	.05	.07	.04	.15	.19
2. AM Education Level	~	.05	.08	-.14	-.11	-.16	-.02	.08	.07	-.16	-.16	.05	-.07	-.09	-.10	.20	.22
3. AM Prenatal Risk		~	.02	.27***	.28***	.28***	.08	-.18*	-.11	.17*	-.08	.16	.18*	.02	-.12	-.14	.01
4. C Gender a			~	.02	.05	-.02	-.04	-.15*	-.01	-.05	.02	-.17*	-.11	.13	.20	.19*	.03
5. AM Depression W1				~	.54***	.77***	.43***	-.30***	-.18*	.05	.11	.24**	.33***	.06	-.14	-.19*	-.31**
6. AM Depression W2					~	.78***	.70***	-.14	-.23**	.07	-.06	.19*	.21**	-.12	-.24*	-.16	-.14
7. Depression Chronicity						~	.92***	-.25**	-.24**	.06	-.01	.23**	.26**	-.02	-.17	-.18	-.31**
8. Timing of Depression							~	-.16	-.25**	.04	-.05	-.04	-.04	-.01	-.05	-.09	-.27*
9. Social Support W1								~	.45***	-.08	-.13	-.09	-.12	-.04	.04	.06	.02
10. Social Support W2									~	.01	-.13	.02	.02	.01	.10	-.04	-.10
11. AM Parenting W2										~	.19*	-.03	-.07	-.06	-.03	-.10	-.09
12. AM Parenting W3											~	-.14	-.04	-.14	-.04	-.11	-.11
13. C Externalizing W4												~	.77***	-.01	-.19	-.15	-.01
14. C Internalizing W4													~	-.01	-.21	-.13	-.06
15. C PPVT W4														~	.33**	.39***	.01
16. C Letter/Word W4															~	.28*	-.34*
17. C Applied Problem W4																~	.37***
18. C PC W4																	~

Note. AM = Adolescent Mother; C = Child; W1 = Wave 1; W2 = Wave 2; W3 = Wave 3; W4 = Wave 4; PC = passage comprehension; a 0 = Male, 1 = Female. * $p < .05$, **$p < .01$, ***$p < .001$.

Table 3.

Estimates from Aim One Models Linking Adolescent Mothers' Perinatal Depressive Symptoms, Negative Parenting, and Children's Externalizing Problems

Model 1: Direct Effects	*b*	SE	*p*
Adolescent Mothers' Depression W1 → Children's Externalizing Problems W4	.23	.07	.002
Adolescent Mothers' Negative Parenting W2 → Children's Externalizing Problems W4	-.05	.08	.563
Adolescent Mothers' Age → Children's Externalizing Problems W4	.03	.11	.812
Adolescent Mothers' Education Level → Children's Externalizing Problems W4	.06	.14	.688
Adolescent Mothers' Prenatal Risk → Children's Externalizing Problems W4	.09	.09	.318
Children's Gender → Children's Externalizing Problems W4	-.19	.07	.009
Adolescent Mothers' Depression W1 → Adolescent Mothers' Negative Parenting W2	-.01	.08	.924
Adolescent Mothers' Age → Adolescent Mothers' Negative Parenting W2	-.02	.12	.887
Adolescent Mothers' Education Level → Adolescent Mothers' Negative Parenting W2	-.10	.15	.524
Adolescent Mothers' Prenatal Risk → Adolescent Mothers' Negative Parenting W2	.19	.09	.032
Children's Gender → Adolescent Mothers' Negative Parenting W2	-.04	.07	.576
Indirect Effects: Adolescent Mothers' Depression W1 → Externalizing Problems W4	.001	.004	.925
Model 2: Direct Effects			
Adolescent Mothers' Depression W2 → Children's Externalizing Problems W4	.17	.09	.072
Adolescent Mothers' Negative Parenting W3 → Children's Externalizing Problems W4	-.12	.09	.211
Adolescent Mothers' Age → Children's Externalizing Problems W4	.01	.12	.918
Adolescent Mothers' Education Level → Children's Externalizing Problems W4	.03	.15	.865
Adolescent Mothers' Prenatal Risk → Children's Externalizing Problems W4	.08	.08	.385
Children's Gender → Children's Externalizing Problems W4	-.18	.06	.017
Adolescent Mothers' Depression W2 → Adolescent Mothers' Negative Parenting W3	-.06	.09	.513
Adolescent Mothers' Age → Adolescent Mothers' Negative Parenting W3	.03	.15	.881
Adolescent Mothers' Education Level → Adolescent Mothers' Negative Parenting W3	-.21	.18	.356
Adolescent Mothers' Prenatal Risk → Adolescent Mothers' Negative Parenting W3	-.04	.10	.656
Children's Gender → Adolescent Mothers' Negative Parenting W3	.03	.08	.702
Indirect Effects: Adolescent Mothers' Depression W2 → Externalizing Problems W4	.01	.02	.667

Note. W1 = Wave 1; W2 = Wave 2; W3 = Wave 3; W4 = Wave 4; Child Gender coded 0 = male, 1 = female

Table 4.

Estimates from Aim One Models Linking Adolescent Mothers' Perinatal Depressive Symptoms, Negative Parenting, and Children's Internalizing Problems

Model 1: Direct Effects	*b*	SE	*p*
Adolescent Mothers' Depression W1 → Children's Internalizing Problems W4	.31	.07	<.001
Adolescent Mothers' Negative Parenting W2 → Children's Internalizing Problems W4	-.11	.08	.196
Adolescent Mothers' Age → Children's Internalizing Problems W4	.14	.11	.216
Adolescent Mothers' Education Level → Children's Internalizing Problems W4	-.11	.13	.433
Adolescent Mothers' Prenatal Risk → Children's Internalizing Problems W4	.10	.09	.280
Children's Gender → Children's Internalizing Problems W4	-.13	.07	.078
Adolescent Mothers' Depression W1 → Adolescent Mothers' Negative Parenting W2	-.01	.08	.921
Adolescent Mothers' Age → Adolescent Mothers' Negative Parenting W2	-.01	.12	.936
Adolescent Mothers' Education Level → Adolescent Mothers' Negative Parenting W2	-.11	.15	.473
Adolescent Mothers' Prenatal Risk → Adolescent Mothers' Negative Parenting W2	.20	.09	.029
Children's Gender → Adolescent Mothers' Negative Parenting W2	.04	.07	.559
Indirect Effects: Adolescent Mothers' Depression W1 → Internalizing Problems W4	.001	.01	.922
Model 2: Direct Effects			
Adolescent Mothers' Depression W2 → Children's Ext Internalizing ernalizing Problems W4	.18	.08	.028
Adolescent Mothers' Negative Parenting W3 → Children's Internalizing Problems W4	-.03	.09	.744
Adolescent Mothers' Age → Children's Internalizing Problems W4	.12	.12	.335
Adolescent Mothers' Education Level → Children's Internalizing Problems W4	-.12	.15	.457
Adolescent Mothers' Prenatal Risk → Children's Internalizing Problems W4	.11	.09	.205
Children's Gender → Children's Externalizing Problems W4	-.12	.08	.120
Adolescent Mothers' Depression W2 → Adolescent Mothers' Negative Parenting W3	-.06	.09	.516
Adolescent Mothers' Age → Adolescent Mothers' Negative Parenting W3	.03	.15	.823
Adolescent Mothers' Education Level → Adolescent Mothers' Negative Parenting W3	-.22	.18	.232
Adolescent Mothers' Prenatal Risk → Adolescent Mothers' Negative Parenting W3	-.04	.10	.650
Children's Gender → Adolescent Mothers' Negative Parenting W3	.04	.08	.665
Indirect Effects: Adolescent Mothers' Depression W2 → Internalizing Problems W4	.002	.01	.773

Note. W1 = Wave 1; W2 = Wave 2; W3 = Wave 3; W4 = Wave 4; Child Gender coded 0 = male, 1 = female

Table 5.

Estimates from Aim One Models Linking Adolescent Mothers' Perinatal Depressive Symptoms, Negative Parenting, and Children's Cognitive Ability

Model 1: Direct Effects	*b*	SE	*p*
Adolescent Mothers' Depression W1 → Children's Cognitive Ability W4	-.22	.11	.068
Adolescent Mothers' Negative Parenting W2 → Children's Cognitive Ability W4	-.10	.11	.374
Adolescent Mothers' Age → Children's Cognitive Ability W4	.12	.20	.580
Adolescent Mothers' Education Level → Children's Cognitive Ability W4	.05	.27	.861
Adolescent Mothers' Prenatal Risk → Children's Cognitive Ability W4	-.08	.11	.504
Children's Gender → Children's Cognitive Ability W4	.25	.10	.043
Adolescent Mothers' Depression W1 → Adolescent Mothers' Negative Parenting W2	-.01	.08	.925
Adolescent Mothers' Age → Adolescent Mothers' Negative Parenting W2	-.02	.12	.888
Adolescent Mothers' Education Level → Adolescent Mothers' Negative Parenting W2	-.10	.15	.529
Adolescent Mothers' Prenatal Risk → Adolescent Mothers' Negative Parenting W2	.19	.09	.036
Children's Gender → Adolescent Mothers' Negative Parenting W2	-.04	.07	.925
Indirect Effects: Adolescent Mothers' Depression W1 → Cognitive Ability W4	.001	.01	.925
Model 2: Direct Effects			
Adolescent Mothers' Depression W2 → Children's Cognitive Ability W4	-.31	.20	.108
Adolescent Mothers' Negative Parenting W3 → Children's Cognitive Ability W4	-.26	.21	.151
Adolescent Mothers' Age → Children's Cognitive Ability W4	.26	.21	.310
Adolescent Mothers' Education Level → Children's Cognitive Ability W4	-.17	.30	.668
Adolescent Mothers' Prenatal Risk → Children's Cognitive Ability W4	-.08	.12	.584
Children's Gender → Children's Cognitive Ability W4	.29	.10	.034
Adolescent Mothers' Depression W2 → Adolescent Mothers' Negative Parenting W3	-.05	.09	.578
Adolescent Mothers' Age → Adolescent Mothers' Negative Parenting W3	.02	.14	.898
Adolescent Mothers' Education Level → Adolescent Mothers' Negative Parenting W3	-.20	.18	.378
Adolescent Mothers' Prenatal Risk → Adolescent Mothers' Negative Parenting W3	-.05	.10	.582
Children's Gender → Adolescent Mothers' Negative Parenting W3	.04	.08	.664
Indirect Effects: Adolescent Mothers' Depression W2 → Cognitive Ability W4	.01	.28	.680

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Note. W1 = Wave 1; W2 = Wave 2; W3 = Wave 3; W4 = Wave 4; Child Gender coded 0 = male, 1 = female

Table 6.

Estimates from Aim Two Models Linking the Severity and Chronicity of Adolescent Mothers' Perinatal Depressive Symptoms to their Negative Parenting at Wave 2

	b	SE	p
		Model 1	
Chronicity of Adolescent Mothers' Depression	.01	.08	.926
Adolescent Mothers' Age	-.02	.12	.848
Adolescent Mothers' Education Level	-.09	.15	.577
Adolescent Mothers' Prenatal Risk	.18	.09	.042
Children's Gender	-.04	.07	.567
		Model 2	
Chronicity of Adolescent Mothers' Depression	.03	.13	.845
Adolescent Mothers' Depression W1	.01	.23	.990
Chronicity * W1 Depression	-.04	.17	.823
Adolescent Mothers' Age	-.03	.12	.184
Adolescent Mothers' Education Level	-.08	.16	.613
Adolescent Mothers' Prenatal Risk	.19	.09	.034
Children's Gender	-.04	.07	.578

Note. W1 = Wave 1; Child Gender coded 0 = male, 1 = female

Table 7.

Estimates from Aim Two Models Linking the Severity and Chronicity of Adolescent
Mothers' Perinatal Depressive Symptoms to their Negative Parenting at Wave 3

	b	SE	p
		Model 1	
Chronicity of Adolescent Mothers' Depression	-.01	.09	.905
Adolescent Mothers' Age	.03	.15	.849
Adolescent Mothers' Education Level	-.20	.18	.260
Adolescent Mothers' Prenatal Risk	-.05	.10	.605
Children's Gender	.03	.08	.718
		Model 2	
Chronicity of Adolescent Mothers' Depression	.09	.14	.524
Adolescent Mothers' Depression W2	-.14	.24	.553
Chronicity * W2 Depression	.03	.19	.891
Adolescent Mothers' Age	.03	.15	.856
Adolescent Mothers' Education Level	-.19	.18	.281
Adolescent Mothers' Prenatal Risk	-.06	.10	.533
Children's Gender	.04	.08	.624

Note. W2 = Wave 2; Child Gender coded 0 = male, 1 = female

Table 8.

Estimates from Aim Two Models Linking the Severity and Chronicity of Adolescent Mothers' Perinatal Depressive Symptoms to their Children's Externalizing Problems at Wave 4

	b	SE	*p*
Model 1			
Chronicity of Adolescent Mothers' Depression	.22	.08	.005
Adolescent Mothers' Age	.01	.12	.905
Adolescent Mothers' Education Level	.06	.14	.659
Adolescent Mothers' Prenatal Risk	.08	.09	.382
Children's Gender	-.18	.07	.014
Model 2			
Chronicity of Adolescent Mothers' Depression	.13	.12	.292
Adolescent Mothers' Depression W1	.01	.21	.991
Chronicity * W1 Depression	.15	.16	.344
Adolescent Mothers' Age	.04	.12	.744
Adolescent Mothers' Education Level	.05	.14	.745
Adolescent Mothers' Prenatal Risk	.07	.09	.391
Children's Gender	-.19	.07	.012
Model 3			
Chronicity of Adolescent Mothers' Depression	.26	.13	.045
Adolescent Mothers' Depression W2	-.18	.24	.452
Chronicity * W2 Depression	.16	.18	.370
Adolescent Mothers' Age	.01	.12	.965
Adolescent Mothers' Education Level	.08	.14	.570
Adolescent Mothers' Prenatal Risk	.07	.09	.447
Children's Gender	-.18	.07	.014

Note. W1 = Wave 1; W2 = Wave 2; Child Gender coded 0 = male, 1 = female

Table 9.

Estimates from Aim Two Models Linking the Severity and Chronicity of Adolescent Mothers' Perinatal Depressive Symptoms to their Children's Internalizing Problems at Wave 4

	b	SE	*p*
		Model 1	
Chronicity of Adolescent Mothers' Depression	.24	.08	.003
Adolescent Mothers' Age	.13	.12	.283
Adolescent Mothers' Education Level	-.10	.14	.485
Adolescent Mothers' Prenatal Risk	.10	.09	.257
Children's Gender	-.12	.08	.124
		Model 2	
Chronicity of Adolescent Mothers' Depression	.09	.12	.444
Adolescent Mothers' Depression W1	.02	.21	.942
Chronicity * W1 Depression	.25	.16	.121
Adolescent Mothers' Age	.16	.11	.162
Adolescent Mothers' Education Level	-.12	.14	.403
Adolescent Mothers' Prenatal Risk	.08	.09	.388
Children's Gender	-.12	.07	.103
		Model 3	
Chronicity of Adolescent Mothers' Depression	.28	.13	.035
Adolescent Mothers' Depression W2	-.14	.23	.564
Chronicity * W2 Depression	.11	.18	.531
Adolescent Mothers' Age	.12	.12	.310
Adolescent Mothers' Education Level	-.08	.14	.561
Adolescent Mothers' Prenatal Risk	.08	.09	.341
Children's Gender	-.12	.08	.129

Note. W1 = Wave 1; W2 = Wave 2; Child Gender coded 0 = male, 1 = female

Table 10.

Estimates from Aim Two Models Linking the Severity and Chronicity of Adolescent Mothers' Perinatal Depressive Symptoms to their Children's Cognitive Ability at Wave 4

	b	SE	*p*
		Model 1	
Chronicity of Adolescent Mothers' Depression	-.20	.12	.120
Adolescent Mothers' Age	.18	.21	.412
Adolescent Mothers' Education Level	-.02	.28	.954
Adolescent Mothers' Prenatal Risk	-.10	.12	.401
Children's Gender	.24	.10	.054
		Model 2	
Chronicity of Adolescent Mothers' Depression	-.27	.21	.253
Adolescent Mothers' Depression W1	.35	.39	.404
Chronicity * W1 Depression	-.39	.27	.198
Adolescent Mothers' Age	.18	.21	.429
Adolescent Mothers' Education Level	-.03	.39	.923
Adolescent Mothers' Prenatal Risk	-.09	.12	.466
Children's Gender	.24	.10	.045
		Model 3	
Chronicity of Adolescent Mothers' Depression	-.12	.19	.526
Adolescent Mothers' Depression W2	.29	.35	.402
Chronicity * W2 Depression	-.54	.27	.084
Adolescent Mothers' Age	.29	.23	.265
Adolescent Mothers' Education Level	-.17	.33	.633
Adolescent Mothers' Prenatal Risk	-.04	.12	.776
Children's Gender	.26	.11	.042

Note. W1 = Wave 1; W2 = Wave 2; Child Gender coded 0 = male, 1 = female

Table 11.

Model Fit Statistics from Aim Two Models Linking the Timing of Adolescent Mothers'
Perinatal Depressive Symptoms to their Negative Parenting and their Children's
Developmental Outcomes

Model	χ^2 Model Fit			CFI	SRMR	RMSEA	90% CI
	χ^2	*df*	*p*				
Model 1: Negative Parenting W2	.64	5	.986	1.00	.01	.00	.00 - 00
Model 2: Negative Parenting W3	.81	5	.976	1.00	.02	.00	.00 - .00
Model 3: Child Externalizing W4	.58	5	.989	1.00	.01	.00	.00 - .00
Model 4: Child Internalizing W4	.60	5	.988	1.00	.01	.00	.00 - .00
Model 5: Child Cognitive Ability W4	29.52	25	.243	.95	.10	.04	.00 - .08

Note. W2 = Wave 2; W3 = Wave 3; W4 = Wave 4

Table 12.

Estimates from Aim Two Models Linking the Timing of Adolescent Mothers' Perinatal Depressive Symptoms to their Negative Parenting and their Children's Developmental Outcomes

Outcome	Negative Parenting W2	Negative Parenting W3	Child Externalizing W4	Child Internalizing W4	Child Cognitive Ability W4
	Model 1	Model 2	Model 3	Model 4	Model 5
Predictor	*b*(SE)	*b*(SE)	*b*(SE)	*b*(SE)	*b*(SE)
W1 Depression vs. No Depression at W1 or W2	-.02(.11)	-.19(.14)	-.20(.13)	-.11(.12)	-.01(.23)
W1 Depression vs. W2 Depression	.01(.13)	-.18(.13)	-.30(.10) **	-.17(.11)	-.15(.18)
Adolescent Mothers' Age	-.04(.16)	.55(.15) **	-.04(.15)	.01(.15)	.27(.34)
Adolescent Mothers' Education Level	-.01(.23)	-.67(.17) ***	.08(.16)	-.08(.14)	-.17(.50)
Adolescent Mothers' Prenatal Risk	.13(.13)	-.11(.13)	.18(.12)	.18(.12)	.05(.19)
Children's Gender	-.02(.10)	.09(.10)	-.11(.09)	-.05(.10)	.40(.13) *

Note. W1 = Wave 1; W2 = Wave 2; W3 = Wave 3; W4 = Wave 4; Child Gender coded 0 = male, 1 = female. *n* = 128.
*** $p < .001$; ** $p < .01$; * $p < .05$; + $p < .10$.

Table 13.

Estimates from Aim Three Models Linking Adolescent Mothers' Perinatal Depressive Symptoms and Perceived Social Support to their Negative Parenting

	b	SE	p
		Model 1: W2 Negative Parenting	
Adolescent Mothers' Depression W1	-.03	.09	.740
Adolescent Mothers' Perceived Social Support W1	-.06	.09	.467
Depression * Social Support W1	-.05	.09	.605
Adolescent Mothers' Age	-.03	.12	.795
Adolescent Mothers' Education Level	-.07	.15	.647
Adolescent Mothers' Prenatal Risk	.19	.09	.041
Children's Gender	-.05	.08	.478
		Model 2: W3 Negative Parenting	
Adolescent Mothers' Depression W2	-.09	.09	.329
Adolescent Mothers' Perceived Social Support W2	-.13	.08	.116
Depression * Social Support W2	.03	.08	.679
Adolescent Mothers' Age	.02	.15	.915
Adolescent Mothers' Education Level	-.19	.18	.278
Adolescent Mothers' Prenatal Risk	-.05	.10	.594
Children's Gender	.03	.08	.701
		Model 3: W3 Negative Parenting	
Chronicity of Adolescent Mothers' Depression	-.03	.09	.744
Adolescent Mothers' Perceived Social Support W2	-.01	.15	.925
Chronicity * Social Support W2	-.12	.14	.407
Adolescent Mothers' Age	.03	.15	.851
Adolescent Mothers' Education Level	-.18	.18	.324
Adolescent Mothers' Prenatal Risk	-.06	.10	.569
Children's Gender	.02	.08	.824

Note. W1 = Wave 1; W2 = Wave 2; W3 = Wave 3; Child Gender coded 0 = male, 1 = female

Table 14.

Estimates from Aim Three Models Linking Adolescent Mothers' Perinatal Depressive Symptoms and Perceived Social Support to their Children's Externalizing Problems

	b	SE	*p*
		Model 1	
Adolescent Mothers' Depression W1	.22	.08	.004
Adolescent Mothers' Perceived Social Support W1	-.03	.08	.764
Depression * Social Support W1	-.02	.08	.818
Adolescent Mothers' Age	.04	.12	.754
Adolescent Mothers' Education Level	.05	.14	.738
Adolescent Mothers' Prenatal Risk	.08	.09	.363
Children's Gender	-.20	.07	.008
		Model 2	
Adolescent Mothers' Depression W2	.19	.08	.021
Adolescent Mothers' Perceived Social Support W2	.06	.08	.453
Depression * Social Support W2	-.05	.08	.573
Adolescent Mothers' Age	.01	.12	.987
Adolescent Mothers' Education Level	.08	.14	.600
Adolescent Mothers' Prenatal Risk	.09	.09	.333
Children's Gender	-.19	.07	.012
		Model 3	
Chronicity of Adolescent Mothers' Depression	.24	.08	.003
Adolescent Mothers' Perceived Social Support W2	.08	.13	.526
Chronicity * Social Support W2	-.02	.13	.902
Adolescent Mothers' Age	.03	.12	.819
Adolescent Mothers' Education Level	.05	.14	.751
Adolescent Mothers' Prenatal Risk	.08	.09	.378
Children's Gender	-.18	.07	.014

Note. W1 = Wave 1; W2 = Wave 2; Child Gender coded 0 = male, 1 = female

Table 15.

Estimates from Aim Three Models Linking Adolescent Mothers' Perinatal Depressive Symptoms and Perceived Social Support to their Children's Internalizing Problems

	b	SE	p
		Model 1	
Adolescent Mothers' Depression W1	.30	.08	<.001
Adolescent Mothers' Perceived Social Support W1	-.01	.09	.976
Depression * Social Support W1	-.03	.08	.739
Adolescent Mothers' Age	.15	.11	.194
Adolescent Mothers' Education Level	-.11	.14	.442
Adolescent Mothers' Prenatal Risk	.08	.09	.351
Children's Gender	-.13	.08	.078
		Model 2	
Adolescent Mothers' Depression W2	.20	.08	.018
Adolescent Mothers' Perceived Social Support W2	.08	.08	.342
Depression * Social Support W2	-.02	.08	.825
Adolescent Mothers' Age	.12	.12	.323
Adolescent Mothers' Education Level	-.11	.15	.455
Adolescent Mothers' Prenatal Risk	.12	.09	.194
Children's Gender	-.12	.08	.112
		Model 3	
Chronicity of Adolescent Mothers' Depression	.26	.08	.001
Adolescent Mothers' Perceived Social Support W2	.06	.13	.665
Chronicity * Social Support W2	.05	.14	.708
Adolescent Mothers' Age	.14	.12	.238
Adolescent Mothers' Education Level	-.13	.14	.349
Adolescent Mothers' Prenatal Risk	.11	.09	.241
Children's Gender	-.11	.08	.141

Note. W1 = Wave 1; W2 = Wave 2; Child Gender coded 0 = male, 1 = female

Table 16.

Estimates from Aim Three Models Linking Adolescent Mothers' Perinatal Depressive Symptoms and Perceived Social Support to their Children's Cognitive Ability

	b	SE	*p*
		Model 1	
Adolescent Mothers' Depression W1	-.20	.11	.105
Adolescent Mothers' Perceived Social Support W1	.03	.11	.813
Depression * Social Support W1	.05	.11	.656
Adolescent Mothers' Age	.07	.20	.742
Adolescent Mothers' Education Level	.13	.27	.629
Adolescent Mothers' Prenatal Risk	-.11	.11	.312
Children's Gender	.26	.10	.044
		Model 2	
Adolescent Mothers' Depression W2	-.29	.12	.062
Adolescent Mothers' Perceived Social Support W2	-.06	.10	.571
Depression * Social Support W2	-.07	.12	.550
Adolescent Mothers' Age	.21	.24	.404
Adolescent Mothers' Education Level	-.02	.34	.963
Adolescent Mothers' Prenatal Risk	-.05	.12	.671
Children's Gender	.27	.10	.033
		Model 3	
Chronicity of Adolescent Mothers' Depression	-.21	.12	.108
Adolescent Mothers' Perceived Social Support W2	.16	.19	.424
Chronicity * Social Support W2	-.30	.18	.144
Adolescent Mothers' Age	.19	.23	.440
Adolescent Mothers' Education Level	.04	.31	.897
Adolescent Mothers' Prenatal Risk	-.09	.12	.456
Children's Gender	.22	.10	.063

Note. W1 = Wave 1; W2 = Wave 2; Child Gender coded 0 = male, 1 = female

Table 17.

Conditional Indirect Effects from Aim Four Models Linking Adolescent Mothers' Perinatal Depressive Symptoms, Negative Parenting, and Children's Externalizing Problems at Social Support, M ± *1* SD

	Indirect Effect	*SE*	*z*	*p*	*CI*
	Model 1: Mothers' Depression W1 → Negative Parenting W2 → Children's Externalizing W4				
-1 *SD* Mothers' Perceived Social Support W1	.05	.23	.21	.830	-.21 to .87
M Mothers' Perceived Social Support W1	.02	.15	.13	.894	-.17 to .53
+1 *SD* Mothers' Perceived Social Support W1	-.01	.23	-.04	.968	-.69 to .38
	Model 2: Mothers' Depression W2 → Negative Parenting W3 → Children's Externalizing W4				
-1 *SD* Mothers' Perceived Social Support W2	.11	.34	.31	.757	-.28 to 1.36
M Mothers' Perceived Social Support W2	.16	.29	.54	.590	-.12 to 1.34
+1 *SD* Mothers' Perceived Social Support W2	.21	.36	.58	.565	-.16 to 1.47

Note. W1 = Wave 1; W2 = Wave 2; W3 = Wave 3; W4 = Wave 4; CI = confidence interval; unstandardized beta coefficients are reported; 95% bias-corrected bootstrap confidence intervals reported

Table 18.

Conditional Indirect Effects from Aim Four Models Linking Adolescent Mothers' Perinatal Depressive Symptoms, Negative Parenting, and Children's Internalizing Problems at Social Support, M ± *1* SD

	Indirect Effect	*SE*	*z*	*p*	*CI*
	Model 1: Mothers' Depression W1 → Negative Parenting W2 → Children's Internalizing W4				
-1 *SD* Mothers' Perceived Social Support W1	.04	.17	.24	.808	-.16 to .65
M Mothers' Perceived Social Support W1	.10	.25	.39	.695	-.15 to 1.02
+1 *SD* Mothers' Perceived Social Support W1	-.01	.26	-.05	.960	-.70 to .42
	Model 2: Mothers' Depression W2 → Negative Parenting W3 → Children's Internalizing W4				
-1 *SD* Mothers' Perceived Social Support W2	.01	.20	.06	.953	-.29 to .65
M Mothers' Perceived Social Support W2	.02	.18	.10	.919	-.21 to .68
+1 *SD* Mothers' Perceived Social Support W2	.03	.24	.10	.918	-.31 to .80

Note. W1 = Wave 1; W2 = Wave 2; W3 = Wave 3; W4 = Wave 4; CI = confidence interval; unstandardized beta coefficients are reported; 95% bias-corrected bootstrap confidence intervals reported

Table 19.

Conditional Indirect Effects from Aim Four Models Linking Adolescent Mothers' Perinatal Depressive Symptoms, Negative Parenting, and Children's Cognitive Ability at Social Support, M ± *1* SD

	Indirect Effect	*SE*	*z*	*p*	*CI*
	Model 1: Mothers' Depression W1 → Negative Parenting W2 → Children's Cognitive Ability W4				
-1 *SD* Mothers' Perceived Social Support W1	.07	.24	.28	.779	-.18 to .68
M Mothers' Perceived Social Support W1	.03	.17	.16	.873	-.14 to 1.05
+1 *SD* Mothers' Perceived Social Support W1	-.01	.27	-.04	.965	-.85 to .38
	Model 2: Mothers' Depression W2 → Negative Parenting W3 → Children's Cognitive Ability W4				
-1 *SD* Mothers' Perceived Social Support W2	.15	.52	.29	.769	-.42 to 2.03
M Mothers' Perceived Social Support W2	.24	.43	.55	.584	-.14 to 2.12
+1 *SD* Mothers' Perceived Social Support W2	.32	.56	.57	.566	-.19 to 2.69

Note. W1 = Wave 1; W2 = Wave 2; W3 = Wave 3; W4 = Wave 4; CI = confidence interval; unstandardized beta coefficients are reported; 95% bias-corrected bootstrap confidence intervals reported

APPENDIX B

FIGURES
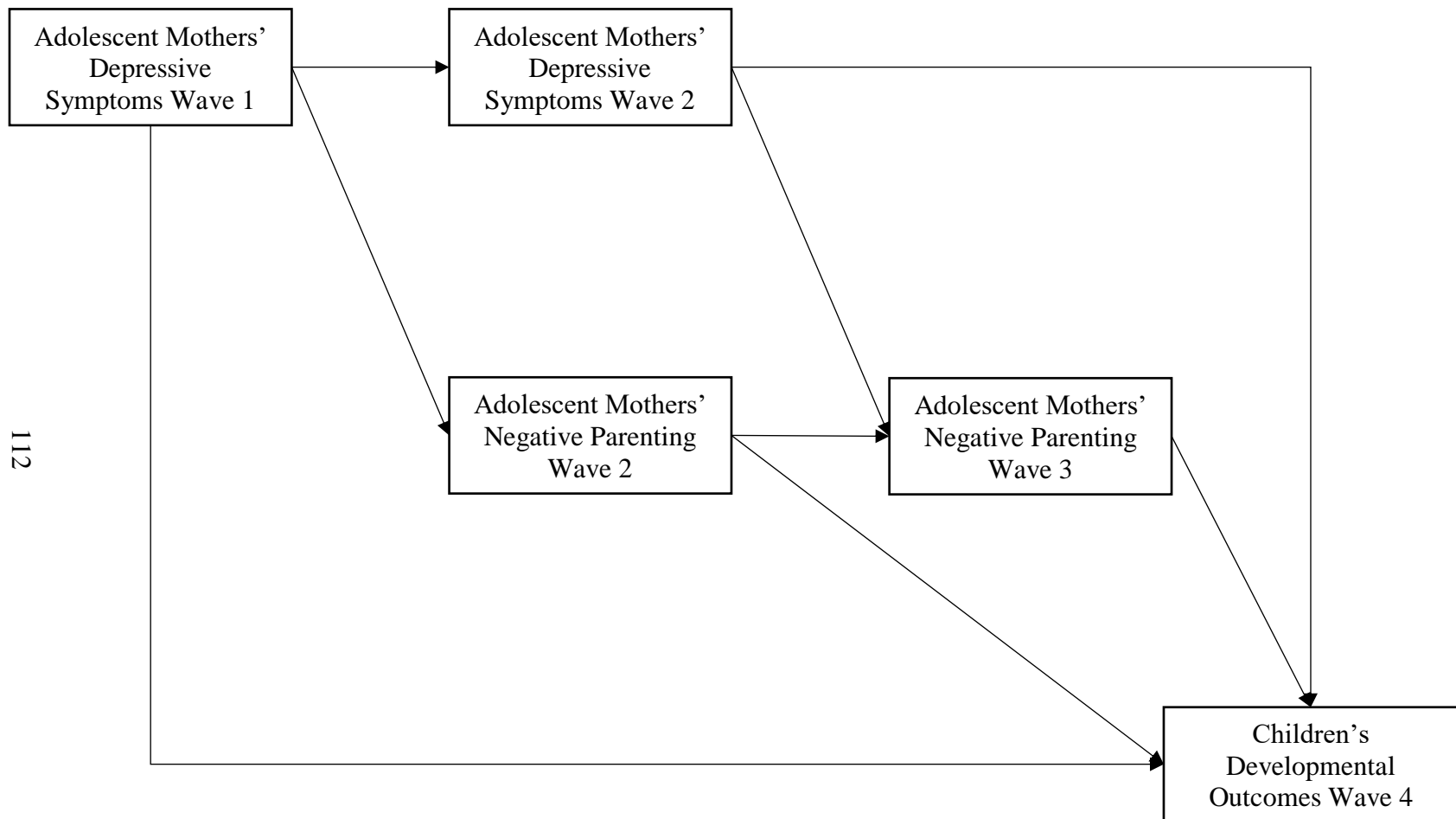
Figure 1. Hypothesized model linking adolescent mothers' depressive symptoms, their negative parenting behaviors, and children's developmental outcomes.
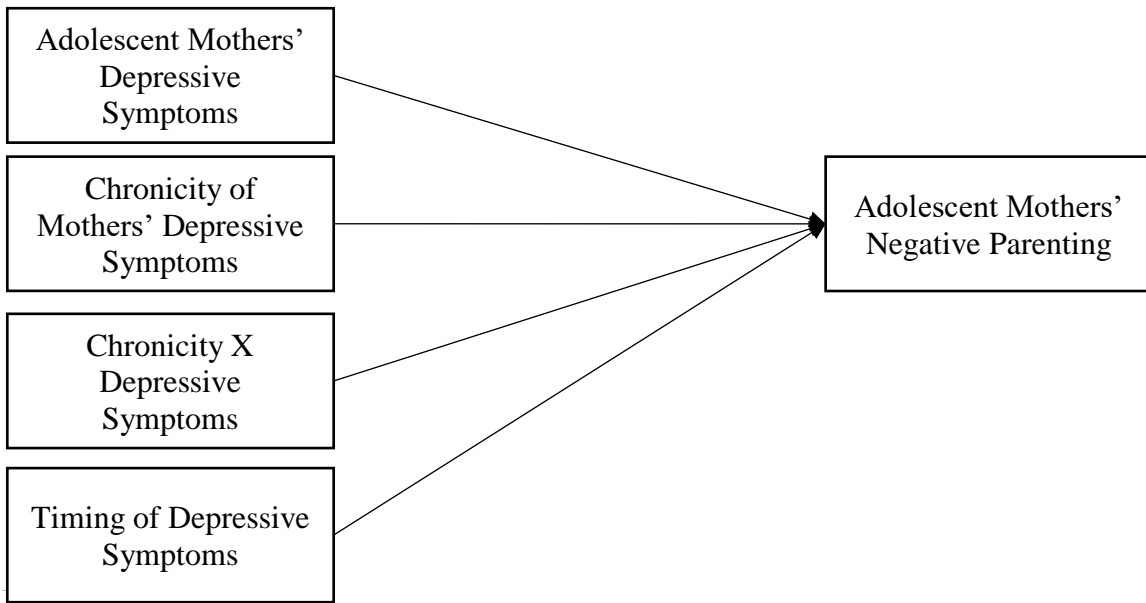
Figure 2. Hypothesized model linking the severity, chronicity and timing of adolescent mothers' perinatal depressive symptoms to their negative parenting behaviors.
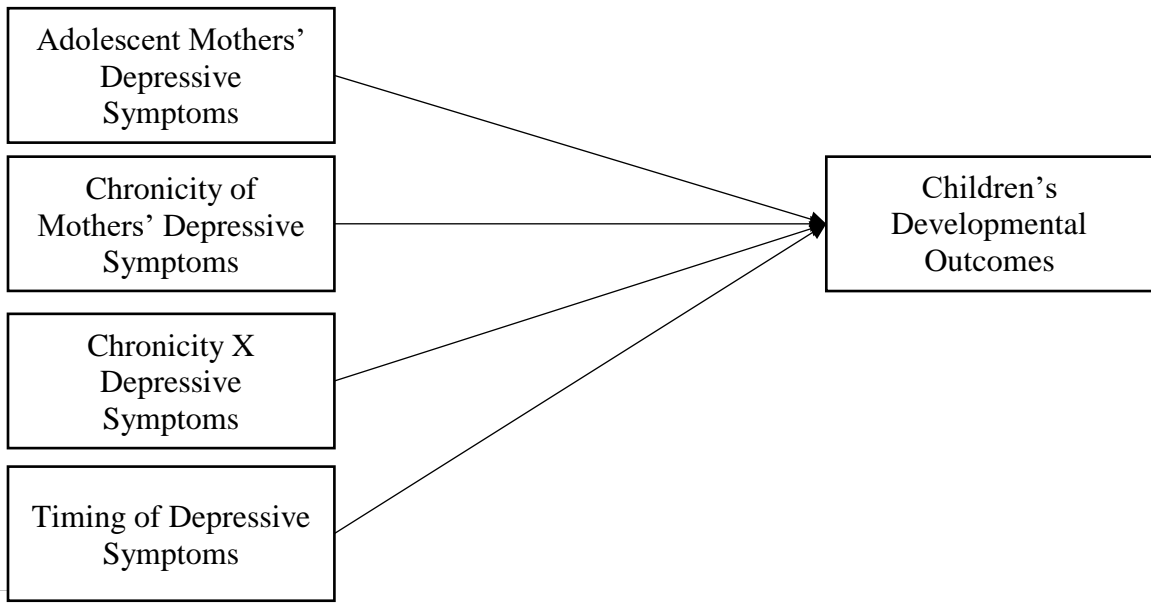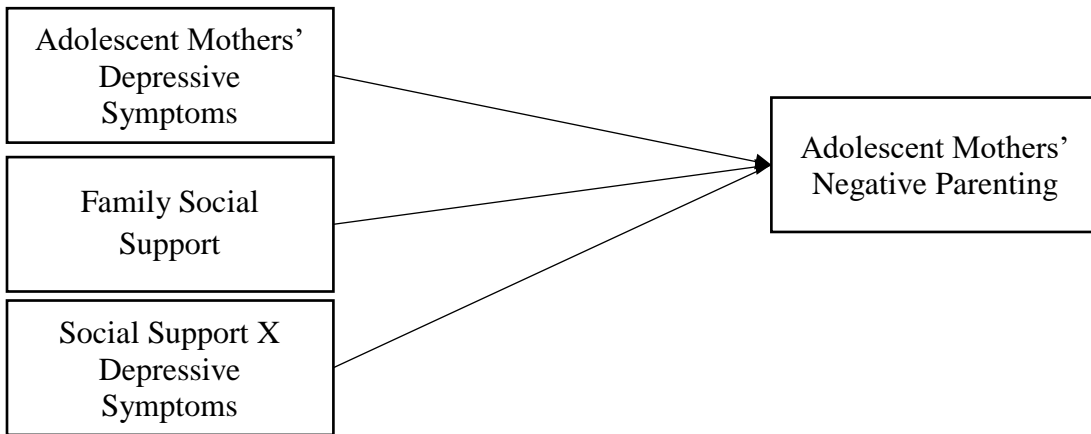
Figure 3. Hypothesized model linking the severity, chronicity and timing of adolescent mothers' perinatal depressive symptoms to their negative parenting behaviors.

Figure 4. Hypothesized model examining adolescent mothers' perceived social support from family as a moderator of the associations between their depressive symptoms and their negative parenting.
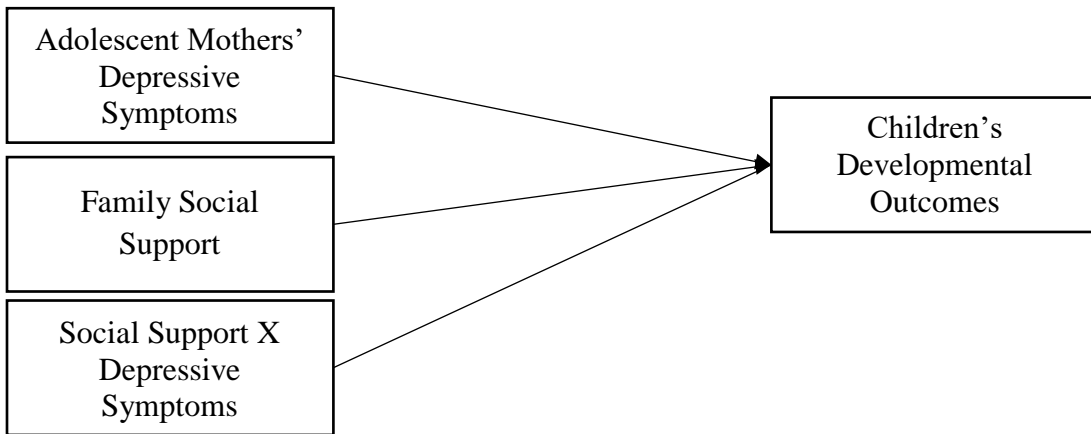
Figure 5. Hypothesized model examining adolescent mothers' perceived social support from family as a moderator of the associations between their depressive symptoms and their children's developmental outcomes.
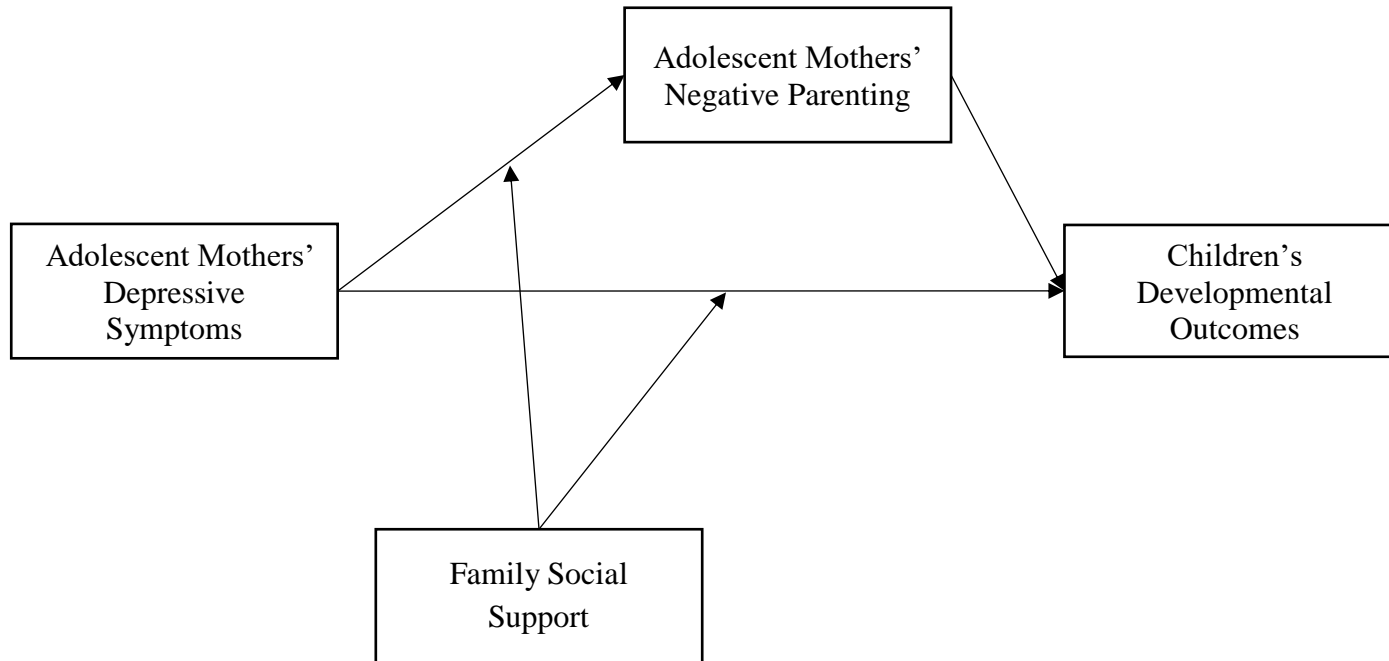
Figure 6. Hypothesized moderated mediation model linking adolescent mothers' depressive symptoms, their negative parenting, and children's developmental outcomes.