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# ASSOCIATIONS BETWEEN EARLY MATERNAL DEPRESSIVE SYMPTOM TRAJECTORIES AND TODDLERS' FELT SECURITY AT 18 MONTHS: ARE BOYS AND GIRLS AT DIFFERENTIAL RISK?

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**ABSTRACT:** The goal of this study was to evaluate whether there are sex differences in children's vulnerability to caregiving risk, as indexed by trajectories of maternal depressive symptoms assessed from 2 to 18 months' postpartum, and children's rated attachment security in toddlerhood, adjusting for maternal social support and demographic risk. Analyses utilized longitudinal data collected for 182 African American mother-child dyads from economically diverse backgrounds. Participants were recruited at the time of the child's birth and followed to 18 months' postpartum. Results of conditional latent growth models indicated that an increasing rate of change in level of maternal depressive symptoms over time negatively predicted toddlers' felt attachment security. Higher social support was associated with decreasing levels of maternal depressive symptoms over time whereas higher demographic risk was associated with increasing levels of maternal depressive symptoms. A subsequent multigroup conditional latent growth model revealed that child sex moderated these associations. For male (but not female) children, a rapid increase in maternal depressive symptoms was associated with lower felt attachment security at 18 months. These findings suggest that boys, as compared to girls, may be more vulnerable to early caregiving risks such as maternal depression, with negative consequences for mother-child attachment security in toddlerhood.

**Keywords:** sex differences, maternal depressive symptom trajectories, toddler felt attachment security, maternal social support, African American

**RESUMEN:** El objetivo de este estudio fue evaluar si hay diferencias de sexo en la vulnerabilidad de los niños al riesgo de prestación de cuidado, como han indicado las trayectorias de síntomas depresivos maternos evaluadas de 2 a 18 meses después del parto, y el puntaje de la seguridad de afectividad de los niños en su temprana infancia, con ajustes basados en el apoyo social materno y el riesgo demográfico. Los análisis utilizaron información longitudinal recogida de 182 díadas de madre-niño afro-americanas de niveles económicamente diversos. Los participantes fueron reclutados al nacer el niño y se les dio seguimiento hasta los 18 meses después del parto. Los resultados de modelos de crecimiento latente condicionales indicaron que un incremento en el puntaje de cambio en el nivel de síntomas depresivos maternos a través del tiempo negativamente predijo la seguridad afectiva que los infantes sentían. Se asoció un más alto apoyo social con decrecientes niveles de síntomas depresivos maternos a través del tiempo, mientras que más altos riesgos demográficos se asociaron con un incrementos en los niveles de síntomas depresivos maternos. Un subsecuente modelo de crecimiento latente condicional reveló que el sexo del niño moderaba estas asociaciones. En el caso de niños varones (no así las niñas), se asoció un rápido incremento en síntomas depresivos maternos con más bajos niveles, a los 18 meses, de seguridad en la afectividad sentida. Estos resultados

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This study was supported in part by Major Research Grants 199700061 and 200100035 from the Spencer Foundation and NICHD Grant R01-HD048841 (M. Beeghly, PI). We thank the families who participated in our study for their commitment to this longitudinal research, and myriad research staff for their valuable contributions to data collection and/or reduction in this project, especially Karen L. Olson, Snaltze C. Pierre, Nikora Downey, Lisa Fhagen, and Holly Haynes. There are no conflicts of interest.

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INFANT MENTAL HEALTH JOURNAL, Vol. 38(1), 53–67 (2017)

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View this article online at [wileyonlinelibrary.com](http://wileyonlinelibrary.com).

DOI: 10.1002/imhj.21617

sugieren que los niños varones, comparados con las niñas, pudieran ser más vulnerables a los riesgos de un cuidado temprano tal como la depresión materna, con consecuencias negativas para la seguridad en la afectividad madre-niño en la más temprana infancia.

**Palabras claves:** diferencias de sexo, trayectorias de síntomas depresivos maternos, seguridad afectiva sentida por el infante, apoyo social materno, afro-americano

**RÉSUMÉ:** Le but de cette étude était d'évaluer s'il existe des différences entre les sexes dans la vulnérabilité des enfants au risque de la personne prenant soin d'eux, telle qu'elle est indexée par les trajectoires des symptômes dépressifs maternels évalués de 2 à 18 mois après la naissance, et la sécurité de l'attachement telle qu'elle est évaluée chez les enfants durant la petite enfance, s'ajustant au soutien social maternel et au risque démographique. Les analyses ont utilisé des données longitudinales recueillies pour 182 dyades mères-enfants noires américaines issues de milieux socioéconomiques divers. Les participants ont été recrutés au moment de la naissance de l'enfant et ont été suivis jusqu'à 18 mois après la naissance. Les résultats de modèles de croissance latents conditionnels ont indiqué qu'un taux croissant de changement dans le niveau des symptômes dépressifs maternels au fil du temps prédisait de manière négative la sécurité de l'attachement ressentie des jeunes enfants. Un soutien social plus élevé était lié à des niveaux décroissants de symptômes dépressifs maternels au fil du temps, alors qu'un risque démographique élevé était lié à des niveaux plus élevés de symptômes dépressifs maternels. Un modèle de croissance latente conditionnelle subséquente et multi-groupe a révélé que le sexe de l'enfant modérait ces associations. Pour les enfants mâles (mais pas les enfants femelles) une augmentation rapide des symptômes dépressifs maternels était liée à une sécurité perçue de l'attachement plus basse à 18 mois. Ces résultats suggèrent que les garçons, comparés aux filles, peuvent être plus vulnérables aux risques liés à la personne prenant soin d'eux comme la dépression maternelle, avec des conséquences négatives pour la sécurité de l'attachement mère-enfant dans la petite enfance.

**Mots clés:** différences entre les sexes, trajectoires de symptômes dépressifs maternels, sécurité de l'attachement perçue par le jeune enfant, soutien social maternel, noir américain

**ZUSAMMENFASSUNG:** Das Ziel dieser Studie war es, Geschlechtsunterschiede bei Kindern im Hinblick auf ihre Vulnerabilität bei Fürsorerisiken zu evaluieren. Die Fürsorerisiken wurden durch den Verlauf der mütterlichen depressiven Symptome von 2 bis 18 Monaten nach der Geburt indiziert, sowie durch die bewertete Bindungssicherheit der Kleinkinder. Dabei wurde für mütterliche soziale Unterstützung und demografische Risiken kontrolliert. Für die Analysen wurden Längsschnittdaten von 182 afro-amerikanischen Mutter-Kind-Dyaden mit verschiedenen ökonomischen Hintergründen genutzt. Die Teilnehmer wurden zum Zeitpunkt der Geburt des Kindes rekrutiert und nach der Geburt für 18 Monate begleitet. Die Ergebnisse der konditionalen latenten Wachstumsmodelle zeigten, dass im Verlauf ansteigende mütterliche depressive Symptome mit der gefühlten Bindungssicherheit der Kleinkinder in einem negativen Vorhersagezusammenhang standen. Höhere soziale Unterstützung war mit einer Abnahme der mütterlichen depressiven Symptome im Verlauf der Zeit assoziiert, während ein höheres demografisches Risiko mit dem Anstieg der mütterlichen depressive Symptome assoziiert war. Ein nachfolgendes konditionales latentes Wachstumsmodell für multiple Gruppen zeigte, dass das Geschlecht des Kindes diese Assoziationen moderierte. Bei Jungen (jedoch nicht bei Mädchen) war eine rasche Zunahme der mütterlichen depressiven Symptome mit einer niedrigeren gefühlten Bindungssicherheit 18 Monate nach der Geburt assoziiert. Diese Ergebnisse deuten darauf hin, dass Jungen, verglichen mit Mädchen, hinsichtlich früher Fürsorerisiken wie mütterlicher Depression vulnerabler sind, was wiederum mit negativen Folgen für die Bindungssicherheit zwischen Mutter und Kind im Kleinkindalter einhergehen kann.

**Stichwörter:** Geschlechtsunterschiede, Trajektorien mütterlicher depressiver Symptome, gefühlte Bindungssicherheit von Kleinkindern, mütterliche soziale Unterstützung, Afroamerikaner

**抄録:** この研究の目的は、養育のリスクへの子どもの脆弱性に性差があるかどうかを評価することである。それは、出産後2~18か月に評価された母親の抑うつ症状の経過と幼児期に評定された子どもの愛着の安定性を指標にして、母親の社会的支援と人口統計学的リスクについて適合させた。分析は、経済的に多様な背景を持つ182組のアフリカ系アメリカ人の母子から集められた縦断的なデータを利用した。研究参加者は子どもの出生時に集められ、産後18か月間追跡された。条件付き潜在成長モデルの結果から、時間経過による母親の抑うつ症状レベルの変化率の増加は、幼児に感じられた愛着の安定性をネガティブに予測することが示された。より高い社会支援は、時間経過による母親の抑うつ症状レベルの低下に関連したが、その一方より高い人口統計学的リスクは母親の抑うつ症状レベルの増加と関連した。それに続く多群条件付き潜在成長モデルから、子どもの性別がこれらの関連を緩和した。男児では(しかし女児ではなく)、急速に増大する母親の抑うつ症状は、18か月で感じられた愛着の安定性の低さと関連した。これらの結果から、女児に比べて男児は、母親の抑うつのような早期の養育リスクに対してより脆弱であり、幼児期の母子の愛着の安定性にネガティブな結果をもたらしている。

**キーワード:** 性差, 母親の抑鬱症状の軌跡, 幼児が感じる愛着の安定性, 母親の社会的支援, アフリカ系アメリカ人

**摘要:** 本研究の目的は評価児童照顧風險の脆弱性是否存在性別差異, 作者根據產後2至18個月的產婦抑鬱症狀的軌跡, 和兒童在幼兒期的額定依附安全感評估, 並調整母親的社會支持和人口風險。研究分析使用從182個來自經濟多樣化背景的美國非洲裔母子二人組合的縱向數據。參與者在孩子出生時招募, 然後跟進到產後18個月。條件潛在生長模型的結果表明, 隨著時間的推移, 母親抑鬱症狀的增加率, 負面地預測幼兒的依附安全感。較高的社會支持與母親抑鬱症狀的降低相關, 而較高的人口風險與母親抑鬱症狀的增加相關。隨後的多組條件潛在

生長模型分析顯示，兒童性別緩和這關係。對於男孩（但不是女孩），母親抑鬱症狀的快速增加與18個月時較低的依附安全感有關。這些研究結果表明，與女孩相比，男孩可能更容易受到早期照顧風險，例如產婦抑鬱症，對幼兒期母子依附安全感帶來的負面影響。

**關鍵詞：** 性別差異，產婦抑鬱症狀軌跡，幼兒依附安全感，產婦社會支持，非裔美國人

ملخص : كان الهدف من هذه الدراسة تقييم وجود اختلافات طبقا للجنس من حيث مدى عرضة الأطفال لمخاطر الرعاية الأمومية. وتم هذا التقييم من خلال تصنيف مسارات أعراض الاكتئاب الأمومي التي تم رصدها في أعمار ما بين 2 إلى 18 شهر بعد الولادة وتقديرات الأمان التعلق في هذه المرحلة وذلك مع ضبط عوامل الدعم الاجتماعي الأمومي والمخاطر الديموغرافية. اشتملت عينة التحليل على بيانات طولية تم تجميعها من 182 ثنائي أمهات وأطفال من الأمريكيين الأفارقة من خلفيات اقتصادية متنوعة. انضم المشاركون في الدراسة من بداية ولادة الطفل وتم متابعتهم بعد ذلك حتى عمر 18 شهر. أوضحت نتائج نموذج النمو الكامن أن زيادة معدل التغيير في مستوى أعراض الاكتئاب الأمومي مع الوقت يؤثر بشكل سلبي على شعور الطفل بأمان التعلق. وارتبط الدعم الاجتماعي القوي بمستويات أقل من أعراض الاكتئاب الأمومي مع الوقت بينما كانت عوامل المخاطرة الديموغرافية مرتبطة بزيادة مستويات أعراض الاكتئاب. وأوضح نموذج متعدد المجموعات للنمو الكامن أن جنس الطفل كان عاملا وسيطا في هذه الارتباطات. بالنسبة للذكور (وليس الإناث) كانت الزيادة السريعة في أعراض الاكتئاب الأمومي مرتبطة بنسبة أقل من الشعور بالأمان في عمر 18 شهر. هذه النتائج تشير إلى أن الأولاد يمكن أن يكونوا أكثر عرضة من البنات لمخاطر الرعاية المبكرة مثل الاكتئاب الأمومي مما يتبعه عواقب سلبية على أمان التعلق بين الأم والطفل في فترة الطفولة.

**كلمات مفتاحية:** اختلافات الجنس – مسارات أعراض الاكتئاب الأمومي – أمان التعلق الطفولي – الدعم الاجتماعي الأمومي – الأمر يكون الأفارقة.

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A growing question in the child development literature is whether there are sex differences in children's susceptibility to environmental risks such as maternal depression during infancy and early childhood. Animal researchers have identified sex-specific sensitivity to postpartum environmental influences, which is linked to epigenetic processes during pregnancy and may shape differential susceptibility to life stress for male versus female offspring (Hodes, 2013; Tibu et al., 2014). In the human literature, however, evidence for sex differences in vulnerability to risk is relatively sparse and inconsistent.

Several studies have shown that boys exhibit poorer biobehavioral regulation in infancy and toddlerhood than do girls (Calkins & Fox, 2002; Else-Quest, Hyde, Goldsmith, & Van Hulle, 2006; Martinez-Torteya et al., 2015). Moreover, findings from a meta-analytic review have indicated that boys express more externalizing emotions than do girls during toddlerhood and early childhood, but fewer externalizing emotions than do girls in adolescence, whereas girls exhibit more positive emotions with increasing age (Chaplin & Aldao, 2013).

Only a few studies have evaluated whether boys are more susceptible to caregiving risk than are girls, particularly in early development (Blatt-Eisengart, Drabick, Monahan, & Steinberg, 2009; Hammen, Hazel, Brennan, & Najman, 2012; Shaw & Vondra, 1995). Although results have varied, several studies using the still-face paradigm have shown that variations in the quality of the maternal caregiving environment (e.g., quality of parenting or maternal psychological distress) affect infant boys and girls differently. For instance, in a cross-sectional analysis, Weinberg, Tronick, Cohn, and Olson (1999) identified sex differences in 6-month-old infants' reactions to their mother's still-face. Specifically, infant boys were more emotionally reactive when confronted with a still-faced mother whereas girls were more neutral and object-focused. In other research, Carter, Mayes, and Pajer (1990) showed that greater maternal positivity during mother-infant play was linked to sex differences in infants' reactions to a

subsequent social stressor (maternal still-face), such that girls who experienced greater maternal positivity displayed decreased affective reactions whereas boys displayed increased affective reactions (both positive and negative). These findings have suggested that infant boys and girls differ in patterns of affective communication behavior during stressful situations, and that maternal behavior may play an important mediating role. However, other researchers (e.g., Haley & Stansbury, 2003; Mayes & Carter, 1990) have reported contrasting findings or no significant sex differences, and results of a meta-analytic review have indicated that the evidence for sex differences in infants' reactions to the maternal still-face is not robust (Mesman, van IJzendoorn, & Bakermans-Kranenburg, 2009).

There also is growing evidence for sex differences in young children's reactions to their mother's psychological distress, particularly maternal postpartum depressive symptoms. Such findings have public health significance because a large literature has shown that maternal postpartum depression, whether defined using diagnostic or subclinical criteria, is linked to poorer parenting quality and a host of negative maternal, child, and familial outcomes across diverse racial/ethnic and socioeconomic groups (Ashman, Dawson, & Panagiotides, 2008; Baker & Iruka, 2013; Field, 2010; Goodman et al., 2011; Huang, Costeines, Kaufman, & Ayala, 2014; Lovejoy, Graczyk, O'Hare, & Neuman, 2000; Martinez-Torteya et al., 2013; O'Hara & McCabe, 2013; Wachs, Black, & Engle, 2009).

Weinberg, Olson, Beeghly, and Tronick (2006) demonstrated that the effects of maternal depression on maternal and infant behavior are moderated by infant sex and the social context. Specifically, as compared to other dyadic configurations, infant sons of depressed mothers exhibited the most negative affect when they resumed normal social interaction following a social stressor (maternal still-face). In other research, Carter, Garrity-Rokous, Chazan-Cohen, Little, and Briggs-Gowan (2001) showed that maternal depression (whether prenatal, postpartum, or concurrent)

is linked to a higher rate of behavior problems for boys (but not girls) in later childhood. Similarly, Shaw and Vondra (1995) reported that maternal depression and less maternal involvement during mother–child interaction predict a higher rate of behavior problems for boys (but not girls) at age 3 years.

In a longitudinal study of women with a childhood history of trauma, McGinnis, Bocknek, Beeghly, Rosenblum, and Muzik (2015) reported that the specific early maternal and infant risk factors that predict behavior problems during toddlerhood differ by child sex. In that study, they used structural equation modeling to examine the unique contribution of a set of maternal and infant risk factors measured in early postpartum in predicting children's behavior problems at 18 months. When McGinnis et al. evaluated a single-group model, they found that only emotional problems assessed during infancy were associated with greater toddler behavior problems at 18 months. However, when they separated their sample by child sex, different infancy factors predicted behavior problems for boys versus girls: For boys, one maternal risk factor (i.e., maternal posttraumatic stress symptoms), but not infant risk factors, was predictive of toddler behavior problems. In contrast, for girls, only infant risk factors (i.e., higher infant negative emotionality and more sleep problems) were significant predictors. In other longitudinal research, Hammen et al. (2012) reported that having a mother with depression in early life predicts a greater likelihood of depression in adolescence for boys, but not for girls. However, findings in this literature are not consistent (e.g., Bureau, Easterbrooks, & Lyons-Ruth, 2009; for a review, also see Goodman et al., 2011). Despite this inconsistency, the results from the studies described earlier suggest that sex-differentiated susceptibility to caregiving risks such as postpartum depression can be identified during infancy and provide initial evidence that young boys and girls show different patterns of affective, behavioral, and communicative reactions to these risks.

The bulk of research evaluating sex-specific vulnerability to maternal depressive symptoms has focused either on infants' behavioral reactions to a social stressor (e.g., maternal still-face) or on older children's behavior problems as the primary outcomes (Goodman et al., 2011; Mesman et al., 2009; Turney, 2012a). One understudied child outcome in this area of research that deserves further scrutiny is toddlers' attachment security. Attachment security not only is negatively linked to chronically high levels of maternal depressive symptomatology during infancy but also is a major stage-salient task of late infancy and toddlerhood, one that is foundational to children's social and emotional functioning in later life (Campbell et al., 2004; Cicchetti, Rogosch, & Toth, 1998; Coyl, Roggman, & Newland, 2002; Sroufe, 2005; Sroufe, Egeland, & Kreutzer, 1990; Teti, Gelfand, Messinger, & Isabella, 1995). To our knowledge, no studies to date have evaluated whether there are sex differences in the associations between trajectories of maternal depressive symptoms across the first 18 months' postpartum and toddlers' attachment security. Even less is known about these associations after adjusting for familial demographic risk and maternal social support, each of which are known to alter the severity and chronicity of maternal depressive symptomatology

(Beeghly et al., 2003; Goodman et al., 2011; Manuel, Martinson, Bledsoe-Mansori, & Bellamy, 2012; Taylor, Budescu, Gebre, & Hodzic, 2014).

## THE PRESENT STUDY

The primary goal of our study was to add to this growing literature by evaluating whether there are sex differences in infants' early vulnerability to maternal psychosocial risk, as indexed by trajectories of maternal depressive symptoms across the first 18 months' postpartum, and toddlers' attachment security at 18 months of age. Analyses were based on longitudinal data collected in an understudied community sample of African American families from heterogeneous socioeconomic backgrounds. Despite current calls for child developmental research in single ethnic minority groups varying in sociodemographic risk (Cabrera, Beeghly, & Eisenberg, 2012; Landry & Marsh, 2011; Tamis-LeMonda, Briggs, McClowry, & Snow, 2008, very little is known about the associations between trajectories of maternal depressive symptoms and toddlers' felt security in this group. Even less is known about whether maternal depressive symptom trajectories continue to predict toddler attachment, after adjusting for familial demographic risk, a common confound in ethnic minority child developmental research (Cabrera & the SRCD Ethnic Racial Committee, 2013) and a strong predictor of maternal depressive symptoms in African American samples in and of itself (Beeghly et al., 2003; Coyl et al., 2002; Dolbier et al., 2013; Liu & Tronick, 2014; Taylor et al., 2014). How maternal social support may contribute to resilient maternal and child outcomes also has been understudied in this cohort. Maternal social support is a well-known resilience factor for many African American and other ethnic minority mothers of young children (Boyd & Waanders, 2013; Hess, Papas, & Black, 2002; Huang et al., 2014; Manuel et al., 2012).

Specifically, using latent growth models, we sought to evaluate whether (a) different trajectories of maternal depressive symptoms assessed from 2 to 18 months' postpartum could be identified in this economically diverse sample of African American mothers, (b) these trajectories predict toddler attachment security at 18 months, (c) these trajectories are altered by level of demographic risk or maternal social support, and (d) the associations among study variables differ for boys versus girls.

## METHOD

Analyses were based on data collected for 182 African American mother–infant dyads from socioeconomically diverse backgrounds who were participating in a larger, two-phase prospective longitudinal study. In the first (infancy) phase, dyads were recruited at the time of the infant's birth and followed to 18 months of age. In the preschool phase, dyads completing the infancy phase were followed to the preschool period (age 4). The current analyses focused on data collected during the infancy phase (through 18 months).

### Recruitment and Attrition

Families were initially contacted in the newborn nursery of two large metropolitan teaching hospitals in the Northeastern United States and formally recruited to participate in the study during a telephone interview when infants were 2 months old. To be eligible to participate, mothers had to self-report as being African American/Black, be at least 18 years old at the time of the infant's birth, have achieved at least a high-school-level education, have no serious medical conditions, have had a clinically normal pregnancy, and have no evidence of prenatal illicit substance use or HIV seropositivity, as documented in the medical record and via maternal self-report. Infants had to be full-term (37–42 gestational weeks at delivery), clinically normal, and physically healthy, as determined by a newborn pediatric exam. These sociodemographic and medical inclusion criteria were implemented to minimize the potential confounding influence of factors such as young teen parenting, maternal prenatal substance use, or preterm birth on maternal and child adaptation. There were no inclusion criteria, however, regarding years of completed parental education, employment status, marital status/living arrangements, family income, household composition, or family size.

Recruited participants received multiple assessments in the laboratory when infants were 3, 6, and 18 months old and were additionally evaluated during a home visit when infants were 12 months old. A total of 182 dyads had data available for at least one measure used in the present study, and 164 dyads had complete data through the 18-month visit. Of the 18 participants who dropped out, 12 moved or were lost to follow-up, and 6 were not interested or too busy to continue their participation. One additional participant missed the 12-month visit due to child illness, but returned to participate in the last infancy visit at 18 months. Results of *t* tests indicated no differential attrition between the 164 participants and the 18 nonparticipants (those who dropped out or had missing data) on demographic variables, including child sex, maternal age, education, marital status, socioeconomic status (SES), family income, or cumulative demographic risk ( $p > .05$ ). However, infants of the 164 participants had slightly higher scores on the Bayley Scales of Infant Development-Second Edition (BSID-II, Bayley, 1993) Mental Development Index (MDI) at 6 months of age than did the 18 nonparticipants,  $t(180) = -2.64, p < .05$ . BSID-II MDI at 6 months was evaluated as a potential covariate in the multivariate analyses in the present study. Further details about recruitment and retention during the infancy phase of this study are provided elsewhere (Beeghly et al., 2003).

### Missing Data

Missing data were evaluated for the study variables at each visit. Little and Rubin's (2014) missing completely at random chi-square test yielded a nonsignificant chi-square,  $\chi^2(11, N = 182) = 8.02, p = .711$ , indicating that the data were at least missing at random. Accordingly, missing data were incorporated using a

full-information maximum likelihood estimation procedure, allowing for the inclusion of all 182 participants.

### Sample Characteristics

The 182 mother–infant dyads in the current sample varied in sociodemographic characteristics, as intended by our recruitment-inclusion criteria. Mothers' average age at the time of the infant's birth was 29.48 years ( $SD = 4.37$ , range = 18–42), and average years of completed education was 14.48 ( $SD = 2.12$ , range = 11–22). Roughly half (47.7%) of the mothers were married. Families also ranged in socioeconomic status, as indexed by a composite variable of parental education and occupational prestige from the Hollingshead Four-Factor Index of Social Status (Hollingshead, 1977; *M* Hollingshead SES composite score = 43.32,  $SD = 11.34$ , range = 8–66), and were diverse with respect to total annual income (*M* income/needs ratio = 1.78,  $SD = 0.86$ , range = .33–3.5). Approximately half of the infants were male ( $n = 90, 49.5%$ ).

### Procedures

All study procedures were approved by an institutional human subjects review board, and all recruited mothers provided written informed consent at the first visit in the study. To promote rapport with the study families, the research assistants who conducted the laboratory and home visits and assessed the mother–child dyads self-identified as being African American or Black, and whenever possible, the same research assistant was assigned to the same families over time.

At each visit, mothers updated demographic information, completed questionnaires about their family's composition and functioning, their own level of depressive symptoms and other dimensions of psychosocial adaptation, and their child's behavior. Mother–child dyads were videotaped during a variety of social interactive tasks. At the 6-month visit, mothers reported on their social support, and trained examiners evaluated children's general developmental skills. At the 18-month visit, toddlers and mothers were additionally videotaped during Ainsworth's Strange Situation (Ainsworth, Blehar, Waters, & Wall, 1978), a standard observational paradigm evaluating toddler attachment.

### Measures

#### Dependent variable.

*Toddler felt security.* Toddlers' level of felt security and categorical attachment status were coded from videotapes of Ainsworth's Strange Situation paradigm (Ainsworth et al., 1978), which was administered at the 18-month lab visit. The Strange Situation is a widely used observational paradigm designed to activate the child's attachment system by placing an increasing amount of mild stress on the parent–child dyad (e.g., introduction to an unfamiliar room, interacting with an unfamiliar adult with mother present, two brief separations from, and reunions with, the parent).

Attachment behavior in the Strange Situation during infancy was chosen as the dependent variable in this study because it is predictive of child adaptation at later ages in other contexts in diverse populations (Sroufe, 2005; for a review, see Thompson, 2016) and because it is associated with maternal postpartum depression and parental behavior at home (Cicchetti et al., 1998) in both middle-class and low-income samples varying in race/ethnicity (DeWolff & van IJzendoorn, 1997; Leerkes, Parade, & Gudmundson, 2011; Stacks et al., 2014).

Attachment scoring was conducted at an external site by two experienced, reliable, nationally trained coding experts who were blinded to the current study's hypotheses and background variables. Coders had been trained to reliability in attachment scoring by Alan Sroufe and Mary Main, and participated on the team that coded infant and preschool attachment in the NICHD's Study of Early Child Care and Youth Development (NICHD Early Child Care Research Network, 2001). In the present study, coders utilized Ainsworth et al.'s (1978) scoring system for the three traditional attachment classifications (insecure-avoidant, A; secure, B; and insecure-ambivalent, C), and Main and Solomon's (1990) system for scoring insecure-disorganized/disoriented (D) attachment. To provide a continuous measure of attachment security, coders also rated the overall level of the infant's "felt security" (Cummings, 2003) with the mother during the Strange Situation using a nine-point Likert scale (1 = *very low*, 5 = *insecure/secure border*, 9 = *very high*). Level of felt security was used as the dependent variable in the growth models in the current study.

Intercoder reliability for ABCD attachment status and rated felt security was evaluated on 33 randomly selected, double-coded cases (~20% of the sample). Average kappa (for ABCD status) was .87, and the intraclass correlation coefficient for rated felt security was .93, both indicating excellent reliability. Any disagreements were later conferenced.

#### *Predictor variables.*

*Maternal depressive symptoms.* Mothers reported on the level of their depressive symptoms at 2, 3, 6, 12, and 18 months' postpartum using the Center for Epidemiological Studies-Depression Scale (CES-D, Radloff, 1977). The CES-D is a widely used self-report questionnaire designed for the general population that evaluates depressive symptomatology during the week prior to administration. Possible total scores on this scale range from 0 to 60, with higher scores reflecting higher levels of depressive symptoms. A cutoff score of 16 or higher denotes elevated depressive symptomatology. The CES-D has excellent psychometric properties in both clinical and epidemiological studies with diverse populations, including African Americans and postpartum women (Beeghly et al., 2003; Beeghly et al., 2002; Tandon, Cluxton-Keller, Leis, Le, & Perry, 2012). In the present sample, standardized Cronbach's  $\alpha$  coefficients for mothers' CES-D total scores at each visit were all at or above .80, indicating good internal consistency.

Because the 2- and 3-month CES-D scores were obtained within 1 month of each other and a paired-sample *t* test revealed

that the magnitude of mothers' depressive symptom scores at each visit did not differ,  $t(181) = -1.473, p = .142$ , the 2- and 3-month CES-D scores were averaged to create one data point. This resulted in four waves at which longitudinal changes in maternal depressive symptoms (CES-D total scores) could be assessed in the growth models: 2 to 3, 6, 12, and 18 months' postpartum.

*Maternal social support.* At the 6-month visit, mothers rated the quality and quantity of their social support at three ecological levels (intimate partners, friends/extended family, and neighborhood/community) using the 16-item Social Support subscale from the Inventory of Parent's Experiences (Crnic, Greenberg, Ragozin, Robinson, & Basham, 1983). To allow creation of a summary variable reflecting total social support, all items were scored using a 5-point Likert scale for the purposes of this study (1=very dissatisfied; 5=very satisfied). The ratings were averaged for use in the present analyses, ( $\alpha = .71$ ). Maternal social support has been robustly associated with parenting quality and child outcomes in other research, and has been described to be a protective factor for African American and other ethnic minority mothers of young children (e.g., Boyd & Waanders, 2013; Hess et al., 2002; Huang et al., 2014; Manuel et al., 2012). In the present study, we hypothesized that maternal total social support at 6 months would attenuate the expected negative association between maternal depressive symptom trajectories and children's 18-month attachment security.

*Demographic risk.* A cumulative demographic risk index was created as a potential covariate in the present study, following Sameroff (1998) and colleagues (Sameroff, Seifer, & McDonough, 2004). This was accomplished by dichotomizing four demographic risk variables assessed during early infancy known to predict negative parenting and poor child developmental and behavioral outcomes (see Appleyard, Egeland, vanDulmen, & Sroufe, 2005; Larson, Russ, Crall, & Halfon, 2008; McLoyd, 1998). A point was assigned for the presence/absence of each of the following risks, and then summed to create a single index ( $\alpha = .80$ ): (a) familial income at or below the federal poverty threshold, adjusting for household size (27.7% met this criterion); (b) low satisfaction with total family income for meeting familial needs (score of 1 or 2 on a 5-point Likert rating; 21.98% met this criterion); (c) low SES (categorical score of 3 or higher on the Hollingshead Four-Factor Index of Social Status; Hollingshead, 1977), which is a composite of parental education and occupational prestige; 16.48% met this criterion), and (d) young maternal age (<22 years at the time of the infant's birth; 11.5% met this criterion). Possible scores on the risk index ranged from 0 to 4 risk points.

*Infant developmental status.* At the 6-month visit, infants' general cognitive skills were evaluated using the Mental Scale of the Bayley Scales of Infant Development-Second Edition (Bayley, 1993), an omnibus age-referenced assessment instrument designed for infants and young children from 2 to 42 months of age. Scoring yields a Mental Development Index (MDI; population  $M = 100$ ,

$SD = 15$ ). MDI was evaluated as a potential covariate in the present study.

### Statistical Analyses

Latent growth models were used to evaluate the association between trajectories of maternal depressive symptoms (assessed at four time points from 2–18 months' postpartum) and toddlers' rated felt security at 18 months, adjusting for demographic risk and maternal social support. Child sex also was evaluated as a possible moderator of this relationship. Latent growth models were estimated using Mplus Seventh Edition (Muthén & Muthén, 1998–2015).

Prior to estimating the latent growth models, preliminary data analyses were conducted to ensure that the variables met the distributional assumptions required for unbiased estimation of the growth models and to test for potential covariates. Descriptive statistics for all study variables and bivariate correlations among study variables also were calculated, both for the whole sample and for each child sex, separately.

## RESULTS

### Results of Preliminary Analyses

All study variables were normally distributed, with two exceptions: The ratio of the skew coefficient to its corresponding  $SE$  exceeded 2.00 for maternal depressive symptoms (CES-D total scores) at each visit and for the demographic risk index, indicating that these variables significantly deviated from normality (i.e., all were positively skewed). These variables were therefore transformed using a natural logarithm transformation for use in subsequent analyses.

Descriptive statistics for and bivariate correlation coefficients among all study variables in the whole sample ( $N = 182$ ) are presented in Table 1. Nontransformed scores were used for the descriptive statistics presented in Table 1 for ease of interpretation. Bivariate correlation coefficients among study variables for the subsamples of male and female children are presented in Tables 2 and 3, respectively.

### Descriptive Statistics for Toddlers' Felt Attachment Security

Toddlers' felt security ratings in this sample, as assessed during the Strange Situation at 18 months, ranged from very low to very high. In support of validity of this measure, the felt security rating was significantly and highly associated with toddlers' categorical secure/insecure attachment status,  $r = .83, p < .001$ .

Scoring for traditional ABCD attachment categories revealed that 61% of the toddlers were classified as securely attached whereas 15.2% were insecure-avoidant, 13.4% were insecure-ambivalent, and 10.4% were insecure-disorganized. Results of a one-way ANOVA comparing level of felt security across the four categorical attachment groups were significant,  $F(1, 160) = 121.63, p < .0001$ . Results of Tukey B post hoc tests revealed that

securely attached toddlers had significantly higher felt security ratings than had children in all insecure groups, and that children classified as insecure-disorganized had significantly lower felt security ratings than had children classified as either insecure-avoidant or insecure-ambivalent.

### Correlational Results for the Whole Sample

Maternal depressive symptom counts (CES-D total scores) were significantly and substantially correlated across each pair of visits. Moreover, toddlers' felt security was significantly and negatively correlated with maternal depressive symptoms at 2 to 3 months and 6 months, marginally associated at 12 months, but not associated at 18 months. As expected, higher demographic risk was associated with higher levels of maternal depressive symptoms at 2 to 3, 12, and 18 months' postpartum, and marginally associated at 6 months' postpartum. Therefore, demographic risk was included as a covariate in the growth models.

Conversely, a higher level of maternal social support at 6 months was significantly and negatively correlated with level of maternal depressive symptoms at each visit. Therefore, social support was included in the conditional growth model evaluating the association between maternal depressive symptom trajectories and toddler felt security.

In contrast, children's general developmental status (Bayley-II MDI) at 6 months was not significantly associated with maternal depressive symptoms at any visit or with toddlers' felt security at 18 months. Therefore, MDI was not retained as a covariate in the growth models.

Regarding sex differences, results of  $t$  tests indicated that child sex was not significantly associated with any of the study variables, all  $ps > .05$ . Interestingly, however, a different pattern of correlations between maternal depressive symptoms at each visit and toddler felt security was observed for boys versus girls. For boys, felt security was significantly and negatively associated with maternal depressive symptoms at each visit during the first postpartum year (i.e., at the 2- to 3-, 6-, and 12-month visits) (see Table 2). In contrast, for girls, felt security was not significantly associated with maternal depressive symptoms at any visit (see Table 3).

### Growth Model Results

As a first step, an unconditional growth model was evaluated using the log-transformed assessments of maternal depressive symptoms at 2 to 3, 6, 12, and 18 months' postpartum as the manifest variables. This unconditional model yielded a good fit to the data,  $\chi^2(4, N = 182) = 4.69, p = .32, CFI = .99, RMSEA = .031$ . The sample average slope was nonsignificant,  $b = -.012, p = .49$ , suggesting that for the sample as a whole, mothers' level of depressive symptoms remained relatively constant across the four waves of assessment. However, there was significant between-subjects variability in the slope,  $b = .047, p < .001$ , indicating that for a

**TABLE 1.** Descriptive statistics for study variables (whole sample, *N* = 182)

Study Variable	<i>M</i> ( <i>SD</i> )	Range	1	2	3	4	5	6	7	8
1. Child Felt Security (18 months)	4.86 (1.81)	1.5–9	1							
2. Maternal Depressive Symptoms (2–3 months)	8.58 (6.57)	0–37	-.221**	1						
3. Maternal Depressive Symptoms (6 months)	8.19 (7.27)	0–42	-.165*	.646***	1					
4. Maternal Depressive Symptoms (12 months)	8.21 (7.08)	0–41	-.135†	.575***	.608***	1				
5. Maternal Depressive Symptoms (18 months)	9.31 (6.91)	0–38	-.033	.496***	.577***	.523***	1			
6. Maternal Social Support (6 months)	3.02 (0.65)	1.2–4	.032	-.283**	-.379**	-.281**	-.271**	1		
7. Familial Demographic Risk	0.66 (0.88)	0–3	-.034	.223**	.171*	.179*	.156*	-.034	1	
8. Child Bayley-II MDI (6 months)	104.75 (5.89)	79–126	.037	.002	-.065	-.081	-.073	.175*	-.068	1

Note. Maternal depressive symptoms were assessed using the Center for Epidemiological Studies-Depression Scale total score (Radloff, 1977); Bayley-II MDI: Bayley Scales of Infant Development (2nd ed.), Mental Developmental Index (Bayley, 1993).  
 †*p* < .10. \**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

**TABLE 2.** Correlations among study variables (boys, *n* = 90)

Study Variable	1	2	3	4	5	6	7	8
1. Child Felt Security (18 months)	1							
2. Maternal Depressive Symptoms (2–3 months)	-.268**	1						
3. Maternal Depressive Symptoms (6 months)	-.209*	.557***	1					
4. Maternal Depressive Symptoms (12 months)	-.255*	.557***	.486***	1				
5. Maternal Depressive Symptoms (18 months)	-.175	.501***	.571***	.571***	1			
6. Maternal Social Support (6 months)	.153	-.351**	-.354**	-.354**	-.271**	1		
7. Familial Demographic Risk	-.057	.267*	.195†	.262*	.266*	-.025	1	
8. Child Bayley-II MDI (6 months)	.008	.106	-.002	-.027	-.104	.085	.015	1

Note. Maternal depressive symptoms were assessed using the Center for Epidemiological Studies-Depression Scale total score (Radloff, 1977); Bayley-II MDI: Bayley Scales of Infant Development-2<sup>nd</sup> edition, Mental Developmental Index (Bayley, 1993).  
 †*p* < .10. \**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

**TABLE 3.** Correlations among study variables (girls, *n* = 92)

Study Variable	1	2	3	4	5	6	7	8
1. Child Felt Security (18 months)	1							
2. Maternal Depressive Symptoms (2–3 months)	-.069	1						
3. Maternal Depressive Symptoms (6 months)	-.081	.747***	1					
4. Maternal Depressive Symptoms (12 months)	.045	.593***	.727***	1				
5. Maternal Depressive Symptoms (18 months)	.097	.488***	.581***	.475***	1			
6. Maternal Social Support (6 months)	-.057	-.203†	-.379***	-.258*	-.235*	1		
7. Familial Demographic Risk	-.012	.184†	.150	.104	.065	-.043	1	
8. Child Bayley-II MDI (6 months)	.086	-.103	-.124	-.120	-.027	.250*	-.149	1

Note. Maternal depressive symptoms were assessed using the Center for Epidemiological Studies-Depression Scale total score (Radloff, 1977); Bayley-II MDI: Bayley Scales of Infant Development (2nd ed.), Mental Developmental Index (Bayley, 1993).  
 †*p* < .10. \**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

subset of individuals in the sample, there was change in level of depressive symptoms over time.

Next, a conditional latent growth model was carried out, in which the 6-month maternal social support variable and familial demographic risk were included as predictors of the variability in the initial level of maternal depressive symptoms and the changes in level of maternal depressive symptoms over time. In addition, paths in which the variability in initial depressive symptoms and the changes in maternal depressive symptoms over time predicted ratings of felt security were specified. This model yielded an ade-

quate fit to the data,  $\chi^2(15, N = 182) = 29.19, p = .02, CFI = .94, RMSEA = .07.$

In this model, mothers' initial levels of maternal depressive symptoms were not associated with toddlers' felt security ratings at 18 months' postpartum, *b* = 31.71, *p* = .76. However, the rate of change in level of maternal depressive symptoms over time was predictive of toddlers' felt attachment security, *b* = 1.93, *p* < .001. Moreover, a higher level of maternal social support was significantly associated with decreasing levels of maternal depressive symptoms across the 18-month postpartum period,



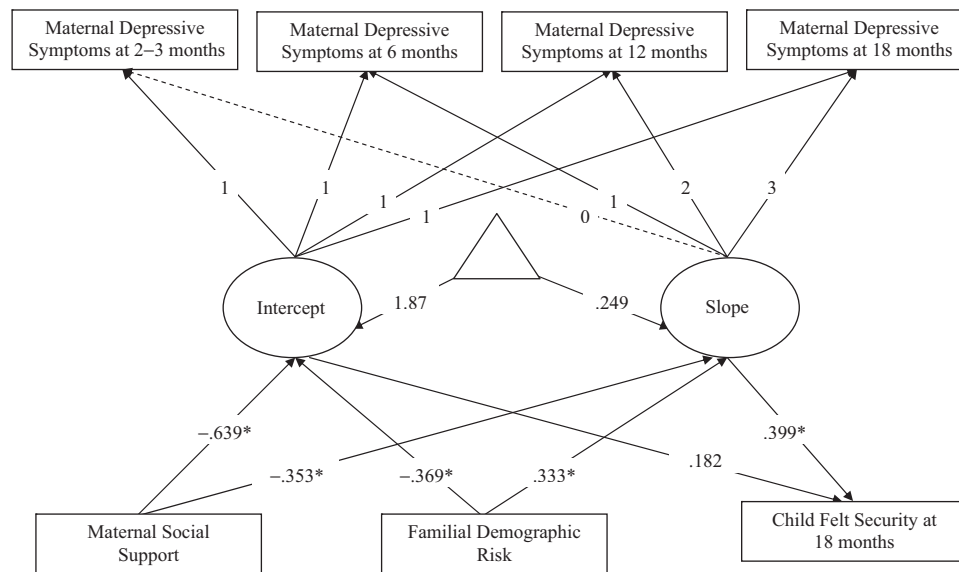


FIGURE 1. Conditional latent growth curve path diagram of maternal postpartum depressive symptoms predicting boys' felt attachment security at 18 months of age.

$b = -.07$ ,  $p < .001$ , whereas higher demographic risk,  $b = .05$ ,  $p < .001$ , was significantly associated with increasing levels of maternal depressive symptoms over time.

The final step was to test the hypothesis that this overall growth model is moderated by child sex, which was accomplished in two stages. First, a multigroup model was estimated, in which all path coefficients and factor loadings were constrained to be equal, but the model was estimated separately for male and female children. This allows the model to estimate the best fitting path coefficients, but requires that the identical coefficients be used for the male and female models. This model yielded a poor fit to the data,  $\chi^2(40, N = 182) = 96.37$ ,  $p < .001$ , CFI = .77, RMSEA = .124. The poor model fit of the constrained model suggests that the underlying statistical relationships among the variables differ between male and female children.

Therefore, in the next step, the same multigroup model was estimated, but this time the parameter estimates were allowed to estimate freely between the male and female models. In this model, the specified structure of the model was the same for male and female children, but the value of the path coefficients for specified relationships was allowed to be different for each of the two groups. This unconstrained model provided an adequate fit to the data,  $\chi^2(30, N = 182) = 46.85$ ,  $p = .03$ , CFI = .94, RMSEA = .07, suggesting that the overall structure of the model does account for the observed variance/covariance matrix for the sample, but that the relationships differ between male and female children. The complete set of parameter estimates and significance levels are presented in Figure 1, for the male subsample, and in Figure 2, for the female subsample.

Notably, the key difference in the model for male and female children was in the relationship between the slope of maternal depressive symptoms and toddlers' felt attachment security at 18 months' postpartum. The initial levels of maternal depressive

symptoms were similar between the male,  $b = 1.87$ , and female,  $b = 1.93$ , subsamples. Moreover, the rate of change in maternal depressive symptoms across the four postpartum assessments was similar between the male,  $b = .25$ , and female,  $b = .23$ , subsamples as well. However, in the male subsample, variability in level of maternal depressive symptoms over the first 18 months' postpartum was significantly associated with toddlers' felt attachment security ratings at 18 months,  $b = -1.82$ ,  $p = .002$ , whereas in the female subsample, there was no statistically significant association,  $b = -.84$ ,  $p = .07$ . Thus, for male children, results show that the more rapid the increase in maternal depressive symptoms over the postpartum period, the more negative the association with toddlers' felt attachment security at 18 months. In contrast, for female children, this same relationship between maternal depressive symptom trajectories and toddlers' felt attachment security was not evident.

## DISCUSSION

The primary goal of this study was to evaluate whether there are sex differences in young children's early susceptibility to maternal psychosocial risk, as indexed by trajectories of maternal depressive symptoms across the first 18 months' postpartum and toddlers' rated felt security, a continuous measure of attachment security assessed during the Strange Situation paradigm at 18 months (Cummings, 2003). We evaluated toddlers' attachment security as our dependent variable because it has not been well-studied as an outcome in the literature on sex-specific sensitivity to postpartum environmental influences and because it is a major developmental task of late infancy and toddlerhood that is predictive of positive child developmental and behavioral outcomes in later childhood (for reviews, see Sroufe, 2005; Thompson, 2016).

A unique feature of our study is that our analyses utilized longitudinal data collected in an understudied community sample

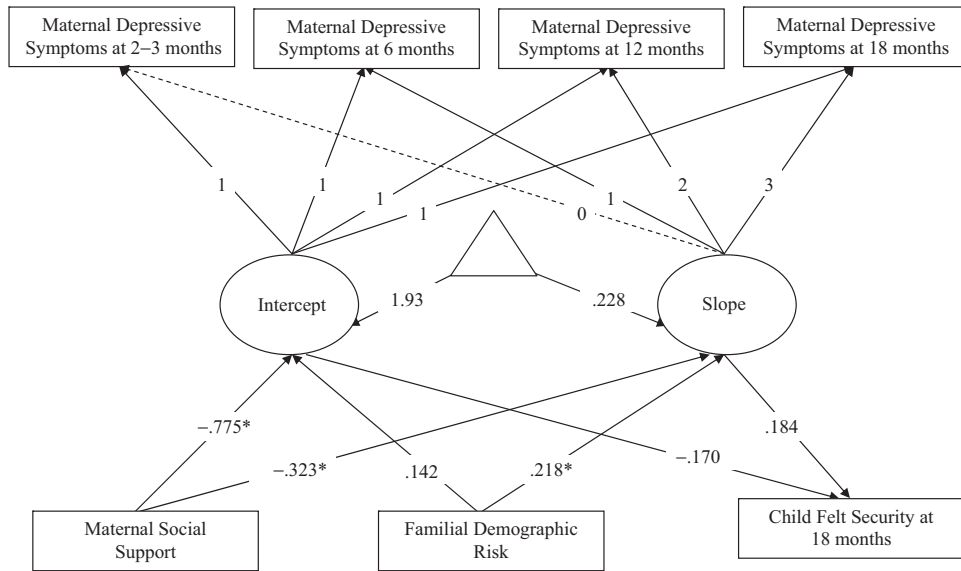


FIGURE 2. Conditional latent growth curve path diagram of maternal postpartum depressive symptoms predicting girls’ felt attachment security at 18 months of age.

of African American families varying in sociodemographic risk, which represents a growing segment of the African American population in the United States (Landry & Marsh, 2011). Our study also is consistent with a recent call for child developmental research with socioeconomically diverse ethnic minority samples (Cabrera et al., 2012; Cabrera & the SRCD Ethnic Racial Committee, 2013; Tamis-LeMonda et al., 2008).

**Descriptive Results**

*Toddler attachment status and felt security.* The distribution of secure and insecure attachment classifications (including disorganized attachment) in this African American, economically diverse cohort is consistent with that reported in prior research (Bakermans-Kranenburg, van IJzendoorn, & Kroonen, 2004) and meta-analytic studies of normative populations not characterized by high-risk characteristics (e.g., child maltreatment) (DeWolff & van IJzendoorn, 1997; van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999).

A majority (61%) of toddlers in our sample were classified as securely attached whereas 15.2% were insecure-avoidant, 13.4% were insecure-ambivalent, and 10.4% were insecure-disorganized. Following Cummings (2003), we evaluated rated felt security as a continuous dependent variable of attachment security in our growth models. In support of the validity of this measure, felt security ratings were substantially associated with children’s dichotomous secure/insecure attachment status in our sample, and also with the four traditional (ABCD) attachment categories, with secure children having the highest felt security ratings and insecure-disorganized children having the lowest.

*Maternal depressive symptoms.* The correlational results for the relative stability of maternal depressive symptoms over time in

this cohort also are largely consistent with prior research in diverse samples (Beeghly et al., 2002; Campbell et al., 2004; Goodman et al., 2011; O’Hara & McCabe, 2013; Turney, 2012a, 2012b). First, mothers in the present sample exhibited striking variability in the level of their postpartum depressive symptoms at intake, and this level was relatively stable over time, as indexed by significant and substantial cross-time correlations. This suggests that mothers in this sample as a whole retained their relative rank-ordering in depressive symptom levels across the first 18 months’ postpartum. On a more sobering note, this finding also suggests that mothers with a high level of depressive symptoms at 2 months’ postpartum are likely to continue to experience high depressive symptoms later during the first 18 months’ postpartum, highlighting the importance of early clinical screening and intervention programs.

Notably, toddlers’ felt security ratings were correlated with maternal depressive symptom total scores during the first postpartum year, but these correlations abated in magnitude to statistical nonsignificance after the first postpartum year. This suggests that emerging attachment relationships may be especially sensitive to maternal psychological distress during the first postpartum year. Stein et al. (2008) reported similar effects of early (versus later) maternal depression on children’s preschool outcomes in bivariate analyses. Other researchers have noted that maternal depressive symptoms assessed during early childhood continue to predict child and teen problems, even after controlling for concurrent depression and other important variables (Bureau et al., 2009).

The correlational results from the current study also show, in this economically diverse African American sample, that higher demographic risk is associated with higher levels of maternal depressive symptoms across the first 18 months’ postpartum. This finding is consistent with results from a host of other research in African American and ethnically diverse samples (e.g., Beeghly

et al., 2003; Coyl et al., 2002; Dolbier et al., 2013; Liu & Tronick, 2014; Taylor et al., 2014). Given the pervasive confound between African American race/ethnicity and uniformly low SES in many prior studies, this finding raises the possibility that the high prevalence of maternal depression reported in prior research with low-income African American samples may be at least partially inflated (Liu & Tronick, 2014).

On a more positive note, a higher level of maternal social support was significantly associated with lower maternal depressive symptoms at each visit across the first 18 months' postpartum in this cohort. This finding is generally consistent with results in other African American samples as well as in those unselected for race/ethnicity (Boyd & Waanders, 2013; Hess et al., 2002; Huang et al., 2014; Lyons-Ruth, Connell, Grunebaum, & Botein, 1990; Manuel et al., 2012; Taylor et al., 2014).

Although child sex was not significantly associated with any of the study variables in bivariate analyses, there was a different pattern of correlations between maternal depressive symptoms at each postpartum protocol point and toddlers' felt security in the male versus female subsample in this cohort. It is striking that for boys, felt security was significantly and negatively associated with maternal depressive symptoms at each study visit; however, for girls, felt security was not significantly associated with maternal depressive symptoms at any visit.

### **Growth Model Results**

Findings observed in the multivariate growth models are both similar to, and different from, those observed in the bivariate analyses reported earlier. The discrepancies likely stem from the different approaches taken in each type of analysis. Fixed effects (i.e., correlations) and random effects (growth parameter variance estimates) focus on the sample as a whole. The results of these analyses indicate that the mothers in this sample exhibited significant variance in the level of their depressive symptoms at intake, which was relatively stable over time. In contrast, growth models capture individual trajectories over time, which are not reflective of the sample average trajectory. Specifically, results from the growth models indicate that mothers exhibited diverse symptom trajectories across the first 18 months' postpartum, and that those exhibiting an increasing level of depressive symptoms over time had toddlers with lower rated felt security.

Moreover, consistent with the correlational findings, results from the single-sample conditional growth model indicate that higher familial demographic risk is significantly associated with increasing levels of maternal depressive symptoms over time. These findings are similar to those reported in prior research with ethnic minority samples (Dolbier et al., 2013; Liu & Tronick, 2014) and in cohorts unselected for race/ethnicity (Coyl et al., 2002; Goodman et al., 2011; Turney, 2012a). Conversely, a higher level of maternal social support was associated with decreasing levels of maternal depressive symptoms across the 18-month postpartum period. The latter finding suggests that maternal social support during in the first postpartum year is an important resilience factor for African

American mothers from diverse socioeconomic backgrounds experiencing postpartum depressive symptoms, as it is for African American and other mothers in low-income cohorts (e.g., Boyd & Waanders, 2013; Hess et al., 2002; McLoyd, 1998) and other cohorts (Huang et al., 2014; Manuel et al., 2012; Taylor et al., 2014; for reviews, see Goodman et al., 2011; O'Hara & McCabe, 2013).

Strikingly, the finding that a rising rate of change in level of maternal depressive symptoms over time predicted lower toddler felt security remained significant, even after controlling for demographic risk and maternal social support. These findings show that the association between maternal depressive symptom trajectories and toddlers' felt security cannot be explained solely by the accumulation of sociodemographic risks or whether the mother has inadequate maternal social support. Rather, these findings suggest that exposure to rising levels of early maternal depressive symptoms may have toxic effects on toddlers' socioemotional functioning, as indexed by rated felt security at 18 months of age. Because African American race/ethnicity is often confounded with uniformly low socioeconomic status in the child development literature, these findings highlight the importance of evaluating these associations in cohorts varying in SES and controlling for demographic risk factors.

These findings also are relevant for the development of prevention and intervention efforts. Our results suggest that for the sample as a whole, mothers' initial levels of depressive symptoms are associated with their later symptom course across the postpartum. This finding highlights the importance of early symptom screening and referral to appropriate treatment or support, even for postpartum women in a nonclinically referred community sample. Often, the postpartum period is understood as a normative time of increased vulnerability for new mothers as they transition into the parenting role (Belsky & Pensky, 1988; Karney & Bradbury, 1995), and the presence of high depressive symptom levels is assumed to subside on its own. As a consequence, a high level of postpartum depressive symptoms early in the postpartum may be undervalued by both professionals and lay people. Our findings suggest that this assumption may not be valid for all postpartum women, and that screening and early treatment initiation may be particularly important for community mothers at risk for higher depressive symptoms, such as those with higher levels of sociodemographic risk or less social support.

Perhaps the most intriguing finding from the vantage point of this study is that the multigroup conditional growth models provided evidence for sex differences in young children's reactions to maternal psychological distress. Specifically, in the subsample of boys, variability in level of maternal depressive symptoms over the first 18 months' postpartum was significantly associated with ratings of toddlers' felt attachment security at 18 months. In contrast, in the subsample of girls, these associations were not statistically significant. Specifically, these findings indicate that boys may be differentially sensitive to a rapid increase in maternal depressive symptoms over the first 18 months' postpartum, and the more rapid

the increase, the more negative the impact on boys' felt security at 18 months. However, note that not all investigators report significant moderating effects of child sex (e.g., Bureau et al., 2009), and the current analyses do not permit inferences about cause and effect. Nevertheless, our findings are consistent with results from a small, but growing, body of studies showing that boys' socioemotional capacities may be differentially affected by early exposure to maternal postpartum depressive symptomatology than those of girls (Carter et al., 2001; McGinnis et al., 2015; Shaw & Vondra, 1995; Weinberg et al., 2006). Given that even subclinical levels of maternal postpartum depressive symptoms are associated with maternal, child, and familial risks, both concurrently and at later time points (for reviews, see Goodman et al., 2011; Hammen et al., 2012; O'Hara & McCabe, 2013), further research on this topic is needed.

### Limitations and Strengths

Our study has both limitations and strengths. Evaluating an understudied economically diverse sample of African American families is a strength because doing so may help disentangle pervasive confounds in the literature between African American race/ethnicity and uniformly low income status (Bakersmans-Kranenburg et al., 2004 (Cabrera et al., 2012; Cabrera & the SRCD Ethnic Racial Committee, 2013; Liu & Tronick, 2014), and because middle-class African American families are growing in prevalence in the United States (McNeil, Harris-McCoy, Brantley, Fincham, & Beach, 2014). Moreover, very little is known about associations between maternal postpartum depressive symptom trajectories and toddlers' attachment outcomes in this population. A limitation is that our results may not generalize to higher risk samples of African American families or to families in other ethnic groups.

Another strength is that our study utilized a prospective longitudinal design, multiple methods (e.g., behavioral observations, parental self-report, and psychometric child tests), repeated measures of maternal depressive symptomatology during the first 18 months' postpartum, and modern latent growth statistical models to analyze the data. A limitation is that possible mediators of the link between maternal depressive symptom trajectories and toddlers' attachment outcomes (e.g., parenting quality, Coyl et al., 2002; Field, 2010; Lovejoy et al., 200; Stein et al., 2008; Turney, 2012a) were not evaluated. The role of parenting and other potential mediators should be addressed in future research with larger samples of African American families.

### Conclusions

The results of this study contribute to a growing literature unselected for race/ethnicity suggesting that sex-differentiated transmission of risk can be identified during infancy. Specifically, in the present study, male and female toddlers show different patterns of social emotional development (as indexed by rated felt attachment security) in response to early exposure to differing trajectories of maternal depressive symptomatology, even after con-

trolling for familial demographic risk and maternal social support. These findings suggest that the social emotional functioning of boys, compared to girls, may be more vulnerable to high levels of maternal depressive symptoms during infancy, particularly when there is a rapid increase in maternal depressive symptoms over the postpartum period.

These findings also are consistent with previous research suggesting that male sex is linked to slower maturation rates in early life, which may create a longer period of early vulnerability to caregiving risks such as maternal depression for boys versus girls. That is, boys may be more affected by poor caregiving quality than may girls in early childhood (Chaplin & Aldao, 2013; Kochanska, Coy, & Murray, 2001; Martel, Klump, Nigg, Breedlove, & Sisk, 2009). However, the mechanisms underlying these associations remain unclear and warrant further research. Based on prior animal and human research, it is very likely that these mechanisms are complex and involve dynamic transactions among variables from multiple levels of influence (Alexander & Wilcox, 2012; Conratt et al., 2016; Martel et al., 2009; Moore, 2012; Tibu et al., 2014).

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