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The Relationship between Genetic Attributions, Appraisals of Birth Mothers' Health, and the Parenting of Adoptive Mothers and Fathers

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Abstract

Parenting beliefs and attributions can influence parenting behavior. We used an adoption design to examine the associations among perinatal risk and poor birth mother health, adoptive parent appraisals of birth mothers' mental health, and genetic attributions to adoptive parents' feelings and behaviors toward their adopted infants. A sample of 361 pairs of adoptive parents and birth mothers were interviewed using standardized measures when infants were between 4 and 9 months old. Adoptive mothers and fathers were observed during play tasks when their infants were 9 months old. We found that adoptive mothers' and fathers' appraisals of birth mothers' health were associated with perinatal risk and poor birth mother health. Adoptive mothers' appraisals were linked to hostile parenting, after accounting for characteristics of the child that may influence her appraisals and attributions. These associations were not present for adoptive fathers. Genetic attributions were associated with both adoptive mother and fathers' feelings of daily hassles in parenting. These findings have implications for prevention and intervention.

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Keywords

genetic attributions; parental expectations; parenting; adoption

The ideas parents have about who their children will become and the attributions they make about their children's behaviors can influence the way they parent. Some of these beliefs about the child, of course, arise from the children themselves; as such, they constitute an important part of reciprocal parent-child relationships that begin during pregnancy. However, other beliefs arise from sources of information unrelated to the child and may influence both parenting behavior and child outcomes. There has been little research in this area in parent-child relationships.

Parents' beliefs about who their children will become can begin even before birth. For example in biological families, parents' ideas about their children during pregnancy have been highly correlated with both mothers' and fathers' ratings of their children's temperament over the first year of life (Benoit, Parker, & Zeanah, 1997; Zeanah, Keener, Stewart, & Anders, 1985). Evidence suggests that this association may reflect mother's negative outlook during pregnancy that, in turn, significantly impacts her parenting during infancy (Coleman, Nelson, & Sundre, 1999). Parent beliefs about the child during infancy can also come from sources outside the child. Parents in both biological and adoptive families may develop ideas about their children directly from their postnatal experience or from impressions they develop from medical information provided.

Often, it is difficult to separate ideas that are formed prenatally and those from subsequent periods in the child's life. The study of adopting families is unique in that it separates prenatal from postnatal influences on these parental expectations. Indeed, in the absence of direct experience of fetal development, the first source of information about the adopted child comes from information about biological parents and the pregnancy of the birth mother. This information may influence adoptive parents' feelings and behaviors toward their children. Adoptive parents can develop ideas about the child based on their knowledge of the birth parents' background, health, and characteristics, learned through observation in open adoptions and/or access to medical information acquired after birth. As in parents rearing their biological children, postnatal experiences of the adopted child can also influence parental expectations. Studying adopted children in infancy narrows this window of exposure.

Further, controlling for infant characteristics as a source of parental beliefs about the child can further narrow our focus on how parents develop impressions from information unrelated to the child's characteristics. For example, if birth parents were known to have significant health problems or psychiatric symptoms, adoptive parents may feel that the child is predisposed to such conditions and that their own parenting may be less effective in reshaping such behaviors. This might be especially the case if they have strong beliefs about the influence of genetic factors.

This study was designed to explore these potential relationships in a large sample of adoptive parents and infants, with the potential to take an important first step in examining if

information about the perinatal environment and birth mother health influences parental behavior towards adopted offspring. We assume, but do not test in this initial study, that parenting behavior induced by appraisals of birth mothers and genetic attributions will have an impact on the child's development. Our goal is to first explore whether adoptive parents' caregiving quality can be influenced by birth mothers' poor health and prenatal risks via their appraisals of birth mothers' health and their genetic attributions in the first months of parenting, while controlling for characteristics of the child.

Potential Evidence of the Influence of Outside Information on Parenting

There is some indication that knowledge provided to biological parents about their own children at birth may influence their parenting behavior. For example, work by Scarr (1979) suggests that parents can be influenced by what they are told, rightly or wrongly, about the monozygotic or dizygotic status of their twins. When parents believe their dizygotic twins are monozygotic, they treat them more similarly than if they are told they are dizygotic. This induced change and subsequent differential treatment can influence twins' reports of their personalities.

Outside of twin studies, researchers have explored the relationship between parental beliefs about academic performance and parenting practices. Parents who expect their children to have high educational achievement have greater positive parenting behaviors such as warmth and play (Davis-Keane, 2005). Parents' ideas about the gender of their children, academic achievements, and career choice, expectations that are often independent of the child's actual potential, have been linked to child school outcomes (Eccles, Jacobs, & Harold, 1990), educational attainment (Scherr, Madon, Gyll, Willard, & Spoth, 2011), occupational choice (Jacobs, Chhin, & Bleeker, 2006), and adult responsibilities and school achievement for those with mental retardation (Mutua & Dimitrov, 2001).

Perinatal factors also can influence parents' beliefs about their children. There is evidence that mothers and fathers may develop different outlooks for preterm infants and therefore behave differently toward their preterm infants than parents of full-term babies. Mothers of preterm infants show less positive affect toward their infants, less gazing at their infants' faces, and fewer "motherese" type vocalizations. These differences have been shown to be associated with lower levels of mother-infant synchrony (Feldman & Eidelman, 2007). Stern and Hildebrandt (1986) studied how mothers responded to a set of unknown infants labeled as either preterm or full-term. When mothers were told an infant was born prematurely, they touched the babies less, and rated them more negatively in terms of physical cuteness and likability than when they believed infants were full-term. These studies suggest that an adoptive mother's knowledge of perinatal difficulties and birth mother health may play a significant role in how she appraises the birth mother's health, ultimately leading to changes in her parenting. This study is designed to assess the indirect associations between perinatal risk and birth mother health and the parenting of adoptive mothers and fathers.

Parental Attributions

Sigel's milestone work (e.g., 1985) is a prominent example from a body of literature linking attributions mothers make about the causes of their child's behaviors to their parenting.

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Attributions are preconceptions about the causes of child behavior that are made by the parent. These cognitions can significantly affect parents' accuracy in perceiving their children's cues and responding to them appropriately (McNally, Eisenberg, & Harris, 1991; Sigel & McGillicuddy-De Lisi, 2002). Parental attributions can be influenced by culture, ethnicity, and gender, and can impact parenting beliefs and practices (Azar, Reitz, & Gosling, 2008). Grusec and colleagues (1994) described two specific kinds of parental attributions: (1) feelings of self-efficacy, and (2) interpretation of their children's behaviors. When parents believe they have less influence over their child's behavior, they may alter their parenting behaviors. This can happen if parents feel ineffective or if they perceive children to have responsibility and blame for their own misdeeds.

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In a similar vein, Bugental and colleagues have studied the link between infant and child behaviors and child maltreatment. They have found that the relationship is moderated by mothers' attributions (Bugental, Blue, & Lewis, 1990; Bugental, Mantyla, & Lewis, 1989). When mothers believe they have less control over their children's "difficult" behavior, they are more likely to use harsh verbal and physical discipline. The association between perinatal risk and harsh parenting also has been shown to be moderated by parents' attributions of lack of control over their children's behaviors (Bugental, 2004). Importantly, these attributions are generated from the parents and not the child (Bugental & Johnson, 2000).

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Specific to adopted children, community surveys have indicated that one third of individuals surveyed believe that adoptive children will be more likely to develop drug and alcohol problems (Harris Interactive, 2002) and those adopted from high-risk foster situations were believed to be even more vulnerable (Harris Interactive, 2007). Additionally, adoptive mothers who view their adopted children as different from non-adopted children are more likely to report conflicted parent-child relationships (Gillum & O'Brien, 2011). Parents' attributions about the heritability of disruptive and difficult behaviors suggest a belief of lack of their own initiative in shaping children's behaviors. If parents believe negative behaviors are highly genetic and predetermined, such attributes might influence how they perceive their infants' behaviors and their own capacities to shape them. This could impact their feelings about parenting and subsequent sensitivity or responsiveness to their child. This study is designed to test whether genetic attributions related to problem behaviors and delinquency influence parenting behavior of adoptive parents during infancy and whether such beliefs enhance the negative impact of their appraisals of birth mother health problems or pregnancy and delivery complications.

Potential Confounding Factors that also Influence Attributions and Parenting

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The interplay between genetic attributions and early child behavior, including specific dimensions of temperament, has not been studied in infancy, or in an adoption sample. There is evidence from twin studies that children's heritable characteristics, particularly temperament, influence parenting behaviors very early during infancy (Forget-Dubois, Boivin, Dionne, Pierce, Tremblay, & Perusse, 2007). Specifically, there is significant literature indicating an interplay between specific dimensions of child temperament and

parent behaviors (Costa & Babcock, 2008; Lifford, Harold, & Thapar, 2008; Mebert, 1991; Putnam, Sanson, & Rothbart, 2002). The most persuasive evidence concerns infant fussiness and “difficulty.” For example, reciprocal associations have been found between infant fussiness and lower maternal responsiveness and increased spanking (Lahey et al., 2008; Mäntymaa, Puura, Luoma, Salmelin, & Tamminen, 2006). Infant fussiness has been used as an indicator of difficult temperament in a variety of studies and has been shown to be associated with feelings of parenting stress or hassles (Coplan, Bowker, & Cooper, 2003), negative parental behaviors (e.g., spanking) and a lack of positive behaviors (e.g. responsiveness) (Lahey et al., 2008). This combination of difficult temperament and lack of responsiveness in early childhood has been shown to predict conduct problems in later childhood (Keenan & Shaw, 1997; Shaw, Bell, & Gilliom, 2000). Given the association of infant temperament with parenting behaviors in past research, and a need to account for the interplay between child characteristics, appraisals and attributions, child difficult temperament is controlled in this study.

A second variable that can contribute to parent attributions and ideas about their children is child gender. As noted earlier, gender effects in the educational literature have been related to parental beliefs and behaviors toward girls (Gunderson, Ramirez, Levine, & Beilock, 2012; Rätty & Kasanen, 2010). Parental ideas about their children’s capabilities based on gender have been linked to parents’ differential behaviors and ultimately children’s academic achievement, beginning in the preschool years (Herbert & Stipek, 2005; Rätty & Kasanen, 2010). Parents may behave differently (e.g., provide less help or discipline) to girls. Mothers and fathers of girls both indicated they would provide less help in the face of school failure to their daughters than their sons (Cote & Azar, 1997). Thus, gender is also controlled in this study.

A final source of parental attributes that must be controlled is intrinsic biases in parental perceptions of children, particularly their own. The most widely documented parental feature is depression that infuses parental perceptions with heightened sensitivity to child problems and difficulties in recognizing children’s emotional cues. (Arteche et al., 2011; Fergusson, Lynskey, & Horwood, 1993; Stein et al., 2010).

Current Study

The associations between adoptive parent genetic attributions and appraisals of birth mothers’ mental health were examined in relation to adoptive parents’ feelings of parenting hassles, hostility, and sensitive/responsive behaviors toward their 9-month-old infants. The following specific hypotheses were tested: (1) adoptive parents’ genetic attributions of problem behaviors (conduct and substance abuse) will be associated with more feelings of parenting hassles and hostility and less sensitive parenting behaviors, after controlling for infant gender, adoption openness, difficult temperament, and adoptive parent depressive symptoms; (2) adoptive parents’ negative appraisals of birth mother mental health will be significantly associated with greater feelings of parenting hassles and hostile behaviors and less sensitive parenting behaviors while controlling for child gender, difficult temperament, and adoptive parent depressive symptoms; and (3) there will be indirect associations between birth mother poor health and perinatal risk and negative parenting (hassles,

hostility, and lower sensitivity) via adoptive parents' appraisals of birth mother health and genetic attributions.

Method

Participants

The sample consisted of 361 sets of adopted children, adoptive parents (AP), and birth parents from the first cohort of the Early Growth & Development Study (EGDS), a longitudinal multi-site study (Leve, Neiderhiser, Scaramella, & Reiss, 2008). The full sample of two cohorts for this study consists of 561 sets each with a birth parent(s), adopted child, and rearing parents; however, only cohort I of this sample had data on rearing parents' opinions about the heritability of child traits. Hence, our selected sample included the 361 families from cohort I only.

Study participants were recruited from 33 agencies in 10 states across the United States. Agencies reflected the full range of US adoption agencies including: public, private, religious, secular, and those favoring both open and closed adoptions. Inclusion criteria were: (a) domestic adoption, (b) placement within three months of birth, (c) adoptive parents were not biological relatives of the baby, (d) the baby had no known medical conditions, and (e) the birth and adoptive parents were able to read and understand English at a least an 8th grade level. Study participants were representative of those completing adoption plans at the participating agencies during the same time span (Leve et al., 2007).

The EGDS cohort I sample consisted of 57% male adopted children with a mean age at the time of adoption of seven days ($SD = 13$ days). Ethnically, adoptive families were relatively homogenous with 92% of adoptive mothers (AMs) and 91% of the adoptive fathers (AFs) Caucasian; 4% of the AMs and 5% of the AFs African American; 1% of the AMs and AFs multiethnic; 2% of the AMs and AFs Hispanic or Latino; and the remaining participants not identified or were of other ethnic status. The majority of the families were heterosexual married couples with only 5 single AM cases and 20 same sex couples. The adoptive parents had been married or living together in a committed relationship for an average of 17 years ($SD = 5.2$ years), were typically college-educated and middle-class. The mean ages of AMs and AFs were both 38. The mean age of birth mothers (BMs) was 24 years ($SD = 5.89$) with 72% Caucasian, 11% African American, 4% percent multiethnic, 7% Hispanic or Latino, 3% American Indian, and the remaining participants not identified or of other ethnic status. The mean age of birth fathers (BFs) was 25 years ($SD = 7.18$) with 75% Caucasian, 9% African American, 5% multiethnic, 1% American Indian, and the remainder of birth fathers (BFs) unidentified. Both BMs and BFs typically had a high school or trade school education level and household incomes under \$25,000. Although data were available for a subset of BFs in EGDS ($n = 121$), BF data were not used in these analyses given the complex modeling and need for a larger sample size.

Procedure

BMs were assessed between 3 to 6 months postpartum. Adoptive families were assessed when the child was 9 months old. All participants were paid for their time. Following

informed consent procedures, interviewers asked participants computer-assisted interview questions, and each participant independently completed a set of questionnaires. AMs and AFs were observed separately for the coded interaction tasks with their infants. Full details on the EGDS study recruitment procedures, sample, and assessment methods are reported elsewhere (Leve et al., 2007). The institutional review boards of the participating academic institutions approved the study.

Measures

The measures used in this study included three parenting outcomes: adoptive parent reports of parenting daily hassles, and coded observations of adoptive parent hostility and sensitivity during a parent-child teaching task. We were primarily interested in how adoptive parents' genetic attributions of problem behaviors and adoptive parent appraisals of the BMs' mental health problems were associated with parenting behaviors and how these were related to BM's health, perinatal risk, and adoption openness. Based on studies indicating that parental attributions and behaviors have been correlated with child gender, infant difficult temperament, and parent depression, these variables were included in the model as covariates. The means, standard deviations, and sample sizes of all variables are reported in Table 1.

Parenting Variables

Parenting daily hassles—The AM's and AF's feelings of being hassled by everyday parenting events were assessed using the *Parenting Daily Hassles* (Crnic & Greenberg, 1990), which consists of 15 items rated from 1 (*no hassle*) to 5 (*big hassle*). The instrument has been used as two inter-correlated scales comprising 8 items reflecting hassles and stress associated with daily duties and chores associated with parenting, and 7 items reflecting hassles specifically associated with the child's challenging behavior. The scales were originally developed for older children and 5 of the 15 items comprising these two scales were rated as "not applicable" by more than 15% of the study sample. These items were generally deemed not applicable for infants of 9 months, and included items such as "being nagged, whined, or complained to," "child doesn't listen without being nagged," or "referee needed for sibling fights." The items that were ranked "not applicable" were excluded. The remaining 10 items were combined into a single scale, which had acceptable levels of internal consistency (AMs = .81, AF = .90). Sample items were: mealtime problems (picky eater, complaining), resists or struggles over bedtime with you, and child schedules interfere with meeting your own or household needs.

Parental hostility and sensitivity—To assess adoptive parents' hostility and sensitivity toward their infants, a parent-child teaching task was administered separately to each AM- and AF-child dyad when infants were 9 months old. The interactions were video recorded and coded by trained research assistants on the degree to which AM and AF displayed hostility and/or sensitivity/child centered responding. AMs and AFs were each given two tasks (AMs = blocks and ring stacker, AFs = shape sorter and ring stacker). Parents were shown the tasks and told to let the child try to complete the tasks on their own. They were instructed, "Try to let [child's name] do the game on his/her own, but you can offer any help that you think is necessary." Tasks were originally coded for hostility and sensitivity on a 9-

point Likert scale ranging from 1 (*not at all characteristic*) to 9 (*mainly characteristic*) of the interaction. Due to limited range of scores, the scale was rescaled into a 3-point Likert scale ranging from 1 (*not at all characteristic*) to 3 (*somewhat characteristic*) of the interaction. Coding was conducted based on the *Family Interactive Behaviors Manual* (Dogan, Lei, Milne-Kahn, Pong, Wu, & Conger, 2005).

The hostility scale measures the degree to which the parent displays negative emotion, anger, disapproval, irritability, criticism, rejection, and/or contemptuous behavior toward the child. Behaviors coded as hostile were: angry or contemptuous facial expressions, menacing/threatening body posture, irritable, sarcastic, or curt tones of voice, shouting, actively ignoring the child, showing contempt or disgust for the child or the child's behavior, denying the child's needs, complaining about the child, critical remarks, manipulative statements, or using physical force to get the child to complete the task.

The child-centered sensitivity scale measures the degree to which the parent's verbal and non-verbal behavior toward the child is child centered. Sensitivity could be manifested through the parent's response to the child's distress, anger, or frustration. Behaviors such as speaking sympathetically to the child, approaching the child, redirecting the child's activities, hugging, patting, or holding in lap and comforting when the child appeared distressed were coded as sensitive. The single-measure interrater-reliability coefficients with absolute agreement, that is intraclass correlations coefficients (ICCs), for AM sensitivity and hostility were .89 and .62, and the ICCs for AF sensitivity and hostility were .90 and .67, respectively.

Genetic attributions—Adoptive parent attributions of genetic inheritance of child problem behavior and delinquency was assessed using the *Opinions about Genetics Inheritance Questionnaire* (Chipuer & Wambolt, 1989). This 13-item questionnaire assesses parents' opinions about the degree to which personality, actions, and physique is genetically inherited. Items are scaled from 1 (*none*) to 5 (*all*). Adoptive parents were asked to rate "how much people inherit the following characteristics from their birth parents..." Items included: alcohol use, delinquency, drug use, and temper. The higher the score, the more the adoptive parent believes these characteristics are inherited biologically. Previous studies suggested three dimensions of this scale: physical characteristics, temperament, and problem behaviors (Chipuer & Wambolt, 1989). In this study, a confirmatory factor analysis was conducted in Mplus 7.0 using AM and AF reports, respectively.

The three-factor model fit AM's data ($\chi^2_{(62)} = 222.49, p < .001; CFI = .92; RMSEA = .08; SRMR = .07$) and AF's data ($\chi^2_{(62)} = 266.62, p < .001; CFI = .90; RMSEA = .09; SRMR = .09$). The factor of problem behaviors consisted of four items of delinquency and problem behaviors (e.g., how much is alcohol use inherited?) with the standardized factor loadings ranging from .63 to .74 in AM's data, and ranging from .63 to .79 in AF's data. This subscale was reliable, $\alpha = .78$ for AM and $\alpha = .81$ for AF. Therefore, the mean across items of this subscale served as the score for beliefs about genetic inheritance.

Perceptions of Birth Mother Variables

Appraisal of BM mental health problems—The strategy of this assessment was balanced between the desire to obtain adequate information on this variable against the ethical constraints of drawing adoptive parents' attention to characteristics that may unduly influence them. Therefore, AMs and AFs were asked to rate their overall impression of the BM's mental health problems from 1 (*excellent*) to 5 (*serious problem*).

Birth mother's poor health—BMs completed a self-report measure of their health using the *SF-36 Health Survey* (Ware, Kosinski, Dewey, 2000). They reported on their overall health in the last four weeks across a range of areas: physical functioning, bodily pain, social functioning, and mental health; sample items were: "have you been a very nervous person," "have you felt so down in the dumps that nothing could cheer you up," "did you feel tired," and "how much of the time has your physical health or emotional health problems interfered with your social activities?" Higher scores indicate worse health after reverse coding ($\alpha = .85$). The mean across 36 items of the scale served as a broad measure of BMs' overall mental and physical health.

Perinatal risk—A perinatal risk index score was derived using the *McNeil-Sjostrom Scale for Obstetric Complications* (McNeil & Sjostrom, 1995) which assesses: (1) maternal/pregnancy complications (including illness, fetal distress during this period, exposure to drugs/alcohol, maternal stress and psychopathology, and psychotropic drug use), (2) labor and delivery complications (prolonged labor, cord complications, interventions needed), and (3) neonatal complications (prematurity, low birth weight). The variable of BM perinatal risk was created by counting the frequency of responses greater than 3. Higher scores indicated more perinatal risks (Marceau et al., 2013).

Covariates

Child gender—Female children were coded as the reference group ("0") and the male children as the comparison group ("1").

Infant difficult temperament—Infant fussy-difficult behaviors were measured using a 6-item *Fussy-Difficult subscale* of the *Infant Characteristics Questionnaire* (Bates, Freeland, & Lounsbury, 1979) when the child was 9 months old. Both AM ($\alpha = .90$) and AF ($\alpha = .92$) reported on their infant's behaviors on a 7-point scale ranging from very easy to difficult. Higher scores suggested a higher level of infant fussiness and difficult behaviors. Sample items include: "how easy or difficult is it for you to calm or soothe your baby when s/he is upset;" and "how many times per day, on average, does your baby get fussy and irritable for either short or long periods of time?" Since AM and AF scores were highly correlated at $r = .67$ ($p < .001$), to best account for both mother and father reports, the AM's and AF's scores were averaged to create a composite measure reflecting the level of infant fussiness.

Adoption openness—Openness was a composite of standardized BM's, AM's, and AF's reports of openness in the adoption, with higher scores indicating more openness (e.g., more contact with each other). The scale consists of actual contact between adoptive and birth parents. This measurement approach is consistent with the conceptualization developed by

Grotevant and McRoy that supports a continuum of openness (Grotevant & McRoy, 1998). Items used to assess openness were ranked by participants on a 7-point scale ranging from very closed (1) to very open (7). Inter-rater agreement was high and ranged from .66 to .81 (all $ps < .001$) (Ge et al., 2008).

Adoptive parent depressive symptoms—Adoptive parents' depressive symptoms were assessed using their self-report on the modified *Beck Depression Inventory* (Beck, Steer, Brown, 1996), which consists of 20 items on a 4-point scale (Note: Original scale contains 21 items; however, the item on suicidal ideation was deemed irrelevant and therefore not administered in this study), with higher scores indicating more severe symptoms. Alpha reliability coefficient was .71 for AM and .75 for AF.

Analytic Strategy

Structural equation modeling was used in data analysis. The path analysis model was specified based on theoretical hypotheses and was estimated in Mplus 7.0, which provides the maximum likelihood estimation with robust standard errors (MLR) for non-normal continuous variables with missing data. For all variables in the study, there was less than 11% missing data under the assumption of missing at random. In addition, AM and AF parental hostility had kurtosis values greater than 8.0 (Kline, 2011). Therefore, the model was estimated using MLR in the study to address the concerns of missing data and high kurtosis.

The path analysis model was used to test whether adoptive parents who had higher genetic attributions and perceived their child's BM to have more serious mental health problems would report more feelings of parenting hassles and treat their children more negatively when child difficult temperament, adoption openness, gender and adoptive parent depressive symptoms were controlled. Further, we tested the indirect effect of perinatal risk and BM poor health on AM and AF self-reported hassles and observed parenting through genetic attributions and appraisal of BM mental health.

To evaluate model fit, we used multiple indices, including the model chi-square (χ^2), the comparative fit index (CFI; Bentler, 1990), the standardized root mean square residual (SRMR), and the root mean square error of approximation (RMSEA; Steiger, 1990). According to Kline (2011), the combination of model chi-square values accompanying p values greater than .05, CFI values greater than .95, RMSEA values less than .05, and SRMR values less than .08 indicates a good model fit. Other researchers have discussed that CFI values between .90 and .95 are acceptable fit (Browne & Cudeck, 1992). We used the significance of indirect effects ($a*b$) as evidence for mediation/partial mediation in our model through the syntax of Model Indirect in Mplus. We used the product of coefficients tests ($a*b$) (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Mplus uses the product of coefficients approach, more specifically, the Sobel multivariate delta method, to obtain SEs for product of two random variables $a*b$.

Results

Model Variable Correlations

Means, standard deviations, sample sizes, and Pearson's bivariate correlation coefficients among all study variables are reported in Table 1. As expected, there was a small and significant negative association between observed parenting hostility and sensitivity for both AMs and AFs. There was also a significant medium correlation between AM and AF reports of their feelings of daily hassles. Adoptive parent self-reported daily hassles are not significantly associated with the observed hostile and sensitive parenting variables.

Examining the bivariate relationships between the three types of parental outcomes and their predictors, we found that AMs' and AFs' reports of daily hassles were positively and significantly correlated with their genetic attributions, depression, and difficult temperament. In addition, AMs' parental hostility was significantly and positively related to their appraisal of the BM's mental health problems, but negatively associated with child gender (girls as reference). AMs' and AFs' appraisals of BM health and genetic attributions were not associated with infant difficult temperament.

Model Results

The model (see Figure 1) fit to the data well, with $\chi^2_{(74)} = 71.85, p = .55$; CFI = 1.00; RMSEA = .00, 90% CI = [.00, .03]; SRMR = .04. The model significantly explained 12.5% of the variance in AMs' reports of daily hassles, 8.2% of the variance in AMs' appraisal of birth mother's mental health, 13.4% of the variance in AFs' daily hassles, and 15.5% of the variance in AFs' appraisal of birth mother's mental health. Moreover, although not statistically significant, the model accounted for approximately 6.6% of the variance in AMs' observed hostile parent behaviors ($p = .06$).

Although the full model was tested, Figure 1 depicts significant paths only. The standardized path coefficients indicate both AMs' and AFs' feelings of parenting daily hassles were significantly and positively associated with their genetic attributions of child problem behaviors, depressive symptoms, and infant difficult temperament. Specifically, child difficult temperament was observed to have a significant association with adoptive parents' daily hassles (for AMs $\beta = .26, p < .001$; for AFs $\beta = .24, p < .001$). Adoptive parents' depressive symptoms were also significantly associated with their feelings of parenting daily hassles (for AMs $\beta = .17, p < .001$; for AFs $\beta = .21, p < .01$). Additionally, the more parents attributed problem behaviors to inherited genes, the more hassles they felt (for AMs $\beta = .13, p < .05$; for AFs $\beta = .13, p < .05$).

AMs' observed parental hostility was significantly associated with their appraisal of the BMs' mental health and child gender, but no other variables in the model. Specifically, mothers of girls expressed more parental hostility than mothers of boys ($\beta = -.15, p < .01$). The worse AMs thought the BMs' mental health was, the more hostile parenting they expressed ($\beta = .19, p < .01$). Furthermore, AMs' appraisals of the BMs' mental health were significantly and positively predicted by the BMs' perinatal risk and poor health. Examining the indirect effects, we found that the BMs' perinatal risk was indirectly linked to AMs' parental hostility through AMs' appraisal of the birth mother's mental health problems

($\beta_a * \beta_b = .04, p < .05$). In contrast, these associations were not present for adoptive fathers. Additionally, there were no indirect effects for perinatal risk and BM poor health through genetic attributions.

Last, adoptive parents' appraisals of BMs' mental health problems were significantly and positively associated with BMs' perinatal risk (for AM $\beta = .22, p < .001$; for AF $\beta = .16, p < .01$), with no significant difference between mothers and fathers regarding this relationship. Adoptive parents' appraisals of BMs' mental health problems were also significantly and positively associated with BMs' poor mental health (for AMs $\beta = .12, p < .05$; for AFs $\beta = .30, p < .001$). This relationship was significantly higher for AFs than for AMs (contrast = $.18, p < .01$).

Discussion

This study was the first to examine the indirect effects of perinatal risk and BM-reported poor health on the parenting of adoptive mothers and fathers through their genetic attributions and appraisals of BM mental health. Findings indicate some evidence for associations among genetic attributions and parental experiences of daily hassles and appraisals of BM mental health and AM parenting behaviors, as well as, an indirect association from perinatal risk and BM self-reported poor health and observed AM hostile parenting behaviors.

For AMs, there was an association between perinatal risk and hostile parenting that was not significant for AFs. Infants with more perinatal risks were more likely to experience hostile parenting by their AMs. This was an indirect effect through the AMs' appraisals of BMs' mental health problems. Perinatal risk and BMs' self-reports of their health were significantly associated with AMs' appraisals of BM mental health. It may be that if BMs have high prenatal risk, their infants may have prenatal risks that evoke more hostile parenting. However, AMs' appraisals of BM mental health seem to be important to this relationship, whereby when the AM appraises BM mental health to be poor she is observed to be more hostile to her infant. This relationship did not exist for parenting sensitivity.

The association among perinatal risk and BM mental health and AM hostile parenting is consistent with literature indicating differential treatment of infants born prematurely in biological families (Feldman & Eidelman, 2007; Minde, 2000), parents rating premature infants more negatively (Stern & Hildebrandt, 1986,) and with findings linking perinatal risk factors specifically to harsh and maltreating parenting behaviors (Bugental, 2004). The lack of association with sensitive parenting behaviors was counter to literature linking parent warmth and play to parent expectations in the educational literature (Davis-Keane, 2005); however, these differences may be due to differences in samples (biological versus adoptive families) and age of children at the time of assessment (infancy versus school age).

Surprisingly, there was no indirect effect for perinatal risk to parenting by genetic attributions. Instead, AMs' appraisals of poor mental health of the BMs were related to AMs' parenting hostility even when infant difficult temperament and gender were controlled. Further evidence that the appraisals of BM health were contributing uniquely to

the hostile parenting of AMs was evidenced by the lack of correlation of this variable with child difficult temperament. It could be argued that since our measure of appraisal was collected when the child was 9-months old and had been living with the family for at least 6 months, it could be influenced by the adoptive parents' experiences with the adopted child. However, since there was no association between child difficult temperament and rearing mothers' appraisal of BMs mental health this alternate explanation is less likely.

There were no indirect or direct effects of appraisals of BM mental health on AF parenting. It may be that fathers are less focused on the prenatal environment and experiences of their infants since this is outside of their gender role and scope of control. There is also evidence that father-child synchrony in preterm infants is influenced by maternal behavior (Feldman & Eidelman, 2007), which was not measured here. Additionally, fathers may have different expectations of the father-child relationship during infancy. Indeed, fathers' participation in child caregiving and play interactions have been shown to differ from mothers during the first 9 months (Belsky & Rovine, 1984). Fathers' interactions are influenced more by maternal behaviors and marital relationship quality than maternal interactions. Inclusion of mother-father interactions and relationship quality would be an important contribution to future studies related to parental expectations.

Although AFs' appraisals of BM mental health was not significantly associated with their parenting behaviors, there was a significant moderate correlation between AM and AF appraisals of BM mental health. This suggests the possibility that the appraisals may not be reached independently, but are a part of a joint view of both adoptive parents. Joint appraisals and attributions formed by parents about their marital relationship and their children have been linked to parenting and parent-child relationships (Brody, Arias, & Fincham, 1996; Fincham & Grych, 1991). This suggests each parents' appraisals may be quite important and influence parenting of the other.

Results also revealed that adoptive parents' general genetic attributions of problem behaviors, such as substance abuse, delinquency, and mental health issues, were significantly associated with AMs' and AFs' reports of feelings of parenting hassles but not their observed hostility nor sensitivity. This suggests that independent of the effects of child characteristics, parental genetic attributions may influence parents' perceptions of parenting hassles. Believing behaviors are genetically predetermined may lead to less positive parenting experiences for adoptive parents because they believe they lack control or significant influence. There is evidence in the clinical literature to suggest maternal attributions about children's genetic ties are hardly unique to adoptive families. For example, in a study of mothers rearing their biological offspring, the mother's belief about the genetic ties of her child to the child's father was found to be associated with the mothers' parenting behaviors and experiences (Lieberman, 1999; Silverman & Lieberman, 1999). Specifically, in a family in which a father was violent, a mother may attribute her son's aggression to his father's genes. This may lead her to feel less in control of his behaviors and less effective as a parent.

It is widely acknowledged that there is reciprocity in the parent-child relationship over time and mutual impact of parent's behavior on the child and vice versa (Ferrier-Lynn &

Skouteris, 2008). It is clear that the interplay between parenting and child behaviors is powerful with bidirectional relationships rather than simple linear cause and effect from parent to child (Scaramella & Conger, 2003; Stover et al., 2012); however, it is reasonable to suggest that fostering healthy parenting practices is crucial to child outcomes. Education about parental beliefs and identification of preconceived notions and cognitive attributions that parents may bring to the parenting environment could have significant implications for the parenting environment and ultimately child development (Azar et al., 2008).

Adoptive mothers' appraisals of BM mental health were linked to their hostile parenting behaviors in this sample. This effect held when controlling for infant difficult temperament and openness of adoption. In fact, openness of adoption did not contribute significantly to the model, as it has in other adoption openness studies (Brodzinsky, 2006; Grotevant, McRoy, Elde, & Fravel, 1994). However, prior studies did not examine parental appraisals or attributions and have been conducted primarily with older children. The current findings indicate AMs' appraisals of BM mental health may influence hostility but not sensitive parenting behaviors toward their adopted children.

Adoptive parents perceptions of BMs' mental health and their attributions based on heritability of problem traits influenced AMs' and to a lesser extent, AFs', parenting experiences. Genetic attributions had a small but significant contribution to both AMs' and AFs' feelings of parenting hassles. For AMs, there was an indirect association between perinatal risk and BM self-reported poor health and observed hostility but not sensitivity via appraisals of BM mental health. This suggests areas for further exploration and ways that adoption agencies may facilitate support for parents adopting an infant. Screening adoptive parents about their attributions for genetic influence, their appraisals of the birth parents, and how those ideas could influence their interpretation of their baby's behaviors and their feelings of control in their role as parents could help identify parents at risk for hostile parenting behaviors or those who will feel higher levels of stress and burden from parenting their infant. This would be particularly true for infants who had less favorable prenatal environments or perinatal difficulties, factors that may be related to the parenting behavior of some AMs. Screening and assessment of such issues could allow for the provision of psychoeducation by adoption agencies and referral to parenting programs that have been shown to be effective in modifying parental cognitions and beliefs regarding the feeling of having a lack of control in parenting their children.

Some effective parent interventions to prevent harsh or maltreating parenting have focused on cognitions such as cognitive restructuring, problem-solving training, and re-attribution training (Azar & Wolfe, 2006; Bugental et al., 2002; Kolko, 1996; Kolko, Iselin, & Gully, 2011; Sanders, Markie-Dadds, Tully, & Bor, 2000; Sanders et al., 2004). These programs work with parents to identify their maladaptive cognitions or beliefs about their inability to influence their children's behaviors and restructure or replace those thoughts. Programs such as these have shown impressive results in reducing the onset of child maltreatment behaviors (Bugental et al., 2002) and could be adapted specifically for work with adopting parents.

Limitations and Future Directions

Although this study is the first of our knowledge to examine how appraisals of BMs can influence parenting in an adoption sample with both AMs and AFs, there are several notable limitations. First, adoptive parents were asked to rate the BMs' mental health using a single question when their infants were 9 months old. While a more comprehensive measure assessed prior to or at the time of infant placement would have been advantageous, when developing the assessments for this study we did not want to conduct a detailed inquiry that might intensify maladaptive adoptive parent expectations in this area. Including a measure of adoptive parents' beliefs about the influence of environment and a parents' capacity to change a child's behavior would have provided a richer context for these findings. There was no correlation between adoptive parent reports of BM mental health and their reports of infant fussiness, suggesting parents' appraisals of BMs was not influenced by their experience with their adopted children. However, it is still possible that parents' appraisals and genetic attributions were influenced by their experiences with the child. Future studies would be strengthened by interviewing adoptive parents about their appraisals of birth parents and their genetic attributions prior to taking their adopted child home. This would ensure no influence of their experience with the child on these constructs.

Replication of these findings is needed in future studies to further explore relationships among study variables given the relatively small amount of variance accounted for in the parenting outcome variables. This was a surprising finding especially given the inclusion of variables such as parental depression and child gender which have previously been found to have robust associations with parenting behaviors in other studies. The sample in this study represents an older, educated, higher socio-economic status, and mostly Caucasian sample of adoptive parents. The findings cannot be generalized to other populations of parents. It may be that the smaller variance in parenting behaviors accounted for by the model variables is a result of the specific nature of this adoption sample. A more diverse sample might yield different and possibly more fruitful results. Further replication of these findings in additional samples of adoptive parents is needed.

We could not—from a practical point of view—measure all attributes of the children in this sample that might have influenced their rearing parents' beliefs about the child. In this initial study we selected child characteristics that have been shown to be reliably linked to parental attributions and behaviors (gender and temperament). Still, it is possible that BMs with poor health transmit characteristics to their child that elicit beliefs from their parents. Some reassurance on this issue is provided by prior reports from this study that show few if any genetically mediated main effects on child difficult behavior at 9 months (e.g., Leve et al., 2009; Natsuaki et al., 2010). Furthermore, as we have shown elsewhere, effects reported here are unlikely to be due to selective placement of a child with a BM with ill health into an adoptive family with similar characteristics (Leve et al., 2013).

This study was cross-sectional in nature and examined the parent-child relationship when infants were nine months old. Examining whether parents' genetic attributions would change over time or have stronger association with parenting and ultimately children's behavior is a next step in understanding these findings. In addition, other attributes of

parents—in addition to depression—may have influenced their parenting and confounded results reported here.

Conclusions

This study used an adoption design to demonstrate the influence of appraisals of birth mother mental health and genetic attributions on the parenting of adopted infants. For adoptive mothers, there was an indirect association between birth mothers' reports of their poor health and perinatal risk to increased observed hostile parenting through adoptive mothers' appraisals of birth mother mental health. This association was not present for adoptive fathers. Parental genetic attributions were also associated with adoptive mothers' and fathers' reports of their feelings of parenting hassles. This association was significant after accounting for parental reports of infant difficult temperament. These findings suggest a need for further studies to determine if links exist between adoptive parents' genetic attributions and poor appraisals of birth parents that result in negative parenting and put children at risk for poor developmental outcomes.

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Highlights

Modeled appraisals of birth mother health and genetic attributions to parent behaviors.

For adoptive mothers appraisals were linked to hostile parenting behaviors.

Adoptive parent genetic attributions were associated with parenting hassles.

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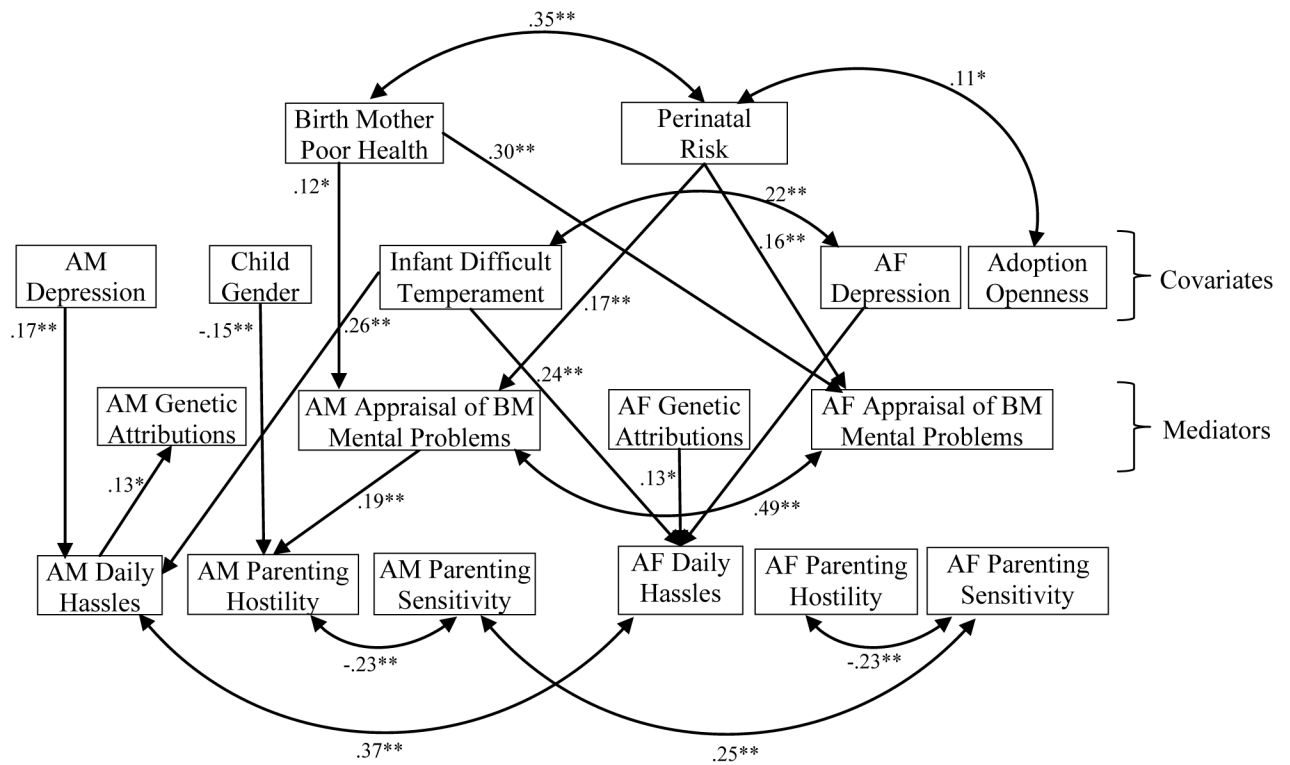


Figure 1. Model Diagram (only significant paths were shown; for the complete information, please see the description in the MODEL SYNTAX).

Standardized path coefficients.

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

MODEL SYNTAX:

AMDailyHassles AMHostility AMSensitivity ON InfantFussiness AMGeneticAttribution
 ChildGender AMAppraisal AMDepression;
 AFDailyHassles AFHostility AFSensitivity ON InfantFussiness AFGeneticAttribution
 ChildGender AFAppraisal AFDepression;
 AMGeneticAttribution AFGeneticAttribution ON BMPoorHealth PerinatalRisk;
 AMAppraisal AFAppraisal ON InfantFussiness PerinatalRisk AdoptionOpenness;
 AMAppraisal WITH AFAppraisal;
 PerinatalRisk WITH AdoptionOpenness BMPoorHealth;
 AFDepression WITH AMDepression BMPoorHealth InfantFussiness;
 [ChildGender *.5]; ChildGender; InfantFussiness; AMDepression; AFDepression;

Table 1

Correlations and Descriptive Statistics for All Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Infant Difficult Temperament	1.00																
2. AM Genetic	.03	1.00															
3. AF Genetic	.01	.21***	1.00														
4. AM appraisal	.01	.05	.13*	1.00													
5. AF appraisal	.03	.01	.11	.55***	1.000												
6. AM Hassles	.28***	.13*	.12*	.02	.02	1.00											
7. AF Hassles	.25***	.05	.15**	.03	.00	.48***	1.00										
8. AM Hostility	.04	-.06	-.01	.18**	.09	-.09	-.01	1.00									
9. AF Hostility	.02	.07	.03	.02	-.06	-.00	-.03	-.02	1.00								
10. AM Sensitivity	.08	.09	.07	-.02	.02	.17**	.07	-.23***	.05	1.00							
11. AF Sensitivity	-.00	.06	.03	-.07	-.01	.08	-.04	-.06	-.22***	.25***	1.00						
12. Perinatal Risk	-.08	.01	.02	.26***	.23***	-.02	-.03	.10	.05	-.03	-.08	1.00					
13. Openness	.03	.11	.08	-.04	-.02	.10	.01	-.04	-.09	.02	.05	.09	1.00				
14. BM Health	-.05	-.01	.08	.22**	.36***	.02	-.04	.08	-.02	.03	.00	.33***	-.04	1.00			
15. Female Gender	.07	.11*	.04	.06	.02	.09	.01	-.14*	-.05	.00	-.07	.08	.06	-.07	1.00		
16. AM Depression	.20	-.03	-.04	.24	-.21	.14**	-.03	-.05	-.08	-.04	-.03	-.10	.25	-.07	.00	1.00	
17. AF Depression	.32*	.11	.01	-.12	.04	-.05	.18*	.02	-.03	.20	-.39	-.09	-.07	-.12*	.07	-.05	1.00
Mean	2.70	2.09	2.03	2.43	2.42	.91	.88	1.05	1.11	5.98	5.45	2.65	.04	23.21	.57	3.53	2.93
SD	.75	.60	.67	1.05	.94	.28	.27	.26	.39	1.58	1.64	1.47	.93	15.08	.50	3.23	3.33
N	333	331	323	330	325	336	329	340	330	340	330	361	361	349	361	346	335

Note. AM = adoptive mother; AF = adoptive father; Genetic = genetic attributions of child problem behavior-delinquency; BM = birth mother

* $p < .05$;

** $p < .01$;

*** $p < .001$.