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EMPIRICAL RESEARCH

Interparental Aggression and Antisocial Behavior Among African American Youth: A Simultaneous Test of Competing Explanations

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Abstract Interparental aggression has long been implicated as a cause of child and adolescent antisocial behavior. Four theoretical explanations (viz., an aggressogenic cognition model, general strain theory, an emotional security model, and a spillover model) have been proposed to account for this deleterious effect. To gain a better understanding of the mechanism whereby interparental aggression promotes antisocial behavior, this study tests the competing explanations simultaneously using longitudinal data from a sample of 508 African American families with a child aged 12–14 (53.5% are girls). Using path analysis, the results support both the general strain theory and the emotional security model for girls. The results also show weak support for the spillover model. Whereas, for boys, all of the four explanations were supported, though the support for the spillover model is weak. Thus, the findings suggest that the mechanisms whereby interparental aggression fosters antisocial behavior may differ by gender. Implications and limitations of the current research are discussed.

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Introduction

Over the past 40 years, the prevalence of antisocial behavior among children and adolescents has increased markedly in the United States. Since 1965, the prevalence of antisocial behavior among youth age 18 or under has increased by roughly 3 fold (Blumstein and Wallman 2000). Although it decreased considerably after a peak in late 1990s, the prevalence of antisocial behavior among children and adolescents remains dramatically higher than it was 40 years ago. A larger portion of the overall increase attributes to the younger juvenile group (i.e., children under age 13) (Synder 2003). Antisocial behavior is costly to society. On average, it accrues to about $ 1 trillion cost to the society annually (Anderson 1999). As a result, the etiology of antisocial behavior among youth has become one of the major topics for researchers in criminology, child development, psychology, and psychiatry.

Antisocial behavior has been shown as caused by multiple factors including genetics, biological factors, community factors, and family processes (e.g., Dodge et al. 2006; Simons et al. 2005). Acknowledging that other factors may induce children's antisocial behavior as well, we focus our research on the impact of family processes, especially interparental aggression, on children's antisocial behavior. Interparental aggression has been defined as overt hostile behavior, either verbal or physical, in which parents engaged when they handle their disagreement (Zimet and Jacob 2001). It includes verbal behaviors such as yelling, shouting, making accusations, name-calling, cursing, and insulting and physical behavior such as

throwing objects, breaking things, pushing, shoving, grabbing, handling roughly, and beating the other severely (Grych et al. 2002). A large volume of studies showed that children who experienced higher levels of interparental aggression were more likely to show antisocial behavior than children who experienced lower levels of interparental aggression (e.g. Cummings et al. 2006; Fincham et al. 1994; Gerard et al. 2006).

To explain the deleterious impact of interparental aggression on children's behavior, four major theoretical explanations have been proposed—an aggressogenic cognition model, a general strain theory, an emotional security model, and a spillover model. Existing literature testing these explanations has focused on testing only one or two explanations without taking into consideration processes emphasized by alternative explanations. In an attempt to provide a more comprehensive understanding of the mechanism whereby interparental aggression fosters antisocial behavior, the present study simultaneously tests all four explanations. In addition, since the general strain theory suggests that there may be gender difference in the mechanism whereby interparental aggression fosters antisocial behavior, the present study tests the mechanisms for boys and girls separately and compares them between genders.

Four Theoretical Explanations

The Aggressogenic Cognition Model

Building on social learning theory, Grych and Fincham (1990) and Dodge (1986) have proposed an aggressogenic cognition model. According to this model, children living in families with interparental aggression learn to engage in aggressive and antisocial behavior through observation or vicarious learning. Facing repeated interparental aggression, children may develop biased social information processing whereby they view the world as fraught with conflict and perceive environmental cues in hostile terms. In addition, as a result of repeated exposure to parents' aggressive conflict tactics, children may acquire beliefs and attitudes that regard hostile and aggressive behavior as legitimate and appropriate. These cognitions, in turn, increase children's aggressive and antisocial behavior.

Supporting this explanation, a number of studies showed that children's hostile attribution bias (e.g., Dodge et al. 1990; Marcus et al. 2001) and children's legitimacy of aggression (e.g., Fite et al. 2008; Kinsfogel and Grych 2004; Marcus et al. 2001) mediated the relationship between interparental aggression and children's antisocial behavior. Marcus et al. (2001), for example, found that legitimacy of aggression and hostile attribution bias partially mediated the relationship between interparental aggression and children's aggressive behavior at school. Similarly, Fite et al. (2008) noted that youth exposed to greater interparental aggression were more likely to develop positive evaluation of aggressive responses which, further, fostered higher level of aggression in their romantic relationship. Supporting the aggressogenic cognition model, the evidence from these studies showed that aggressogenic cognition mediated the relationship between interparental aggression and children's antisocial behavior.

The General Strain Theory

Building on traditional strain theory, Agnew's (1992) general strain theory provides yet another explanation for the relationship between interparental aggression and children's antisocial behavior. Revising traditional strain theory where strain is defined narrowly as the inability to achieve conventional goals (e.g., economic success or middle-class status), Agnew (1992) has asserted that experiencing noxious events and circumstance, including those at home, is a major type of strain. Interparental aggression that communicates hostility and is shown as arguments and aggressive behavior between parents, poses as such noxious circumstances. According to Agnew (1992), experiencing strains increases the likelihood that individuals experience negative emotions such as anger, disappointment, and depression which, in turn, create pressure for "corrective action" such as antisocial behavior and delinquency. Agnew (1992) has suggested that, among the array of negative emotions, anger is the most important emotion in predicting antisocial behavior and delinquency since anger is more likely to foster individuals' desire for retaliation/revenge and energize them for action. In addition, Broidy and Agnew (1997) have suggested that the mechanism whereby strain induces antisocial behavior and delinquency may differ for boys and girls. According to this perspective, relative to girls, boys are more likely to both respond to strain by getting angry and externalize their anger emotion as antisocial behavior and delinquency.

The general stain theory has received abundant support from empirical research showing that strain induces delinquency and anger emotion at least partially mediates the relationship between strain and delinquency (for a review, see Agnew 2001). Though not specifically examining strain of interparental aggression, a few studies showed that interparental aggression as strain induced children's delinquency (Hay 2003; Maxwell 2001; Moon et al. 2008; Sigfusdottir et al. 2004). Using a sample of six-graders, Maxwell (2001) found that the frequency with which children's parents/caregiver hit each other because of anger significantly contributed to children's antisocial behavior. Examining 7,758 students age 14–16 years,

Sigfusdottir et al. (2004) found that severe arguments and violence within family (including those between parents/caregivers) significantly induced anger in both boys and girls which, in turn, contributed significantly to boys' and girls' delinquency. In addition, both Hay (2003) and Sigfusdottir et al. (2004) found that there were gender differences in the mechanism whereby strain induced delinquency for boys and girls. They found that the major difference between boys and girls were in the effect of anger on delinquency—the effect was almost 2 times stronger for boys relative to that for girls.

The Emotional Security Model

Based on attachment theory, Davies and Cummings (1994) have proposed an emotional security explanation. This explanation assumes that parents serve as the child's refuge or source of security, and hence interparental aggression is emotionally distressing for children. Posing as a threat to children's emotional security, interparental aggression may result in children's negative emotions (e.g., fear, anger, and sadness) and behavioral disregulation which, in turn, give rise to children's antisocial behavior. In support of this model, several studies found that children's emotional reactivity mediated the relationship between interparental aggression and children's conduct problems (e.g., Cummings et al. 2003; Ei-Sheikh et al. 2008). Cummings et al. (2003), for example, found that interparental aggression elicited a general increase in children's negative emotionality (i.e., anger, fear and sadness) which increased children's conduct problems. Similarly, Ei-Sheikh et al. (2008) noted that children's emotional negativity mediated the relationship between marital aggression and children's delinquent behavior.

Studies investigating the emotional security model focused on a variety of negative emotions including fear, anger and sadness. Davies et al. (2002) have suggested that children's concerns about security are more likely to prime children fear relative to other negative emotions. Whereas Jenkins (2000) has argued that anger is the predominant response when children are exposed to interparental aggression, and that anger is the basic emotion involved in externalizing disorders. Given these differing views, the present study includes both anger and fear as consequences of emotional insecurity.

The Spillover Model

In contrast to the above three explanations positing that interparental aggression directly affects children, some researchers have proposed a spillover model (Zimet and Jacob 2001) where interparental aggression impacts children indirectly through deteriorating parenting practices. The spillover model asserts that parenting practices may partially mediate the relationship between interparental aggression and children's antisocial behavior. According to this model, interparental aggression is distressing and diverting for parents, and tends to disrupt one or more dimensions of parenting (e.g., warmth and monitoring). This deterioration in parenting, in turn, gives rise to children's antisocial behavior.

The spillover model has received abundant support from existing research (e.g., Davies et al. 2009; Krishnakumar et al. 2003; Sturge-Apple et al. 2006). Most of these studies focused on supportive parenting practices (e.g., warmth, acceptance, and emotional availability) and aspects of parental control (e.g., such as monitoring and consistent discipline). Davies et al. (2009), for example, found that interparental aggression significantly impacted both fathers' psychological control over children and fathers' insensitivity to children's affect. Krishnakumar et al. (2003) noted that, at least for European-American families, interparental aggression was linked with youth behavioral problems through lower levels of parental monitoring, maternal acceptance, and higher levels of parent-youth conflict. Similarly, Sturge-Apple et al. (2006) found that interparental hostility significantly decreased mothers' emotional availability which, in turn, significantly contributed to children's conduct problems. Supporting the spillover mode, the evidence from these studies showed that parenting (i.e., supportive parenting and/or parental control) mediated the relationship between interparental aggression and children's antisocial behavior.

The Present Study

Although all four of these explanations for the relationship between interparental aggression and adolescent antisocial behavior have received some degree of empirical support, most research only tests a single theory. The exception is a few studies that have considered two models. Davies et al. (2004), for example, included variables from both the emotional security and the social learning explanations. Their findings provided the strongest support for the emotional security model. Onyskiw and Hayduk (2001), on the other hand, tested the social learning and the spillover explanations and their results showed support for both models. As far as we are aware, however, no studies have evaluated statistical models that incorporate the effects of all four explanations. This omission is important as the variables from the various theoretical explanations are likely to be correlated thereby raising the possibility that research on a particular model may produce findings that are spurious due to associations with omitted variables specified by another of the theories. In addition, it is possible that these explanations work in parallel in mediating the relationship between

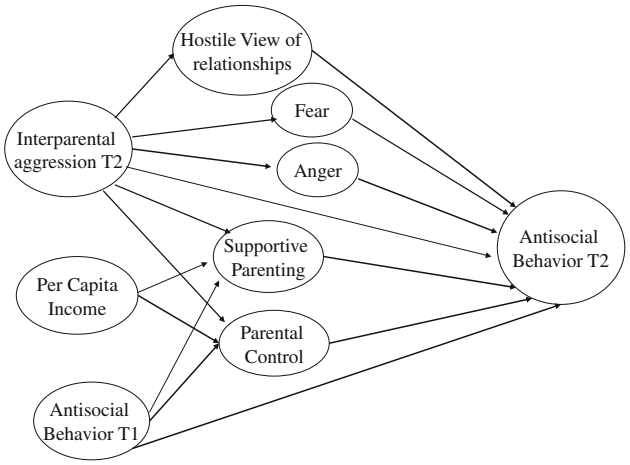

Fig. 1 Conceptual model

interparental aggression and children's antisocial behavior. For example, interparental aggression may both be able to disrupt parenting practices, induce anger and fear, and foster hostile view of relationships, all of which further contribute to children's antisocial behavior.

The present study uses structural equation modeling (SEM) to test a path model that includes variables from each of the four explanations (see Fig. 1). According to the aggressogenic cognition model, we hypothesize that interparental aggression has a significant positive impact on children's hostile view of relationships which, in turn, positively affects children's antisocial behavior. According to the emotional security explanation, interparental aggression is hypothesized to have a positive effect on anger and/or fear which, in turn, has a positive effect on children's antisocial behavior. According to the general strain theory, interparental aggression is hypothesized to have a positive effect on anger which, in turn, has positive impact on children's antisocial behavior. According to the spillover model, we hypothesize that interparental aggression has negative impact on supportive parenting and/or parental control which, in turn, has a negative effect on children's antisocial behavior. In addition, consistent with the general strain theory, we hypothesize that the impact of interparental aggression on anger and the impact of anger on antisocial behavior are stronger for boys relative to that for girls.

The analysis employs data from a sample of 508 African American caregivers and their children aged 12–14 years. Testing the various theories with a sample of African Americans is important as virtually all past research on the association between interparental aggression and child antisocial behavior has used European American samples. Our analyses are performed separately for boys and girls in order to explore the possibility of gender differences in the avenues whereby interparental aggression influences conduct problems.

Method

Sample

We tested the relationships posited by the various theories using two waves of data from the Family and Community Health Study (FACHS), a multi-site investigation of neighborhood and family effects on health and development (Conger et al. 2002; Simons et al. 2002). The FACHS sample consists of 867 African American families that lived in Georgia and Iowa and had a 5th grader at the time of recruitment. The selection of the two states is based on the consideration of both available resources to us and their well-representation of two different regions, the Midwest and the South, of the US.

Families were recruited from neighborhoods that varied on demographic characteristics, specifically racial composition (percent African American) and economic level (percent of families with children living below the poverty line). Block groups (BGs) were used to identify neighborhoods. Using 1990 census data, BGs were identified in both Iowa and Georgia in which the percent of African American families was high enough to make recruitment economically practical (10% or higher), and in which the percent of families with children living below the poverty line ranged from 10 to 100%. Using this criterion, 259 were identified (115 in Georgia and 144 in Iowa). The study families were randomly selected and recruited from rosters of all African American families in these BGs that had a fifth grader. Most study families were recruited by telephone. However, after repeated unsuccessful attempts to make telephone contact, or if a potential participant did not have a telephone, a staff member attempted to make face-to-face contact. If the potential participant was no longer at the address, we asked neighbors for information regarding their new address.

Two waves of data were collected from the Georgia and Iowa families using identical procedures. The first wave was collected in 1998 and the second in 2000. Target children and their primary caregivers who lived in the same household with the target children and were responsible for the majority of the children's care were interviewed in their homes by trained African American interviewers. Each interview was conducted privately, with no other family members present. The instruments were presented on laptop computers. Questions appeared in sequence on the screen, which both the researcher and participant could see. The researcher read each question aloud and the participant

entered a response using the computer keypad. The participants were compensated according to the amount of time they were interviewed. Primary caregivers were compensated $100, and target children $70.

At wave 1, the participants were 867 African American children (400 boys and 467 girls; 462 in Iowa and 405 in Georgia) and their primary caregivers. The children were 10–12 years old (mean age of 10.5 years) at wave 1 of data collection. At wave 2, 779 of the children (361 boys and 418 girls) and their caregivers were interviewed again. This was a response rate of 89%. Analyses indicated that the families who did not participate at wave 2 did not differ significantly from those who did with regard to caregiver income and education, child's age, gender, school performance, and antisocial behavior. Comparing families from Iowa and Georgia, there is no significant difference in the study constructs.

The present study focused on a subsample of families in which the primary caregiver was living with a spouse or romantic partner. This included 518 primary caregivers and their target child. Due to missing data, 508 families were included in the final analysis (236 boys and 272 girls). Among them, most (84%) of the primary caregivers were the target child's biological mother, 6% were the child's father, 6% were the child's grandmother, and 4% were the child's foster or step parents, aunt, or uncle. 294 of the primary caregivers were married. Whereas prior studies of interparental aggression have usually focused only on married couples, the present study included primary caregivers who were married or cohabitating. This more inclusive approach was used given the high prevalence of cohabitation among African American couples (Hummer and Hamilton 2010) and the fact that African American grandparents or other relatives often serve as primary caregivers for children (Pearson et al. 1990).

Measures

The independent variable in our analysis is interparental aggression and the outcome is antisocial behavior. Supportive parenting, parental control, hostile view of relationships, and child's fear and anger are the potential mediators. Our analysis utilized measures of antisocial behavior from wave 1 as a control. All of other variables were measured at wave 2. The fact that the measures of the independent and mediating variables were collected in the same wave is consistent with the assumption that interparental aggression has a concurrent effect on the mediators and that the mediators, in turn, have a concurrent effect on children's antisocial behavior. Using a wave 1 measure of interparental aggression (had it been available) to predict wave 2 assessments of the mediators or antisocial behavior would have assumed that the effect of interparental aggression has a two-years lag.

We included children's antisocial behavior at wave 1 as a control in our analysis since children's earlier experience of interparental aggression may induce children's earlier antisocial behavior which tends to be stable over time (e.g., Caspi and Moffitt 1995). Without controlling for the contribution of earlier antisocial behavior to later antisocial behavior, the magnitude of the impact of interparetal aggression on antisocial behavior will be inflated. In addition, controlling for children's earlier antisocial behavior helps ensure that the casual sequence flows in the right direction. It is reasonable to expect that children's antisocial behavior increases the incidence of interparental aggression. Children's antisocial behavior may increase tension in their families and create disagreements between parents which are often precursors of interparental aggression. To ensure our test is about the impact of interparental aggression on children's antisocial behavior, not the other way around, we included children's antisocial behavior at wave 1 as a control in our model.

Among the study constructs, supportive parenting and parental control were computed based on both children's and primary caregiver's report to avoid the *method variance problem* (Simons et al. 1991). However, child's report on interparental aggression and parents' report on children's emotions, cognition, and antisocial behavior were not available in our project. Because of this, we computed interparental aggression using primary caregiver's report and children's emotions, cognition, and antisocial behavior using child's report.

Antisocial Behavior

This construct was measured using child self-reports on the conduct disorder section of the Diagnostic Interview Schedule for Children, Version 4 (DISC-IV). The DISC-IV covers Diagnostic Statistical Manual-IV (American Psychiatric Association, 1994) criteria for diagnoses. The DISC was developed over a 15-years period of research on thousands of children and parents, and has demonstrated reliability and validity (Shaffer et al. 1993). Version IV became available in 1995 and represents a modest revision of the DISC-III based on findings from the MECA study (Shaffer et al. 1993). The conduct disorder section contains a series of questions regarding how often during the preceding year the respondent engaged in 26 deviant acts such as shoplifting, physical assault, lying, setting fires, cruelty to animals, vandalism, burglary, and robbery. The scale can be used to construct symptom counts or diagnoses. Symptom counts were used in the present study. Coefficient alpha was above .90 at both waves 1 and 2.

Interparental Aggression

This construct was assessed using a 6-item measure adapted from the hostility scale developed by Conger and his associates (Cui et al. 2005). Primary caregivers were asked to

report how often (1 = never, 5 = always) during the past 12 months they and their spouse/romantic partner engaged in behaviors such as shouting, throwing things, swearing, calling names, etc. when they and their spouse/romantic partner had had a disagreement. Scores on the items were summed as final scores on interparental aggression. Coefficient alpha for the scale at wave 2 was .79.

Supportive Parenting

This construct was assessed using a 30-item scale consisting of questions concerning parents' warmth/affection, avoidance of hostility, inductive reasoning, and problem solving. The items for the scales were adapted from instruments developed for the Iowa Youth and Families Project (Conger et al. 1992). These measures have been shown to have high validity and reliability. For example, analyses from IYFP have shown that parent reports on these instruments correlate with child reports and with observer ratings (Conger et al. 1992; Simons and Associates 1996), and they predict various dimensions of child behavior across a several year period (Simons et al. 2001). Focus group feedback prior to data collection indicated that these items are meaningful to African American parents and capture what they consider to be the important dimensions of effective parenting (Simons et al. 2002).

Children were asked to indicate how often, during the past 12 months, their parents/primary caregivers showed warmth or affection, avoided hostility toward them, and engaged in inductive reasoning and problem solving such as acted supportive and understanding, told reasons for their decisions, figured out how to deal with problems with them, and asked what the child thinks before deciding on family matters involving them. Parents/primary caregivers were asked to respond to the same questions (reworded) concerning inductive reasoning and problems solving. The response format ranges from 1 (never) to 4 (always). Scores on all these items were summed for children and parents, respectively. Coefficient alpha for this scale based on child report and parent's report was .89 and .77 at wave 2, respectively. The scores of supportive parenting reported by child and parents were then standardized and summed as the final score of supportive parenting.

Parental Control

Primary caregivers completed a 12-item scale consisting of five questions concerned with monitoring (e.g., "How often do you know who your child is with when he/she is away from home?") and seven with consistency of discipline (e.g., "How often do you punish your child for something at one time and then at other times not punish him/her for the same thing?"). These same items were reworded so that the target child could use this scale to rate the primary caregiver's parenting behavior. Response format for the items ranged from 1 (never) to 4 (always). Scores for inept disciplinary practices were reverse coded. The caregiver and child-report items were then summed and standardized to form a composite 24-item measure of parental control. Coefficient alpha for the instrument was .85 at wave 2.

Hostile View of Relationships

A 9-item scale developed for the FACHS project (Simons et al. 2006) was used to assess this construct. Hostile view of relationship (Dodge 1986) refers to biased views of interpersonal relationship that prompt children to attribute malevolent motives to others and to think an aggressive and belligerent attitude as a necessary means to avoid exploitation. The items focused on the extent to which the respondent took a cynical view of people's motives (e.g., When people are friendly, they usually want something from you) and beliefs that violence is often necessary to achieve respect and obtain fair treatment (e.g., People will take advantage of you if you don't let them know how tough you are). Among the nine items, four items had a response format of either 0 (mostly false) or 2 (mostly true). Response format for the other five items ranged from 1 (strongly disagree) to 4 (strongly agree). Scores on the nine items were recoded, standardized, and summed up as scores on hostile view of relationships. The higher the score, the child holds a more hostile view of relationships. Coefficient alpha for the scale was .72 at wave 2.

Anger

In this study, anger and fear were included to test the emotional security explanation. Since researchers in the emotional insecurity tradition have different views as to the predominance of anger or fear when children feel that their emotional security is threatened by interparental aggression, we examined the two emotions separately. Children's anger was assessed using four items from the Oppositional/Defiant disorder section of DISC-IV. The items focused on how often the respondent felt grouchy, annoyed, mad at people or things, or unfairly treated. Response format for the items ranged from 1 (less than once a week) to 4 (nearly every day). Scores on these four items were summed up and averaged as scores on anger. Coefficient alpha for this measure was .69 at wave 2.

Fear

Children's fear was assessed using six items from the Anxiety disorder section of DISC-IV. Children were asked

to report how often, during the past year, they experienced various worries and anxieties such as had a lot of bad dreams or nightmares, were unable to fall asleep without attachment figure near them, worried that something bad might happen to their attachment figure, and felt very nervous or upset when they couldn't be with their attachment figure. Response format for the items ranged from 1 (less than once a week) to 4 (nearly every day). Scores on these four items were summed up and averaged as scores on fear. Coefficient alpha for fear was .62 at wave 2.

The coefficient alpha for both anger and fear were lower than .70, the conventional cutoff point (George and Mallery 2003). Prior researchers (e.g., Schmitt 1996) have suggested that, if the scale is unidimensional and its items loaded well on a meaningful content, coefficient alpha between .70 and .50 will not be a major impediment for its use as a good measure. The four items in the anger scale loaded well on a single factor with item loadings .87, .89, .73, and .58. Similarly, the six items of fear scale loaded well on a single factor with items loading .58, .63, .55, .51, .65, and .62. In addition, the coefficient alpha for anger and fear were much higher than the unacceptable level (.50). Acknowledging that a measure with higher reliability would be better, we feel that our measures for anger and fear are acceptable.

Analytic Strategy

Structural equation modeling (SEM; LISREL VIII 8.54) was utilized to examine the predictions of the four competing models regarding the factors that mediate the association between interparental aggression and child antisocial behavior (see Fig. 1). We used Weighted Least Square Estimation recommended by Jeoreskog and Seorbom (1993) to deal with the multivariate non-normal distributions of the studied variables. We did our analysis in three steps. First, we fitted fully recursive conceptual model to data and trimmed the non-significant paths to obtain a more parsimonious model. Second, we used Model Indirect command of SEM available in Mplus 5.0 (Muthen and Muthen 2004) to test the significance of the hypothesized mediating paths. Since the general strain theory (Broidy and Agnew 1997) has suggested that there are gender differences in the mechanism whereby interparental aggression fosters children's antisocial behavior, the first two steps of analysis were conducted separately for boys and girls. In the third step, we compared the mechanisms for boys and girls using multi-group analysis and nested goodness-of-fit strategies available in LISREL VIII 8.5.

We used ratio of Chi-square to degree of freedom (χ^2/df), Root Mean Square of Error Approximation (RMSEA), Goodness-of-Fit Index (GFI), and Adjusted Goodness-of-Fit Index (AGFI) as our goodness-of-fit indexes (Kelloway 1998). The Chi-square is a fit index to show the extent to which the hypothesized model deviates from the perfect model for the data. Since this statistic is very sensitive to the size of sample (greater than 200), researchers have suggested a ratio of Chi-square to degree of freedom as an index of goodness of fit (Arbuckle and Wothke 1999). A ratio that is less than 3 stands for a good model fit. Root Mean Square of Error Approximation (RMSEA) is a fit index that measures the amount of error of approximation. RMSEA that is smaller than .08 means a good model fit. The goodness-of-fit index (GFI) is a matrix proportion of explained variance, analogous to R-square. GFI that is greater than .90 suggests a good model fit. Adjusted goodness-of-fit (AGFI) is an adjusted value of GFI based on model complexity. AGFI that is greater than .90 suggests a good model fit.

Antisocial behavior at wave 1 was included as a control. Our models also controlled for per capita family income (primary and secondary caregiver income from employment, government payments, and child support) as there is evidence that economic distress influences parents' parenting practices which is, in turn, associated with children's externalizing problems (Conger et al. 1992, 1994).

Results

The descriptive statistics and correlation matrix are displayed in Table 1. The statistics and correlation coefficients above the diagonal are for girls whereas those below the diagonal are for boys. At wave 2, most of the target children (83% of boys and 69% of girls) reported that during the preceding year they had engaged in at least one of the deviant behaviors listed in the conduct problems scale. The number of deviant acts reported ranges from 0 to 15 for boys and 0 to 12 for girls. Using t test, the result shows that, as expected, boys have significantly more counts of antisocial behavior than girls ($t = 2.78$, $p < .01$). The primary caregivers for boys and girls report similar level of interparental aggression ($t = -.399$, $p = .69$). On average, boys and girls experience similar levels of anger ($t = -.813$, $p = .41$), while girls experiences higher levels of fear ($t = -2.82$, $p < .01$). Boys and girls enjoy similar level of supportive parenting; however, girls are under higher levels of parental control ($t = -2.30$, $p = .02$) relative to boys. Comparing married and cohabitating families, there are no significant difference in terms of interparental aggression and children's antisocial behavior.

Since all of our hypotheses are directional, one-tailed tests were utilized in reporting the significance of correlation coefficients. The correlation matrix shows that, for both boys and girls, antisocial behavior at wave 2 is significantly and positively correlated with interparental

Table 1 Descriptive statistics and correlation matrix

Variables	1	2	3	4	5	6	7	8	9	Mean	SD
1. Antisocial behavior T2	1	.55**	.12*	.48**	.22**	.30**	−.40**	−.37**	−.1	2.5	2.86
2. Antisocial behavior T1	.39**	1	.07	.27**	.13*	.17**	−.31**	−.24**	−.12*	1.19	2.11
3. Interparental aggression	.14*	.10	1	.11*	−.004	.05	−.11*	−.15*	.01	9.50	2.81
4. Anger	.48**	.16*	.09†	1	.13*	.26**	−.25**	−.13*	−.07	1.9	1.4
5. Fear	.13*	.03	.06	.18**	1	.21**	.02	−.03	−.11*	1.53	1.51
6. Hostile view of relationships	.29**	.20**	.11*	.09	.18**	1	−.15**	−.15**	−.19**	−0.37	5.42
7. Supportive parenting	−.28**	−.20**	−.15*	−.23**	−.09	−.12*	1	.47**	.05	.09	1.57
8. Parental control	−.13*	−.005	−.11*	.06	−.20**	−.12*	.40**	1	.16**	0.17	1.55
9. Per capita income	−.02	−.09	.003	.10	−.08	−.01	.16**	.06	1	8.39	7.09
Mean	3.25	2.17	9.5	1.8	1.18	0.37	−0.07	−0.14	9.03		
SD	3.22	2.94	2.47	1.47	1.23	4.83	1.35	1.47	9.8		

The correlation coefficients above diagonal are for girls (N = 272), and below are for boys (N = 236)

The unit for per capita income is $1,000; except antisocial behavior at time 1, other variables are all time 2 measures

* $p < .05$; ** $p < .01$; † $p = .06$; one-tailed test

aggression. Antisocial behavior at wave 1, hostile view of relationships, anger, and fear are all significantly and positively correlated with antisocial behavior at wave 2. This pattern holds for both boys and girls. In addition, regardless gender, supportive parenting and parental control are significantly correlated, and both of them significantly and negatively correlated with antisocial behavior at wave 2.

For girls, anger is positively correlated with interparental aggression. Both supportive parenting and parental control for girls are significantly and negatively correlated with interparental aggression. In addition, girls' hostile view of relationships, anger, and fear are all significantly correlated with each other. For boys, hostile view of relationships is positively correlated with interparental aggression. The correlation coefficient between anger and interparental aggression is marginally significant ($p = .06$). Both supportive parenting and parental control for boys are significantly and negatively correlated with interparental aggression. Boys' hostile view of relationships and fear are positively and significantly correlated.

Using path analysis available in LISREL VIII (8.54), we fitted the fully recursive conceptual model to our data for both girls and boys and tested the significance of each path coefficient in the model (results available upon request). To obtain a more parsimonious model, we trimmed non-significant paths whose deletion did not significantly change the model fit from the fully recursive conceptual model. The results are presented in Fig. 2. Beginning with girls, the model fit indexes show that the reduced model fits the data well (*Chi-square/df* = 31.50/17; RMSEA = .056; GFI = .98; AGFI = .93). This result shows support for the general strain theory. Controlling for the other proposed mediating variables, both the effect of interparental aggression on girls' anger ($\gamma_{32} = 0.11$) and the effect of girls' anger on antisocial behavior at wave 2 are statistically significant ($\beta_{13} = 0.33$). In contrast, the effect of interparental aggression on fear ($\gamma_{42} = 0.02$) and the effect of fear on antisocial behavior at wave 2 ($\beta_{14} = -0.04$) are not statistically significant. This also supports the emotional security model in that anger emotion, though not fear, mediates the relationship between interparental aggression and girls' antisocial behavior.

The result for girls also shows weak support for the spillover model. The effect of interparental aggression on parental control ($\gamma_{62} = -0.13$, $t = -1.63$) approaches significance, and the effect of parental control on girls' antisocial behavior at wave 2 ($\beta_{16} = -0.20$) is significant. In contrast, the effect of interparental aggression on supportive parenting ($\gamma_{52} = -0.08$) is not significant, though the effect of supportive parenting on girls' antisocial behavior at wave 2 ($\beta_{15} = -0.13$) is significant. Parental control over girls seems to be the dimension of parenting that is sensitive to the spillover effect of interparental aggression. In addition, the result for girls does not support the aggressogenic cognition model for girls. The effect of interparental aggression on girls' hostile view of relationships ($\gamma_{22} = 0.05$) is not statistically significant, though the effect of girls' hostile view of relationships on antisocial behavior at wave 2 ($\beta_{12} = 0.14$) is significant.

To test the significance of the seeming mediating role of anger and parental control in the relationship between interparental aggression and girls' antisocial behavior at wave 2, we used Model Indirect command of SEM available in Mplus (Muthen and Muthen 2004). This command provides a direct test of the significance of mediating routes. The result is presented in Table 2 panel A. It shows that, consistent with the general stain theory and the

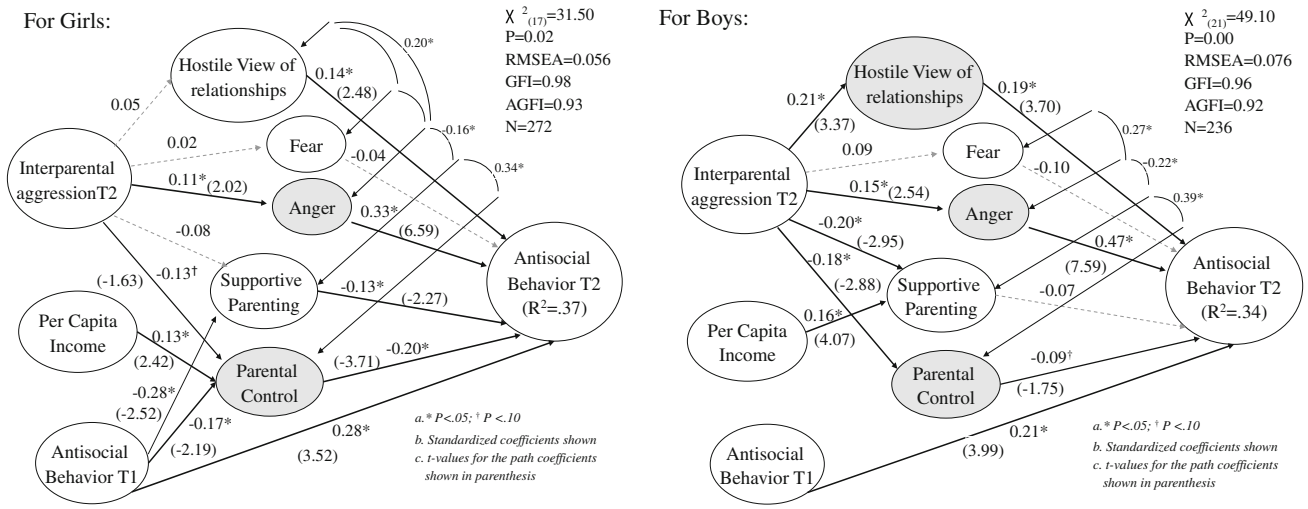

Fig. 2 Trimmed models for boys and girls. To show the performance of competing mediating mechanisms in the model, these non-significant paths from interparental aggression to the proposed mediating variables are not excluded from the model

emotional security model, the effect of interparental aggression on antisocial behavior via anger is significant ($p = .048$). It also shows that the effect of interparental aggression on antisocial behavior via parental control approaches significance ($p = .06$). This lends weak support for the spillover model.

To analyze boys' data, we repeated the same procedure that we used for girls' data. The result is presented in Fig. 2. The reduced model for boys fits the data well (*Chi-square/df* = 49.10/21; RMSEA = .076; GFI = .96; AGFI = .92). As was the case for girls, the result for boys shows support for the general strain theory. Controlling other proposed mediating paths, both the effect of interparental aggression on boys' anger ($\gamma_{32} = 0.15$) and the effect of anger on boys' antisocial behavior at wave 2 ($\beta_{13} = 0.47$) are significant. In contrast, both the effect of interparental aggression on fear ($\gamma_{42} = 0.09$) and the effect of fear on boys' antisocial behavior at time 2 ($\beta_{14} = -0.10$) fail to reach significance. Similar to that of girls, the result for boys show support for the emotional security model in that anger emotion, though not fear, mediates the relationship between interparental aggression and boys' antisocial behavior.

The results for boys also show support to the aggressogenic cognition model. Both the effect of interparental aggression on boys' hostile view of relationships ($\gamma_{22} = 0.21$) and the effect of boys' hostile view of relationships on antisocial behavior at wave 2 ($\beta_{12} = 0.19$) are

Table 2 Result from testing significance of path coefficients

Group	Models	Paths fixed	B	SE	T	*p* value
Panel A. Test of indirect effect of interparental aggression on antisocial behavior at time 2						
Girls	Model girls-1	γ_{32} & β_{13}; Parental aggression → Anger → Antisocial behavior	.037	.019	1.98	.048
	Model girls-2	γ_{62} & β_{16}; Parental aggression → Parental control → Antisocial behavior	.026	.017	1.527	.063[a]
Boys	Model boys-1	γ_{22} & β_{12}; Parental aggression → Hostile view → Antisocial behavior	.028	.014	2.003	.045
	Model boys-2	γ_{32} & β_{13}; Parental aggression → Anger → Antisocial behavior	.056	.028	1.973	.049
	Model boys-3	γ_{62} & β_{16}; Parental aggression → Parental control → Antisocial behavior	.018	.011	1.554	.06[a]

Models	Paths constraint to be equal	Boys	Girls	Equal	χ^2	*df*	$\Delta\chi^2$	*p* value
Panel B. Testing the significance of difference in path coefficients for boys and girls								
Baseline model	Free all paths				80.59	38		
Model I	γ_{22} Parental aggression → Hostile view of relationships	0.21	0.05	0.12	84.12	39	3.53	0.06
Model IV	β_{13} Anger → Antisocial behavior	0.47	0.33	0.37	86.2	39	5.61	0.02

To save space, only significant results are presented in the table. Other results are available upon request

"a" denotes that the test is based on one-tailed test

significant. Furthermore, the results show weak support for the spillover model. The effect of interparental aggression on parental control ($\gamma_{62} = -0.18$) is significant, and the effect of parental control on boys' antisocial behavior ($\beta_{16} = -0.09$; $t = -1.75$) approaches significance. In contrast, the effect of supportive parenting on boys' antisocial behavior ($\beta_{15} = -0.07$) is not significant, though the effect of interparental aggression on supportive parenting ($\gamma_{52} = -0.20$) is significant. As was the case for girls, the results for boys show that, among dimensions of parenting, it is parental control that mediates the relationship between interparental aggression and antisocial behavior.

Using the Model Indirect command of SEM available in Mplus, we tested the significance of the seeming mediating paths for boys. The results are presented in Table 2 panel A. The results show that, consistent with the aggressogenic cognition model, the effect of interparental aggression on antisocial behavior at wave 2 via hostile view of relationships is significant ($p = .045$). Supporting the general strain theory and the emotional security theory, the effect of interparental aggression on antisocial behavior at time 2 via anger is significant ($p = .049$). The results also show weak support for the spillover model in that the effect of interparental aggression on children's antisocial behavior at wave 2 via parental control approaches significance ($p = .06$).

The results also suggest that earlier antisocial behavior is a strong predictor of later antisocial behavior for both boys ($\gamma_{11b} = 0.21$) and girls ($\gamma_{11g} = 0.28$). Given the strong predictive power of earlier history in antisocial behavior, interparental aggression still uniquely and significantly contributes to children's later antisocial behavior. Every standard deviation increase in interparental aggression results in 0.05 and 0.08 standard deviation increase in girls' and boys' antisocial behavior, respectively.

Our results suggest that boys and girls have different avenues whereby interparental aggression impacts their antisocial behavior. To determine whether these differences are statistically significant, we employed the multi-population analysis and nested goodness-of-fit strategy available in SEM (Jaccard and Wan 1996). First, boys and girls data were stacked and analyzed simultaneously with path coefficients for boys and girls free to vary. Then, once at a time, the path was constrained to be equal for boys and girls. In each case, the change in model chi-square was assessed. A significant increase in model chi-square (a decrease in model fit) means a significant difference in the constrained path between boys and girls.

The results are presented in Table 2 panel B. The results show that constraining the paths from anger to antisocial behavior at time 2 for boys ($\beta_{13b} = 0.47$) and girls ($\beta_{13g} = 0.33$) to be equal yields a significant model chi-square change ($\Delta\chi^2/df = 5{,}62$, $p = .02$). This supports the general strain theory (Broidy and Agnew 1997) suggesting that boys are much more likely to externalize feelings of anger as antisocial behavior. This finding is also consistent with findings by Sigfusdottir et al. (2004) and Hay (2003) that the effect of anger on antisocial behavior is about 2 times stronger for boys compared to girls. However, there is no significant difference between boys and girls in terms of the relationship between interparental aggression and anger.

The results also show that, constraining the path from interparental aggression to hostile view of relationships for boys ($\gamma_{22b} = .21$) and girls ($\gamma_{22g} = .05$) to be equal, the model chi-square change approaches significance ($\Delta\chi^2/df = 3.53$, $p = .06$). This suggests that the strength of the relationship between interparental aggression and hostile view of relationships is marginally stronger for boys relative to girls. However, by constraining the paths from hostile view of relationships to antisocial behavior at time 2 for boys ($\beta_{12b} = .19$) and girls ($\beta_{12g} = .14$) to be equal, the model chi-square does not change significantly ($\Delta\chi^2/df = 1.7/2$, $p = .19$). It suggests that there is no difference between boys and girls in the effect of hostile view of relationships on antisocial behavior at time 2. In addition, there are no other significant differences between boys and girls in terms of the relationships between interparental aggression and fear/parenting and between fear/parenting and antisocial behaviors at time 2.

Discussion

The etiology of antisocial behavior has become a major research topic as its prevalence among children and adolescents in the US has increased dramatically over the past 40 years (Blumstein and Wallman 2000). Multiple factors such as genetics, biological factors, community factors, and family processes have been proposed as causal factors of antisocial behavior (e.g., Simons et al. 2005). As one of the major family processes, interparental aggression has been consistently shown as inducing children's antisocial behavior (e.g., Cummings et al. 2006). To account for the relationship between interparental aggression and children's antisocial behavior, four explanations (i.e., the aggressogenic cognition model, the general strain theory, the emotional security model, and the spillover model) have been proposed. Although all four of them have received some empirical support (e.g., Cummings et al. 2003; Fite et al. 2008; Sturge-Apple et al. 2006), scarce of research test them simultaneously. Thus, it remains unclear how these proposed mechanisms function in context of other competing ones. To provide a better understanding of the working mechanism whereby interparental aggression induces youth's antisocial behavior, the present study tested the four explanations simultaneously.

Using longitudinal data from a sample of 508 African American families with a child aged 12–14 and using path analysis in SEM, our research shows that the proposed mechanisms work in parallel to mediate the impact of interparental aggression on children's antisocial behavior. In other words, there are multiple paths through which interparental aggression might impact children. This is consistent with prior findings (Onyskiw and Hayduk 2001) that different mechanisms work in parallel in explaining the relationship between interparental aggression and children's antisocial behavior. Facing interparental aggression, both boys and girls are likely to develop anger which, in turn, contributes to their antisocial behavior. Facing interparental aggression, boys also tend to develop a hostile view of relationships which is likely to be expressed as antisocial behavior. It is also likely that, having overt hostile conflict with their romantic partner, parents tend to relax their control over their children which, in turn, gives rise to their children's antisocial behavior. For both boys and girls, parental control seems to be the parenting dimension that is sensitive to interparental aggression and able to induce antisocial behavior. This finding echoes criminological literature in that parental control including monitoring and discipline is shown as essential in preventing children's antisocial behavior (e.g., Gottfredson and Hirschi 1990). The proposed competing mechanisms work in parallel to explain the relationship between interparental aggression and children's antisocial behavior.

Our research also shows that boys and girls have different avenues whereby interparental aggression impacts their behavior. Though boys and girls respond to interparental aggression similarly with anger, boys are more likely to externalize their anger as antisocial behavior relative to girls. This is consistent with the findings reported by other researchers (Hay 2003; Sigfusdottir et al. 2004) that gender difference in the mechanism whereby interparental aggression induces antisocial behavior lies in the effect of anger on antisocial behavior, not in the effect of interparental aggression on anger. Besides the difference in the effect of anger on antisocial behavior, boys are more likely to develop a hostile view of relationships when exposed to interparental aggression. Having stronger total effect of interparental aggression on antisocial behavior and more avenues for the deleterious impact of interparental aggression, boys seem to be more vulnerable to interparental aggression relative to girls.

Furthermore, our findings show support for the emotional security model in that anger mediates the relationship between interparental aggression and antisocial behavior. This is consistent with propositions suggested by some researchers in the emotional security explanation tradition (Jenkins 2000) that anger is the predominant emotion when children feel threatened by interparental aggression. However, it is contrary to Davies et al.'s (2002) argument that fear is the primary sign of emotional insecurity. Whether treating interparental aggression as a type of strain or as a threat to children's emotional security, anger seems to be the primary emotional response toward interparental aggression that prompts children to antisocial behavior.

Finally, our findings suggest that, when experiencing interparental aggression, boys are likely to develop a hostile view of relationships while girls are not. Interparental aggression seems only to set an example of interpersonal interaction for boys and foster a hostile view of relationships in them. It is possible that this result may be partially due to the limitation of our measure. Our measure of interparental aggression is based on primary caregivers report only. It is possible that primary caregivers are more likely to recall aggression that is inflicted by their spouse/romantic partner. Since most of the primary caregivers are women, the measured interparental aggression is more of those inflicted on females by males. Since boys are more likely to identify with the men of the romantic dyads, they are more likely to follow men's example and develop a hostile view of relationships. This, to some extent, highlights the significance of the gender of both the parent and the child in examining the mechanism that explains the relationship between interparental aggression and antisocial behavior.

The data utilized in the present study has its strength. For example, it was collected following a longitudinal design. The longitudinal research design enables us to include children's earlier antisocial behavior as a control in our analysis and make sure that the causal sequence flows in the right direction from interparental aggression to antisocial behavior. This renders our research more rigorous in terms of testing the causal relationship among interparental aggression, the proposed mediators, and children's antisocial behavior. In addition, it provides a large array of family and psychological variables examined in the present study. It is the availability of these variables that makes our simultaneous test of the four proposed mechanisms possible. Both of them added significantly to the strength of the current study.

Meanwhile, it is worthwhile to point out that the data utilized in the current study also has limitations that hampered our analysis to some extent. The data focuses exclusively on an African American sample. Though this focus makes the current research unique in terms of its contribution to the literature, it raises the question as to the generalizability of our findings. As far as we are aware, there is no reason why the mechanisms whereby interparental aggression impacts children's antisocial behavior would differ across cultural groups. However, to establish the generalizability of our findings, future studies using samples from diverse race/ethnic groups are needed.

In addition, our research focuses on families in which the primary caregiver was living with a spouse or a romantic partner, rather than married families only. Our approach is more inclusive relative to the tight focus of prior research on interparental aggression in married families. This is justifiable given the high prevalence of cohabitation among African American couples (Bumpass and Lu 2000; Hummer and Hamilton 2010) and the fact that African American grandparents or other relatives often serve as primary caregivers for children (Pearson et al. 1990). Prior research has shown that married and cohabiting families are quite similar in terms of mother's parenting behavior (Kalenkoski et al. 2005; Kendig and Bianchi 2008) and romantic relationship after controlling for individuals' demographic and general interpersonal relationship characteristics (Hsueh et al. 2009). In addition, primary caregivers other than child's biological mothers (e.g. grandmothers) were shown as similar to child's biological mothers in terms of the care they provided for the child (Pearson et al. 1990). Comparing married and cohabiting families in our sample, we did not find substantial difference between them in terms of the study constructs. Thus, we feel that a more inclusive approach is warranted.

Another reason for our focusing on married and cohabitating families is to distinguish these families from other family types (e.g., single-parent, non-cohabitating families). In single-parent, non-cohabiting families, aggression between primary caregivers and their romantic partners could happen outside of the family settings and away from children. Thus, presumably, the aggression is less threatening to children. The findings that single, non-cohabiting mothers are significantly different from cohabiting and married mothers in the time spent with their children (Kalenkoski et al. 2005; Kendig and Bianchi 2008) suggested that single-parent, non-cohabiting family may fundamentally different from cohabiting and married families. Although the focus on married and cohabiting families in the present study is well justified, we are aware of its difference from the tight focus of prior research on married families and ask for extra caution in interpreting our findings.

It is also important to point out that the mechanisms whereby interparental aggression affects children's antisocial behavior may vary across children's developmental stages. Younger children, relative to their older counterparts, may be more likely to feel fear, rather than anger, facing interparental aggression (Davies and Cummings 2006). As children grow older and the center of their life shifts away from the family to school and peer group (Thornberry 1987), the spillover effect of interparental aggression on children may be less pronounced. The current research focuses on the early adolescent period (age 12–14). Thus, our research only speaks to the processes that link interparental aggression and children's antisocial behavior at the early adolescent stage.

Family is the source from which children seek support and nurturance for their growth and development. Fraught with interparental aggression, families often fail to provide the basic positive environment that children need for prosocial development. Even worse, interparental aggression sets bad examples for children and fosters negative emotions in them. Given the multiple paths by which the impact of interparental aggression can simultaneously impact children, it is hard to shield children completely from the deleterious consequences of interparental aggression. Because conflict with one' romantic partner is sometimes unavoidable, perhaps the best strategy to prevent these negative child outcomes is for parents to reduce the level of hostility and aggressiveness when handling disagreement with their partners. Making parents aware of the impact of their hostile, aggressive behavior on their offspring is the first step in producing this change. Parenting interventions should emphasize to parents the need for them to take the responsibility in minimizing their level of hostility and aggression during conflict in order to promote their children's optimal development.

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