

Fathering and mothering in the family system: linking marital hostility and aggression in adopted toddlers

Carla Smith Stover,¹ Christian M. Connell,² Leslie D. Leve,³ Jenae M. Neiderhiser,⁴ Daniel S. Shaw,⁵ Laura V. Scaramella,⁶ Rand Conger,⁷ and David Reiss¹

¹Child Study Center, Yale University School of Medicine, New Haven, CT; ²Department of Psychiatry, Yale University School of Medicine, New Haven, CT; ³Oregon Social Learning Center, Eugene, OR; ⁴Department of Psychology, Pennsylvania State University, University Park, PA; ⁵Department of Psychology, University of Pittsburgh, Pittsburgh, PA; ⁶Department of Psychology, University of New Orleans, New Orleans, LA; ⁷Department of Human and Community Development, University of California Davis, Davis, CA, USA

Background: Previous studies have linked marital conflict, parenting, and externalizing problems in early childhood. However, these studies have not examined whether genes account for these links nor have they examined whether contextual factors such as parental personality or financial distress might account for links between marital conflict and parenting. We used an adoption design to allow for a clear examination of environmental impact rather than shared genes of parents and children, and assessments of parental personality and financial strain to assess the effects of context on relationships between marriage and parenting of both mothers and fathers. **Method:** Participants were 308 adoption-linked families comprised of an adopted child, her/his biological mother (BM), adoptive mother (AM) and adoptive father (AF). BMs were assessed 3–6 and 18 months postpartum and adoptive families were assessed when the child was 18 and 27 months old. Structural equations models were used to examine associations between marital hostility, fathers' and mothers' parenting hostility, and child aggressive behavior at 27 months of age. In addition, the contribution of financial strain and adoptive parent personality traits was examined to determine the associations with the spillover of marital hostility to hostile parenting. **Results:** A hostile marital relationship was significantly associated with hostile parenting in fathers and mothers, which were associated with aggressive behavior in toddlers. Subjective financial strain was uniquely associated with marital hostility and child aggression. Anti-social personality traits were related to a more hostile/conflicted marital relationship and to hostile parenting. **Conclusions:** Results clarify mechanisms that may account for the success of early parent-child prevention programs that include a focus on parental economic strain and personality in addition to parent training. **Key words:** Marital hostility, parenting, fathers, toddler aggression.

Introduction

Recent research has highlighted the importance and unique contributions of fathers to the psychological, social, and cognitive development of their children (Lamb, 1997, 2004), yet there continues to be a dearth of research on the parenting of fathers especially in early childhood. The recent increase in research on father involvement and the development of father-specific interventions necessitates a better understanding of the unique contributions of fathering to child development. Numerous studies have established a sequence of processes from marital conflict to hostile parenting to child aggression (e.g. Katz & Gottman, 1996; Krishnakumar & Buehler, 2000), with some showing a particularly strong association between these links for fathers (Katz & Gottman, 1996), but the majority of studies have been conducted with mothers and older children in biologically related families. There is a par-

ticular paucity in our understanding of this sequential process in toddlers with little attention paid to these pathways for fathers as compared to mothers. Understanding the etiological factors that lead to early childhood aggression is critical to prevention and intervention efforts as a substantial percentage of individuals with the most severe conduct problems during middle childhood and adolescence typically begin showing these behaviors between the ages of two and three (Shaw & Gross, 2008). Gaining further clarity of fathers' roles in the development of aggressive behaviors is essential to current fatherhood initiatives.

Family systems theory is often used to explain the links between marriage and parenting. Within this framework, families are hierarchically organized systems with multiple subsystems including the interparental, parent-child, and sibling relationships. The interdependence of these subsystems allows for the influence of emotional and behavioral dynamics within the interparental subsystem to impact the parent-child subsystem (Cox & Paley,

Conflict of interest statement: No conflicts declared.

1997). One theory that has been developed and tested to explain this interdependence is the spillover hypothesis, which suggests that (a) highly conflicted marriages place emotional distress on parents leading to deterioration in parenting quality (Easterbrooks & Emde, 1988); and/or (b) emotions aroused in one family relationship 'spill-over' into another (Margolin, Christensen, & John, 1996). There have been numerous studies that provide data to support this theory showing that marital hostility is associated with increases in parent-child hostility and parental rejection (Harold, Shelton, Goeke-Morey, & Cummings, 2004; Shelton & Harold, 2008). Some studies have suggested that fathers' parenting may be more sensitive to marital problems than mothers (Goldberg & Easterbrooks, 1984; Katz & Gottman, 1996), while others have not (Erel & Burman, 1995). To our knowledge, only one study has examined the spillover hypothesis in relation to child adjustment in children under age five in biologically unrelated families. Rhoades et al. (2011) found an indirect effect of marital hostility when infants were 9 months of age in relation to toddler anger/frustration at 18 months via parental harsh discipline.

Financial strain and family process

Economic distress has consistently revealed direct associations with marital hostility and indirect associations through marital conflict on parenting (Barnett, 2008). Studies by Conger et al. have clearly shown a cascade from financial pressures to marital conflict to hostile parenting, the latter of which has been associated with child externalizing problems in adolescents (Conger, Ge, Elder, Lorenz, & Simon, 1994; Conger et al., 2002). Studies highlight the importance of subjective financial strain and worry, not simply poverty or low SES, on the family system (Elder, Conger, Foster, & Ardel, 1992). Others have found similar results with school aged children and adolescents (Robila & Krishnakumar, 2006). Financial strain appears to be equally stressful and to impact marital conflict for mothers and fathers (Gudmunson, Beutler, Israelsen, McCoy, & Hill, 2007). Studies suggest that marital hostility may reflect subjective experiences of economic strain that could operate through marriage to intensify the spillover or simultaneously impact the entire family environment. Researchers have called for examination of these processes in early childhood when the impact of financial worry and family processes may be the strongest (Barnett, 2008).

Importance of parent antisocial personality traits

Antisocial and other personality traits are defined as a set of enduring characteristics that affect behavior and perceptions. Numerous studies have found strong associations between parent antisocial traits,

marital conflict and negative parenting (Cadoret, Yates, Ed, Woodworth, & Stewart, 1995; Connell & Goodman, 2002; Moffitt & Caspi, 2001; Nagin & Tremblay, 2001). There is evidence of a genetic component to this spillover from marital hostility to parenting as data from twin samples reveal personality traits, including aggression, explain 33%–42% of the covariance between marital quality and parenting for both mothers and fathers (Ganiban et al., 2009). Furthermore, genetically influenced aggressive personality traits are correlated with conflict in the family (Horwitz et al., 2010).

The potential role of genes in the spillover of marital conflict to parenting and child aggression

Although there is significant evidence of the spillover hypothesis in the research literature and some evidence of the impact of this spillover to child functioning, associations between parenting and child externalizing behaviors also may be influenced by shared genes. As children share 50% of their genes with each biological parent, the same genetic factors that influence hostile parenting might also affect the expression of child aggression, thereby creating an association between hostile parenting and child aggression that is the product of shared genes rather than a direct effect of caregiving. Meta-analyses have suggested that the heritability of child aggression is in the moderate range (DiLalla, 2002; Rhee & Waldman, 2002). Hicks and colleagues found that parents pass on a general vulnerability for externalizing disorders that is highly heritable and is equally transmittable from biological mothers and fathers (Hicks, Krueger, Iacono, McGue, & Patrick, 2004). Studies of adopted twins reveal that children may inherit a vulnerability to antisocial behavior, but are also influenced significantly by the postnatal environment (Bohman, 2007; Bohman, Cloninger, Sigvardsson, & von Knorring, 1982; Sigvardsson, Cloninger, Bohman, & von Knorring, 1982). As genes may also account for the association of marital conflict and hostile parenting, it is possible that they may explain the entire cascade from marriage to parenting to child aggression.

The current study

The literature supports a study that examines: (a) the spillover of marriage to parenting to child aggression in very early childhood; (b) the strength of these associations in nonbiologically related families to disentangle environmental and genetic effects on this cascade; (c) the unique contribution of both mothers and fathers in the same model; and (d) simultaneously considers factors such as parent antisocial traits and financial strain that have clearly been linked to spillover in the research literature.

This study models the spillover of hostility in the marriage to mothers' and fathers' hostile parenting

to toddler aggression to determine if these environmental pathways are significant in genetically unrelated parent-toddler dyads. We test the hypothesis that family financial strain and parental antisocial traits will be significantly associated with marital hostility and hostile parenting and that financial strain will have direct associations to toddler aggression. We simultaneously examine genetic risk via birth mother (BM) antisocial behaviors. We expected that (a) marital hostility would be significantly associated with hostile parenting for both adoptive mothers (AM) and adoptive fathers (AF); (b) in turn, we expected hostile parenting to be positively associated with toddler aggression from 18 to 27 months; (c) financial strain would be positively associated with marital hostility and child aggression; (d) adoptive parent antisocial traits would be positively associated with marital hostility and hostile parenting; and (e) higher levels of BM antisocial behaviors would be associated with higher levels of toddler aggressive behaviors at 18 months.

Methods

Participants

The sample consisted of 361 linked adopted children, adoptive parents, and birth parent participants of the Early Growth and Development Study (Leve, Neiderhiser, Scaramella, & Reiss, 2008). Participants were enrolled between January 2003 and January 2006 using a rolling recruitment procedure in three regions of the United States: Mid-Atlantic, West/Southwest, and Pacific Northwest. Families were recruited from 33 adoptions agencies in 10 states. Adoption agencies included a range of public, private, religious, and secular, with both open and closed adoption philosophies. Study participants were representative of those completing adoption plans at the participating agencies during the same time span (Leve et al., 2007). The study received ethics approval from the three institutional review boards for the universities involved in data collection. Given the goal of the current study – to examine the links from marriage to parenting to child aggression for mothers and fathers in two parent families – and the limited number of gay ($n = 12$) and lesbian couples ($n = 8$) and single parent families ($n = 5$) in the larger EGDS sample, these cases were excluded. In addition, cases were excluded if data were not available from BMs at 3 to 6 months postpartum or from one adoptive parent at 27 months, resulting in a final analytic sample of 308 families (child, adoptive parent, and birth parent).

The full EGDS sample consists of 57% male adopted children with a mean age at the time of adoption of 7 days ($SD = 13$ days). Ethnically, adoptive families were relatively homogenous with 92% of AM and 91% of the AF Caucasian; 4% of the AM and 5% of the AF African American; 1% of the AM and AF multiethnic; 2% of the AM and AF Hispanic or Latino; and the remaining participants not identified or were of other ethnic status. 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 AM and AF were both 38. The mean age of BMs was 24 ($SD = 5.89$) with 72% Caucasian, 11% African American, 4% multiethnic, 7% Hispanic or Latino, 3% Native American and the remaining participants not identified or of other ethnic status. BMs typically had high school or trade school education levels. Their incomes ranged from less than \$5,000 to \$60,000 per year with the majority under \$25,000 per year. There were no significant differences in demographic characteristics between the full EGDS sample and the participants in the subsample used in these analyses.

Procedure

Birth mothers were assessed between 3 and 6 months and again at 18 months postpartum. Adoptive families were assessed when the child was 18 and 27 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. Full details on the EGDS study recruitment procedures, sample, and assessment methods are reported elsewhere (Leve et al., 2007).

Measures

Child aggression. Child aggression was measured using the *Child Behavior Checklist 1.5–5 version* (CBCL) when the child was 18 and 27 months of age. For purposes of these analyses, AM ($\alpha = .87$) and AF ($\alpha = .90$) reports on the Aggression factor were used. To best account for both mother and father reports, AM and AF reports were averaged to create a composite measure reflecting the mean level of child aggression. AM and AF scores were correlated at $r = .27$ ($p < .001$) at 18 months and $r = .36$ ($p < .001$) at 27 months.

Marital hostility. Marital hostility was assessed using the hostility index of the *Behavior Affective Rating Scale* (Melby, Conger, Ge, & Warner, 1995). AM and AF were asked to report on their partner's hostility toward them when the child was 27 months of age. Each parent reported on a 7-point likert scale how often in the last year his/her partner acted in a hostile way such as: 'Criticize you or your ideas; Shout or yell at you because he/she was mad at you; Ignore you when you tried to talk to him or her; Hit, push, shove or grab you'. Scores from the 13-item hostility subscale were summed to create a marital hostility score for AMs ($\alpha = .89$) and AFs ($\alpha = .90$). AM and AF scores were significantly correlated ($r = .50$, $p < .001$) and were averaged to create a composite measure reflecting the mean level of perceived marital hostility in the family.

Parenting hostility. AFs and AMs reported about their own and their partners' behaviors on the hostility scale of the *Iowa Family Interaction Rating Scales* (Melby & Conger, 2001) when the child was 27 months old. On the IOWA, parents reported on their own (AM $\alpha = .74$ and AF $\alpha = .68$) and their partners' hostility (AM $\alpha = .77$ and AF $\alpha = .70$) toward their child on a 7-point likert

scale. Parents reported on the frequency of the behavior in the last month. Sample items include: 'Shout or yell at him/her because you were mad at him/her; Criticize him/her or his/her ideas; Hit, push, shove, or grab him/her'. AM and AF reports of parenting hostility were significantly correlated for AFs ($r = .64, p < .001$) and AMs ($r = .53, p < .001$). Two composites were created reflecting the mean of self and partner reports for AF and AM hostile parenting.

Financial strain. Financial strain was reported by AMs ($\alpha = .73$) and AFs ($\alpha = .71$) separately when the child was 27 months old. This measure has been used in previous studies (Conger et al., 1992, 1994) and asks parents to report (on a 5-point likert scale): 'How much difficulty have you had paying bills each month; How much trouble have you had making ends meet?' Higher scores indicate greater subjective experiences of financial strain. AM and AF reports of financial strain were highly correlated ($r = .70, p < .001$). The mean of AM and AF reports were used to form one construct to represent subjective financial strain within the family. The financial strain variable was significantly negatively correlated with AM and AF reported household income ($r = -.37, p < .001$).

Adoptive parent antisocial traits. Adoptive parent antisocial traits were measured when the child was 18 months of age using an adaptation of the Antisocial Action Scale (Levenson, Kiehl, & Fitzpatrick, 1995), which is a 13-item scale resulting in a sum score representing psychopathy and antisocial behavior. Sample items include: 'Lying comes easily to me; I cheat at work or other places; I don't care if others get hurt as long as I get what I want'. Items (answered on a 4-point likert scale) were summed to create scores for AM ($\alpha = .56$) and AF ($\alpha = .51$).

BM antisocial behavior. Birth mother antisocial behavior was measured using the 38-item Elliot Social Behavior Questionnaire (Elliott, Huizinga, & Ageton, 1985). BMs reported on items reflecting their engagement in various delinquent behaviors over the previous 12 months (e.g. purposely damaged or destroyed property, purposely set a fire) at 3–6 months and 18 months postpartum. Items were summed at each time point to create an antisocial behavior score that was log-transformed to reduce skewness ($\alpha = .84$ and $\alpha = .81$ for 3–6 months and 18 month time points, respectively). BM reports at each time point were significantly correlated ($r = .43, p < .000$) and were averaged to create a mean composite score for BM antisocial behavior.

Additional covariates. Several additional covariates were examined that could confound results. These were: **Adoption openness.** Openness in adoption was examined to account for the potential influence of postadoption contact between birth and adoptive families. The level of openness in adoption was measured when the child was 27 months of age using a 7-point openness scale that was independently reported by AM and AF. **Perinatal risk.** A perinatal risk index score was derived using the McNeil-Sjostrom Scale for obstetric complications (McNeil & Sjostrom, 1995) which assesses: (a)

maternal/pregnancy complications (illness, fetal distress during this period, exposure to drugs/alcohol, maternal stress and psychopathology, and psychotropic drug use), (b) labor and delivery complications (prolonged labor, cord complications, interventions needed), and (c) neonatal complications (prematurity, low birth weight). A total was created by summing the frequency of responses greater than three.

Analytic strategy

Structural equation models were generated with full information maximum likelihood (FIML) estimate procedures using Amos version 18.0. Two sets of models were analyzed. The first set tested a simple spillover hypothesis of marital hostility effects on child aggression through indirect effects on AF and AM parent-child hostility. The second set incorporated hypothesized covariates including financial distress, AF and AM antisocial behavior, earlier (i.e. 18 months) child aggression, and BM antisocial traits. Two additional covariates, adoption openness and perinatal risk, were dropped from the analyses as they were not associated with child aggression or parenting behaviors in preliminary correlation analyses. For modeling, we used a multiple-rater approach to measuring financial strain, marital hostility, hostile parenting, and toddler aggression, which helps ensure that any observed associations are not merely the result of shared method or informant variance. To evaluate model fit, we used the model chi-square test along with two additional fit indices: the comparative fit index (CFI; Bentler, 1990) and the root mean square error of approximation (RMSEA; Steiger, 1990). Model chi-square values with accompanying p values greater than .05 indicate a good model fit. CFI values greater than .95 and RMSEA values less than .05 indicate a good fit; CFI values between .90 and .95 and RMSEA values between .05 and .08 indicate an acceptable fit. For a discussion of various fit indices, see Browne and Cudeck (1992).

Results

Model variable correlations

Descriptive statistics and correlations among all study variables are reported in Table 1. As expected correlations between marital hostility, AF and AM hostile parenting, and children's aggression were small to moderate and significant. BM antisocial behavior, perinatal risk and adoption openness were all unrelated to child aggression at 18 and 27 months.

Marital hostility, hostile parenting, and child aggression

The initial model, specifying the simple spillover hypothesis, resulted in a poor fit to the data [$\chi^2 (2, N = 308) = 22.21, p = .00, CFI = .76, RMSEA = .18$]. Allowing for correlated error variances between AM and AF hostile parenting resulted in a significant

Table 1 Correlations and descriptive statistics for hypothesis variables

	1	2	3	4	5	6	7	8	9	10	11
1. Financial strain	–	–	–	–	–	–	–	–	–	–	–
2. Marital hostility	.199**	–	–	–	–	–	–	–	–	–	–
3. AF hostile parenting	.151*	.299**	–	–	–	–	–	–	–	–	–
4. AM hostile parenting	.102	.195**	.311**	–	–	–	–	–	–	–	–
5. AM antisocial traits	.036	.229**	.043	.250**	–	–	–	–	–	–	–
6. AF antisocial traits	.019	.271**	.265**	.079	.185**	–	–	–	–	–	–
7. BM antisocial behaviors	–.091	–.022	.038	–.043	.046	.009	–	–	–	–	–
8. Perinatal risk	–.035	.006	–.009	–.002	.016	.045	.139*	–	–	–	–
9. Adoption openness	.046	.091	–.065	–.035	.048	–.022	.013	.063	–	–	–
10. CBCL aggression-18 Mos	.135*	.100	.254**	.239**	.111	.140*	.037	.045	.063	–	–
11. CBCL aggression-27 Mos	.259**	.190**	.285**	.273**	.060	.036	.008	.067	–.004	.453**	–
Mean	3.61	26.30	8.58	8.49	16.90	17.03	3.71	3.17	4.37	53.39	53.72
SD	1.25	7.52	2.43	2.39	2.48	2.58	.11	.09	1.20	4.35	4.35

AF, adoptive father; AM, adoptive mother; BM, birth mother; CBCL, Child Behavior Checklist.

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

improvement in model fit with no appreciable change in the estimates of association between study variables. Consistent with study hypothesis, the direct effect of marital hostility on child aggression was near-zero and nonsignificant in the resulting model. This direct path was dropped, and the final model presented in Figure 1 resulted in an excellent fit [$\chi^2(1, N = 308) = 2.36, p = .12, CFI = .98, RMSEA = .07$]. As hypothesized, there was a significant association from marital hostility to both AF and AM hostile parenting, which were individually associated with toddler aggression (Figure 1).

Next, we tested the fit of the full hypothesized model. As with the simple spillover model, the initial model resulted in a poor fit to the data [$\chi^2(20, N = 308) = 43.31, p = .00, CFI = .90, RMSEA = .06$], which was resolved when we accounted for correlated error variance between AM and AF hostile parenting variables [$\chi^2(19, N = 308) = 24.95, p = .16, CFI = .97, RMSEA = .03$]; again, the inclusion of this effect and removal of the direct path from marital hostility to child aggression (which was near-zero and nonsignificant) did not alter the parameter estimates for study variable associations (Figure 2). Model results indicate the paths from financial

strain to marital hostility and child aggression were significant. AF and AM antisocial traits were significantly positively associated with both marital hostility and hostile parenting. Paths from marital hostility to AF hostile parenting to toddler aggression and marital hostility to AM hostile parenting to toddler aggression were all significant. BM antisocial behavior was not a significant predictor of child aggression. Child aggression at 18 months was significantly positively associated with both AM and AF hostile parenting at 27 months.

Discussion

Results of the current analysis support the spillover of marital hostility to hostile parenting for fathers and mothers of biologically unrelated children. These findings provide evidence for the importance of the marital and parenting environment on the change in toddler aggression from 18 to 27 months. As previously shown, the association from marital hostility to parenting may be slightly stronger for fathers (Goldberg & Easterbrooks, 1984; Katz & Gottman, 1996). This finding has implications for intervention efforts and supports results from early prevention and treatment studies targeting parenting (Dishion et al., 2008; Shaw, Dishion, Supplee, Gardner, & Arnds, 2006; Van Zeijl et al., 2006; Webster-Stratton & Hammond, 1997; Zisser & Eyberg, 2010) and/or marital/coparenting (Cowan & Cowan, 2005), in interventions to reduce externalizing problems in young children. Given that current results indicate mothers' and fathers' hostile parenting equally contribute to toddler aggression, further exploration of the impact of these kinds of interventions for both parents is warranted.

Financial strain was related to marital hostility, which in turn was linked to hostile parenting and child aggression. This finding is consistent with other studies in biologically related families linking subjective experiences of financial strain to conflicted marital relations, hostile parenting, and child

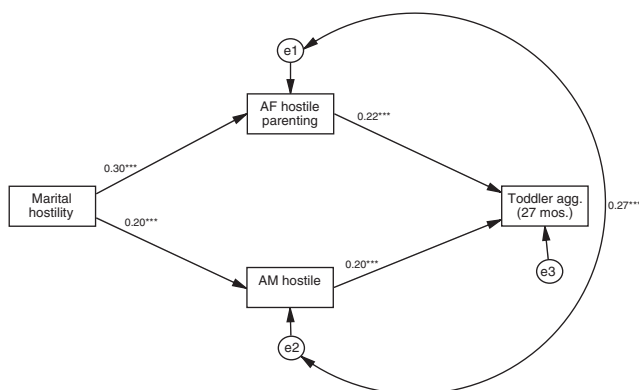


Figure 1 Simple spillover from marital to parenting. AF, adoptive father; AM, adoptive mother; BM, birth mother; model fits statistics: $\chi^2(1, N = 308) = 2.36, p = .12, CFI = .98, RMSEA = .07$; *** $p < .001$

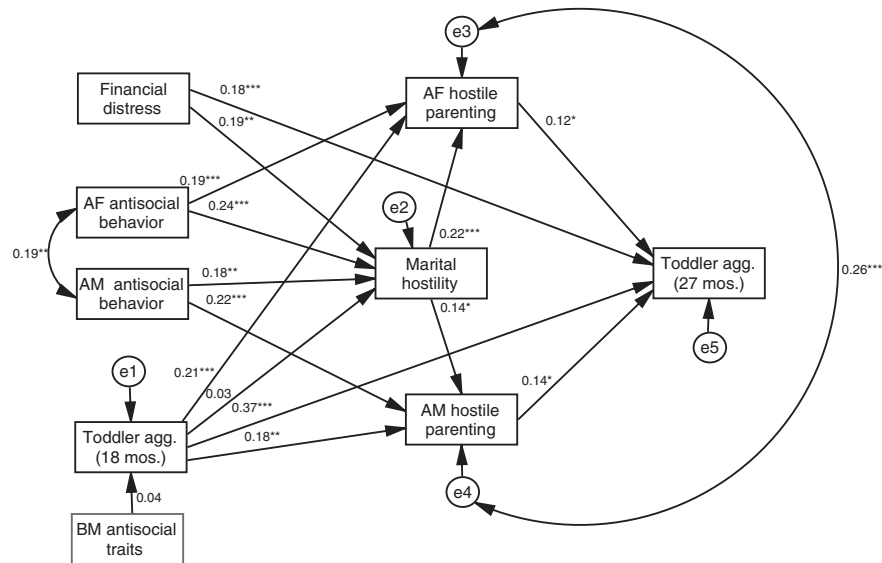


Figure 2 Full hypothesis model. AF, adoptive father; AM, adoptive mother; BM, birth mother; model fits statistics: χ^2 (19, $N = 308$) = 24.95, $p = .16$, CFI = .97, RMSEA = .03. * $p < .05$, ** $p < .01$, *** $p < .001$

externalizing (Conger et al., 1994; Gudmunson et al., 2007). Parents' financial worry was also directly associated with child aggression, independent of parenting. In fact, the direct association between financial strain and child aggression is an important finding and suggests parents' subjective experiences of financial strain are a pervasive risk factor for child problem behavior within the family system.

Antisocial traits of adoptive parents were significant correlates of marital hostility and hostile parenting for both mothers and fathers. This is consistent with several studies suggesting parent personality traits impact the amount of spillover from marital conflict into the coparenting domain (Talbot & McHale, 2004), and others who have found parent behavior is more powerful than genetics for adopted children (Bohman et al., 1982). The significant contribution of adoptive parent antisocial traits on parenting hostility and, through parenting, to child aggression, was not surprising in light of previous work. However, this study is the first to establish in toddlers that this chain of events is not likely attributable to genes shared by parents and children. Antisocial traits were a correlate of hostile parenting in this nonclinical sample. In clinical settings with families characterized by higher levels of antisocial traits and socioeconomic distress, the contribution of these factors to marital conflict, hostile parenting and child aggression may be even greater.

Moreover, although these analyses are limited by their predominantly cross-sectional nature and sole reliance on parent-reported data, it is improbable that within a longitudinal design child-to-parent effects would be evident with respect to parent antisocial traits (e.g. trouble with the law, use of a weapon, fighting). It also is not clear whether reciprocal effects would be evident on financial strain (e.g. difficulty paying bills), although this remains an empirical

question. There were significant direct paths from 18 month child aggression to AM and AF hostile parenting, which are consistent with other reports of a reciprocal relationship between child behavior and parenting (Colder, Lochman, & Wells, 1997; Gault-Sherman, 2011; Scaramella & Conger, 2003).

Despite their limitations, these data are useful in thinking about current interventions that have been shown to be effective and the reasons for their success. With respect to treating antisocial traits in parents, recent data suggest a link between these parental behaviors and their adverse but malleable cognitions about the child (Bugental et al., 2002). Further focus on these cognitions within interventions targeting early childhood externalizing has strengthened already effective treatments such as the Healthy Family Program (Bugental et al., 2002) and the Triple P Positive Parenting Program (Sanders, Markie-Dadds, Tully, & Bor, 2000). These data also alert the clinician to the importance of parents' subjective experience of financial strain (not just income or SES, but financial worry regardless of income level) on the family system as a whole and the need to assess the impact on both marriage and child adjustment (Elder et al., 1992; Olds et al., 1998).

Birth mother antisocial behaviors were not associated with child aggressive behaviors in our sample. There are several possible reasons for this finding: (a) we did not account for genetic effects of birth father (BF) in our modeling. Others have found BF antisocial and criminal behavior to be associated with adopted child criminality in adulthood (Bohman, 2007); (b) genetic effects may become stronger with age (Jacobson, Prescott, & Kendler, 2002); or (c) there may be no direct genetic effect at this young age, but genetic predisposition may enhance sensitivity to adverse environmental factors such as marital hostility (Rhoades et al., 2011).

Conclusion

This study revealed that marital hostility is associated with hostile parenting of both mothers and fathers which in turn, is associated with changes in toddler aggressive behaviors from 18 to 27 months in nonbiologically related parent-child dyads. It is clear the broad family environment is important to the development of toddler aggression and thus is an important area for prevention and intervention. These findings support the further study of prevention and intervention efforts that target multiple facets of the family atmosphere including: parenting and coparenting, subjective financial strain and parent antisocial personality traits. Programs aiming to prevent emerging childhood externalizing disorders would benefit from a focus on comprehensive assessment of fathers, mothers, and children to understand the broad family context and areas of intervention need.

Acknowledgements

This project was supported by the following grant: R01 HD042608; NICHD, NIDA, and OBSSR; NIH, US PHS (PI

Years 1–5: David Reiss, MD; PI Years 6–10: Leslie Leve, Ph.D.). The writing of this manuscript was partially supported by the following grants: K23DA023334-01A2 (PI: Stover), P30 DA023920 (PI: Reid), and R01 DA020585 (PI: Neiderhiser) from NIDA, NIH, US PHS., and by R01 MH092118 (PI: Neiderhiser & Leve) from NIMH, NIH, US PHS. The content is solely the responsibility of the authors and does not necessarily represent the official views of the Eunice Kennedy Shriver National Institute of Child Health and Human Development or the National Institutes of Health. We thank the adoptive and birth families who participated in this study; the adoption agency staff members who helped with the recruitment of study participants; and John Reid for his long term collaboration and significant contributions to the study. We also acknowledge the late Xiaojia Ge, who was a close and long time collaborator on this study. His contributions to this study are substantial, and we will long feel the loss of our colleague.

Correspondence to

Carla S. Stover, Ph.D., Child Study Center, Yale University School of Medicine, 230 S. Frontage Road, New Haven, CT 06514, USA; Tel: +1 203 785 2048; Fax: +1 203 785 4608; Email: carla.stover@yale.edu

Key points

- What's known: Past research has shown clear links from marital hostility to hostile parenting to child aggression
- What's new: Previous studies have not examined these links in early childhood for biologically unrelated mothers, fathers and toddlers, while considering contributing factors of subjective financial strain and parent antisocial traits on the family environment
- Findings: There is clear evidence of the relationship of marital hostility to hostile parenting of both mothers and fathers to child aggression in toddlers, even in biologically unrelated parents and children
- Financial strain and antisocial personality traits contribute significantly to this cascade from marriage to parenting to child aggression
- Parents' subjective experiences of financial strain have direct associations with toddler aggression
- Implications: Prevention and intervention programs that target early childhood problem behaviors by focusing on coparenting and/or parenting while also assessing the impact of financial strain on the family environment may have the most impact

References

- Barnett, M. (2008). Economic disadvantage in complex family systems: Expansion of family stress models. *Clinical Child and Family Psychology Review*, 11, 145–161.
- Bentler, P.M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, 107, 238–246.
- Bohman, M. (2007). Predisposition to criminality: Swedish adoption studies in retrospect. *Ciba Foundation Symposium 194 – Genetics of criminal and antisocial behaviour* (pp. 99–114). Chichester, UK: John Wiley & Sons, Ltd.
- Bohman, M., Cloninger, C.R., Sigvardsson, S., & von Knorring, A.-L. (1982). Predisposition to petty criminality in Swedish adoptees: I. Genetic and environmental heterogeneity. *Archives of General Psychiatry*, 39, 1233–1241.
- Browne, M.W., & Cudeck, R. (1992). Alternative ways of assessing model fit. *Sociological Methods and Research*, 21, 230–258.
- Bugental, D.B., Ellerson, P.C., Lin, E.K., Rainey, B., Kokotovic, A., & O'Hara, N. (2002). A cognitive approach to child abuse prevention. *Journal of Family Psychology*, 16, 243–258.
- Cadoret, R.J., Yates, W.R., Ed, T., Woodworth, G., & Stewart, M.A. (1995). Genetic-environmental interaction in the genesis of aggressivity and conduct disorders. *Archives of General Psychiatry*, 52, 916–924.
- Colder, C.R., Lochman, J.E., & Wells, K.C. (1997). The moderating effects of children's fear and activity level on relations between parenting practices and child symptomatology. *Journal of Abnormal Child Psychology*, 25, 251–263.
- Conger, R.D., Conger, K.J., Elder, G.H., Lorenz, F.O., Simons, R.L., & Whitbeck, L.B. (1992). A family process model of economic hardship and adjustment of early adolescent boys. *Child Development*, 63, 526–541.
- Conger, R., Ge, X., Elder, G.H., Lorenz, F.O., & Simon, R.L. (1994). Economic stress, coercive family process, and developmental problems of adolescents. *Child Development*, 65, 541–561.
- Conger, R., Wallace, L., Sun, Y., Simon, R., McLoyd, V., & Brody, G. (2002). Economic pressure in African American families: A replication and extension of the family stress model. *Developmental Psychology*, 38, 179–193.

- Connell, A., & Goodman, S.H. (2002). The association between psychopathology in fathers versus mothers and children's internalizing and externalizing behavior problems: A meta-analysis. *Psychological Bulletin*, *146*, 746–773.
- Cowan, C.P., & Cowan, P.A. (2005). Two variations of a preventive intervention for couples: Effects on parents and children during the transition to elementary school. In P.A. Cowan, C.P. Cowan, J. Ablow, V.K. Johnson, & J. Measelle, (Eds.), *The family context of parenting in children's adaptation to elementary school* (pp. 277–312). Mahwah, NJ: Lawrence Erlbaum.
- Cox, M., & Paley, B. (1997). Families as systems. *Annual Review of Psychology*, *48*, 243–267.
- DiLalla, L.F. (2002). Behavior genetics of aggression in children: Review and future directions. *Developmental Review*, *22*, 593–622.
- Dishion, T.J., Shaw, D.S., Connell, A., Gardner, F., Weaver, C., & Wilson, M. (2008). The family check-up with high risk indigent families: Preventing problem behavior by increasing parents' positive behavior support in early childhood. *Child Development*, *79*, 1395–1414.
- Easterbrooks, M.A., & Emde, R.N. (1988). Marital and parent-child relationships: The role of affect in the family system. In R.A. Hinde, & J. Stevenson-Hinde, (Eds.), *Relationships within families: Mutual influences* (pp. 83–103). Oxford, England: Carendon.
- Elder, G.H., Conger, R.D., Foster, E.M., & Ardelt, M. (1992). Families under economic pressure. *Journal of Family Issues*, *13*, 5–37.
- Elliott, D.S., Huizinga, D., & Ageton, S.S. (1985). *Explaining delinquency and drug use*. Beverly Hills, CA: Sage.
- Erel, O., & Burman, B. (1995). Interrelatedness of marital relations and parent-child relations: A meta-analytic review. *Psychological Bulletin*, *118*, 108–132.
- Ganiban, J.M., Ulbricht, J.A., Spotts, E.L., Lichtenstein, P., Reiss, D., Hansson, K., & Neiderhiser, J.M. (2009). Understanding the role of personality in explaining associations between marital quality and parenting. *Journal of Family Psychology*, *23*, 646–660.
- Gault-Sherman, M. (2011). It's a two-way street: The bidirectional relationship between parenting and delinquency. *Journal of Youth and Adolescence*, 1–25. doi:10.1007/s10964-001-9656-4.
- Goldberg, W.A., & Easterbrooks, M.A. (1984). The role of marital quality in toddler development. *Development and Psychopathology*, *20*, 504–514.
- Gudmunson, C., Beutler, I., Israelsen, C., McCoy, J., & Hill, E. (2007). Linking financial strain to marital instability: Examining the roles of emotional distress and marital interaction. *Journal of Family and Economic Issues*, *28*, 357–376.
- Harold, G.T., Shelton, K.H., Goeke-Morey, M.C., & Cummings, E.M. (2004). Marital conflict, child emotional security about family relationships and child adjustment. *Social Development*, *13*, 350–376.
- Hicks, B.M., Krueger, R.F., Iacono, W., McGue, M., & Patrick, C.J. (2004). Family transmission and heritability of externalizing disorders. *Archives of General Psychiatry*, *61*, 922–928.
- Horwitz, B.N., Ganiban, J.M., Spotts, E.L., Lichtenstein, P., Reiss, D., & Neiderhiser, J.M. (2010). The role of aggressive personality and family relationships in explaining family conflict. *Journal of Family Psychology*, *25*, 174–183.
- Jacobson, K.C., Prescott, C.A., & Kendler, K.S. (2002). Sex differences in the genetic and environmental influences on the development of antisocial behavior. *Development and Psychopathology*, *14*, 395–416.
- Katz, L.F., & Gottman, J.M. (1996). Spillover effects of marital conflict: In search of parenting and coparenting mechanisms. *New Directions for Child and Adolescent Development*, *1996*, 57–76.
- Krishnakumar, A., & Buehler, C. (2000). Interparental conflict and parenting behaviors: A meta-analytic review. *Family Relations*, *49*, 25–44.
- Lamb, M.E. (1997). Influence of the father on the development of the child. *Enfance*, *3*, 337–349.
- Lamb, M.E. (2004). *The role of the father in child development*, 4th edn. Hoboken, NJ: John Wiley & Sons.
- Leve, L.D., Neiderhiser, J.M., Ge, X., Scaramella, L.V., Conger, R.D., Reid, J.B., ... & Reiss, D. (2007). The Early Growth and Development Study: A prospective adoption design. *Twin Research and Human Genetics*, *10*, 84–95.
- Leve, L.D., Neiderhiser, J.M., Scaramella, L.V., & Reiss, D. (2008). The Early Growth and Development Study: Using the prospective adoption design to examine genotype-environment interplay. *Acta Psychologica Sinica*, *40*, 1106–1115.
- Levenson, M.R., Kiehl, K.A., & Fitzpatrick, C.M. (1995). Assessing psychopathic attributes in a non-institutionalized population. *Journal of Personality and Social Psychology*, *68*, 151–158.
- Margolin, G., Christensen, A., & John, R.S. (1996). The continuance and spillover of everyday tensions in distressed and non-distressed families. *Journal of Family Psychology*, *10*, 304–321.
- McNeil, T., & Sjostrom, K. (1995). *McNeil-Sjostrom Scale for obstetric complications*. Malmö, Sweden: Lund University.
- Melby, J.N., & Conger, R.D. (2001). The Iowa Family Interaction Rating Scales: Instrument summary. In P.K. Kerig, & K.M. Lindahl, (Eds.), *Family observational coding systems: Resources for systemic research* (pp. 33–58). Mahwah, NJ: Erlbaum.
- Melby, J.N., Conger, R.D., Ge, X., & Warner, T. (1995). The use of structural equation modeling in assessing the quality of marital observations. *Journal of Family Psychology*, *9*, 280–293.
- Moffitt, T.E., & Caspi, A. (2001). Childhood predictors differentiate life-course persistent and adolescence-limited antisocial pathways among males and females. *Development and Psychopathology*, *13*, 355–375.
- Nagin, D.S., & Tremblay, R.E. (2001). Parental and early childhood predictors of persistent physical aggression in boys from kindergarten to high school. *Archives of General Psychiatry*, *58*, 389–394.
- Olds, D., Henderson, C.R., Cole, R., Eckenrode, J., Kitzman, H., & Luckey, D. (1998). Long-term effects of nurse home visitation on children's criminal and antisocial behavior: 15-year follow-up of a randomized controlled trial. *Journal of the American Medical Association*, *280*, 1238–1244.
- Rhee, S.H., & Waldman, I.D. (2002). Genetic and environmental influences on antisocial behavior: A meta-analysis of twin and adoption studies. *Psychological Bulletin*, *128*, 490–529.
- Rhoades, K., Leve, L.D., Harold, G.T., Neiderhiser, J.M., Shaw, D., & Reiss, D. (2011). Longitudinal pathways from marital hostility to child anger during toddlerhood: Genetic susceptibility and indirect effects via harsh parenting. *Journal of Family Psychology*, *25*, 282–291.
- Robila, M., & Krishnakumar, A. (2006). Economic pressure and children's psychological functioning. *Journal of Child and Family Studies*, *15*, 433–441.
- Sanders, M.R., Markie-Dadds, C., Tully, L.A., & Bor, W. (2000). The Triple P-Positive Parenting Program: A comparison of enhanced, standard, and self-directed behavioral family intervention for parents of children with early onset conduct problems. *Journal of Consulting and Clinical Psychology*, *68*, 624–640.
- Scaramella, L.V., & Conger, R.D. (2003). Intergenerational continuity of hostile parenting and its consequences: The moderating influence of children's negative emotional reactivity. *Social Development*, *12*, 420–439.
- Shaw, D.S., Dishion, T.J., Supplee, L., Gardner, F., & Arnds, K. (2006). Randomized trial of a family-centered approach to

- the prevention of early conduct problems: 2-year effects of the family check-up in early childhood. *Journal of Consulting and Clinical Psychology*, 74, 1–9.
- Shaw, D., & Gross, H. (2008). What we have learned about early childhood and the development of delinquency. In A.M. Liberman, (Ed.), *The long view of crime: A synthesis of longitudinal research* (pp. 79–127). Malmö, Sweden: Springer.
- Shelton, K.H., & Harold, G.T. (2008). Interparental conflict, negative parenting, and children's adjustment: Bridging links between parents' depression and children's psychological distress. *Journal of Family Psychology*, 22, 712–724.
- Sigvardsson, S., Cloninger, C.R., Bohman, M., & von Knorring, A.-L. (1982). Predisposition to petty criminality in Swedish adoptees: III. Sex differences and validation of the male typology. *Archives of General Psychiatry*, 39, 1248–1253.
- Steiger, M. (1990). Structural model evaluation and modification: An interval estimation approach. *Multivariate Behavioral Research*, 25, 173–180.
- Talbot, J., & McHale, J. (2004). Individual parental personality traits moderate the relationship between marital and coparenting quality. *Journal of Adult Development*, 11, 191–205.
- Van Zeijl, J., Mesman, J., Van IJzendoorn, M.H., Bakermans-Kranenburg, M.J., Juffer, F., Stolk, M.N., ... & Alink, L.R.A. (2006). Attachment-based intervention for enhancing sensitive discipline in mothers of 1- to 3-year-old children at risk for externalizing behavior problems: A randomized controlled trial. *Journal of Consulting and Clinical Psychology*, 76, 994–1005.
- Webster-Stratton, C., & Hammond, M. (1997). Treating children and early-onset conduct problems: A comparison of child and parent training interventions. *Journal of Consulting and Clinical Psychology*, 65, 93–109.
- Zisser, A., & Eyberg, S.M. (2010). Treating oppositional behavior in children using parent-child interaction therapy. In A.E. Kazdin, & J.R. Weisz (Eds.), *Evidence-based psychotherapies for children and adolescents*, 2nd edn (pp. 179–193). New York: Guilford.

Accepted for publication: 10 November 2011