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Positive and Negative Interactions Observed Between Siblings: Moderating Effects for Children Exposed to Parents' Conflict

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Abstract

This study investigated links between interparental conflict appraisals (specifically threat and self-blame), sibling relationship quality (positive and negative dimensions), and anxiety in sibling pairs comprised of an adolescent and a younger sibling close in age. Sibling relationship quality was measured through behavioral observation. Links between self-blame and anxiety were moderated by sibling relationship quality. In older siblings, positive behavior with a sibling was associated with an attenuated relation between self-blame and anxiety. A paradoxical moderating effect was found for negative interactions; for both younger and older siblings, a relation between self-blame and anxiety was weakened in the presence of sibling negativity. Results offered support for theorized benefits of sibling relationship quality in helping early adolescents adjust to conflict between parents.

Keywords

behavioral observation; interparental conflict; siblings

In the past three decades, investigators have made the case for a link between parents' relationship conflict and the anxieties of their children (Buehler et al., 1997; Cummings & Davies, 2002; Davies & Cummings, 1994; Emery, 1982). Interparental conflict encompasses an array of behaviors, ranging from normative forms of verbal disagreement to more severe psychological and physical aggression. When examining exposure to interparental conflict, studies tend to focus on one designated child in the family. However, this approach ignores differences among siblings. Although siblings are exposed to the same source of interparental conflict, they may vary in how they understand it, and these subjective appraisals may produce differential levels of anxiety. As a further complication, some research indicates that interparental conflict has deleterious effects on the sibling relationship itself (e.g., Dunn, Deater-Deckard, Pickering, & Golding, 1999). Scant research has examined possible interactions between interparental conflict and sibling relationship dimensions in predicting adjustment (e.g., Caya & Liem, 1998), although recent findings indicate that sibling relationship quality helps differentiate patterns of adjustment to more severe forms of interparental conflict (Piotrowski, 2011). The present study addresses this gap with an underexamined population, adolescents and their siblings.

A limitation of sibling research is the use of questionnaire measures. A common investigative practice is to have children report on positive and negative aspects of the sibling relationship, such as warmth and conflict, with some findings suggesting that the former is helpful whereas the latter is harmful (e.g., Linares, Li, Shrout, Brody, & Pettit, 2007; Stocker, Burwell, & Briggs, 2002). At the same time, researchers acknowledge that sibling relationships are typified by a mixture of frequent, at times intense, positive and negative interactions (Straus, Gelles, & Steinmetz, 2006), and that sibling conflict may confer benefits by offering valuable practice in the development of interpersonal skills (Brody, 1998). Behavioral observation evades the social desirability and other response biases inherent to self-report that may contribute to a false polarity between positive and negative sibling relationship dimensions. Through the observation of playing and fighting behaviors, with their requisite affection and arguing, it is possible to more objectively assess the balance of positive and negative aspects of a sibling pair's relationship. The present study utilized a macro-coding approach to measure sibling interaction behaviors that were positive (validation, engagement, warmth, cooperation) and negative (criticism and conflict).

The study of siblings presents logistical and quantitative challenges. For example, the wide variability across families in structural variables such as sibling gender and age spacing can present additional complexity to a study's core questions. However, given that for the majority of families the presence of multiple children is the norm, studies of siblings offer the chance to measure differential impacts of a single stressor on distinct children in a shared environment. Children in the same family show variability in how much interparental conflict they report as well as their subjective appraisals of the conflict, differences that have been found to relate to a corresponding variability in internalizing symptoms (Richmond & Stocker, 2003; Skopp, McDonald, Manke, & Jouriles, 2005). Given longitudinal evidence that a large proportion of children exposed to interparental conflict do not evince more adjustment problems than those without this experience (Criss, Pettit, Bates, Dodge, & Lapp, 2002), sibling studies provide an opportunity to consider individual differences that may contribute to resilience. A developmental psychopathology framework contends that it is important to identify not only risk factors but also protective factors that distinguish the variable trajectories associated with a life stressor such as interparental conflict (Sameroff, 2000). In this study we examined two sources of heterogeneity in anxiety symptoms: sibling relationship quality and subjective appraisals of interparental conflict including threat and self-blame.

Sibling Relationships, Interparental Conflict Appraisals, and Anxiety

An appreciable number of studies have examined sibling relationships in the context of interparental conflict, but most have focused on the phenomenon of spillover, an idea attributed to family systems theory (Minuchin, 1985). In this view, conflict between parents permeates other family relationships such as those between siblings. Some investigations have found a prospective link between marital discord and sibling conflict (Brody, Stoneman, McCoy, & Forehand, 1992; Dunn et al., 1999). Positive dimensions of the sibling relationship (e.g., affection, warmth, and helping) were either unexamined or not found to be associated with interparental conflict. For example, in two studies employing behavioral observation, children with maritally dissatisfied or divorced parents exhibited more negative behavior with a sibling, but their level of positive behaviors appeared unaffected (Erel, Margolin, & John, 1998; MacKinnon, 1989). These spillover findings have provided a valuable first step, but more investigation is needed of positive and protective influences of the sibling relationship in the context of interparental conflict.

Given that having a positive sibling relationship is associated with lower levels of internalizing symptoms in children exposed to a variety of life stresses (Gass, Jenkins, &

Dunn, 2007; Waite, Shanahan, Calkins, Keane, & O'Brien, 2011), it is also possible that a positive sibling relationship influences the relation between interparental conflict and anxiety. Little research has addressed this question. Two retrospective studies with college students offer evidence that positive dimensions of siblinghood serve a buffering role for children of divorced parents (Bush & Ehrenberg, 2003; Caya & Liem, 1998) and an early study suggested that merely having a sibling was associated with fewer emotional problems in children whose parents were experiencing marital disharmony (Jenkins & Smith, 1990). More generally, positive sibling relationships have been found to predict desirable outcomes in children, including fewer anxiety symptoms (Pike, Coldwell, & Dunn, 2005; Richmond, Stocker, & Rienks, 2005).

It is similarly important to know whether the association between interparental conflict and children's anxiety is influenced by negative sibling behavior. Negative interactions are ubiquitous in most sibling relationships, and are a significant source of interpersonal conflict as youth enter adolescence (Furman & Buhrmester, 1985a), but their perceived meaning for the siblings and their implications for mental health are not well understood. Behaviors experienced as highly aversive in other relationships, such as name-calling, teasing, and taunting are common and perhaps unremarkable in their impact when they occur between siblings. In more extreme forms, actual sibling violence and assault have been associated with later emotional maladjustment (reviewed in Caffaro, 2011). However, the verbal negativity and physical jostling that are readily observed between siblings, though temporarily annoying, may also communicate a valuing of the other person. As yet, it is unknown whether negative interaction behaviors in the sibling relationship moderate the impact of interparental conflict on children's anxiety. It is possible that negative sibling interactions exacerbate the anxiety associated with interparental conflict, producing a "double whammy" (Hughes, Parkinson, & Vargo, 1989). Another possibility is that negative sibling interactions act as a sort of inoculation, i.e., a small, non-dangerous exposure to sibling conflict that lessens the distress associated with observing conflict between one's parents.

At the individual level, an important predictor of anxiety symptoms are children's subjective appraisals of interparental conflict. Skopp and colleagues (2005) found that differences in siblings' internalizing symptoms were related to differential levels of children's self-blame (how responsible they believed they were for the conflict) and perceived threat (how damaging they believed the conflict might be to the family). Based on a cognitive-contextual framework, these interparental conflict appraisals have been shown to mediate and moderate associations with anxiety (Cummings, Davies, & Simpson, 1994; Grych, Fincham, Jouriles, & McDonald, 2000; Kerig, 1998). Although the present study also measured the self-reported quantity of children's exposure to interparental conflict, these "conflict properties" were expected to be less predictive of outcomes compared to subjective appraisals. This view is consistent with past findings that, compared to conflict properties, self-blame and perceived threat account for more individual differences in siblings' adjustment to interparental conflict (Stocker & Youngblade, 1999; Skopp et al., 2005). The present study examined anxiety as an outcome because it is so often implicated in studies of interparental conflict. A recent meta-analysis reported that for perceived threat and self-blame, the highest effect sizes were typically for internalizing symptoms ($d = .36$ for perceived threat and $.40$ for self-blame; Rhoades, 2008).

The Present Study

The study reported here had several goals and hypotheses. First, in a replication of past findings, we hypothesized that interparental conflict appraisals of perceived threat and self-blame would be associated with child anxiety. Second, we expected that positive sibling

interaction behaviors would be associated with better adjustment. In particular, we hypothesized that observed sibling positivity would be inversely associated with anxiety, and that positive behaviors would interact with interparental conflict appraisals such that the appraisal-anxiety link would be weaker among siblings with more observed positivity. Third, we hypothesized that more negative interparental conflict appraisals would be related to more negative sibling interaction behaviors and that observed sibling negativity would moderate an association between interparental conflict appraisals and anxiety. Although, to our knowledge, observed sibling negativity has not been tested previously as a moderator of this association, we hypothesized that children with a more negative sibling relationship would display a stronger association between interparental conflict appraisals and anxiety, given past findings that have implicated sibling conflict as a predictor of anxiety in early adolescents (Stocker et al., 2002). Effects were examined using dyadic analyses that accounted for non-independence of siblings' data while testing distinct effects for younger and older siblings.

Method

Participants

Along with their parents, the participating 52 sibling pairs were part of the third wave of a larger longitudinal study. Families were recruited from a major metropolitan area through newspaper advertising, flyers, and word-of-mouth to take part in a study of family coping with day-to-day stressors and conflict. Original inclusion criteria specified only that family members be willing to complete measures in English, that parents be married or regularly cohabiting, and that they have a child aged 9 or 10 at the study's inception. To be included in the present study, the original participating child needed to have a sibling who was available to participate and within five years of age. Of the total 103 families who participated in the larger project at this wave, 51 were excluded from the present study for the following reasons: 25 did not have children close enough in age to the original participating child, 15 had only one child, four had eligible children of whom one sibling was unavailable to participate, two refused consent for the sibling task, two completed measures from home with no sibling task, and three had sibling tasks that could not be used because of recording errors. All study procedures were approved by the Institutional Review Board of the university where the research was conducted. Written assent was obtained from both siblings per family, in addition to signed consent from their parents.

Most sibling pairs came from families with three or fewer children ($n = 33$; 63.5%) whereas 19.2% ($n = 10$) had five or more. Older siblings, on average, were aged 13.81 ($SD = 1.60$, ranging from 11 to 17), whereas younger siblings' mean age was 11.33 ($SD = 1.55$, ranging from 8 to 14). Nineteen pairs were comprised of older sisters, of whom nine had younger brothers and 10 had younger sisters; 32 consisted of older brothers, of whom 20 had younger sisters and 12 had younger brothers. There was one pair of girl-boy twins; after a coin toss, the girl was assigned as the "younger" sibling for the purpose of analyses. Most of the older siblings ($n = 34$; 65.4%) were also the first-born child in the family; seven were second-born, seven were third-born, two were fourth-born, and two were fifth-born. All younger siblings were the next-born child. For all pairs, the original participating child was reported to be biologically related to both parents; this information was not collected for his or her sibling. In 51 out of 52 families, the other sibling was born during the time span of the parents' relationship, suggesting that half-siblings were rare in this sample. Participating children came from ethnically and socioeconomically diverse backgrounds. The sample was 36.5% Hispanic or Latino, 30.8% Non-Hispanic White, 15.4% African-American or Black, 5.8% Asian or Pacific Islander, and 11.5% of another ethnic category or mixed ethnicity. Median household income was \$80,000, with 15.7% of families earning less than \$30,000, 15.7% earning \$30,000–\$60,000, 35.3% earning \$61,000–\$100,000, and 33.3% earning

more than \$100,000. On average, mothers were aged 41.40 ($SD = 5.20$), fathers were aged 43.27 ($SD = 6.58$), and the two had been in a relationship for 16.86 years ($SD = 3.72$). Descriptive statistics of the sample are presented in Table 1.

Procedures

Parents visited the laboratory with their two children. Siblings were asked to participate in a video-recorded tower-building task, which was adapted from past work on cooperation and communication in married couples (J. Gottman, personal communication, September 9, 2002). Siblings were instructed to work together as a team to build their tallest possible tower out of ordinary but flimsy materials, including cellophane tape, drinking straws, rubber bands, construction paper, and pens. Siblings were allowed 15 minutes and were instructed that their towers would be measured and compared to the results of other participating children. Experimenters provided a warning when two minutes remained in the task. This novel but ecologically valid task was designed to elicit siblings' naturally playful and competitive interaction styles, including typical sibling behaviors such as bossiness, name-calling, and helping. The task was sufficiently unstructured to allow for wide-ranging sibling behaviors that represent both positive and negative dimensions of the sibling relationship.

Measures

Interparental conflict appraisals—Both younger and older siblings completed the commonly used and well-validated Children's Perceptions of Interparental Conflict (CPIC; Grych, Seid, & Fincham, 1992), which is comprised of three subscales with item responses on a 1 to 3 scale (*false*, *sometimes true*, *true*). Self-blame (sum of 9 items) assessed the child's own feelings of guilt and responsibility for interparental conflict (e.g., "I know I am to blame when my parents argue"). Perceived threat was summed from 12 items reflecting the child's fear about the consequences of interparental conflict (e.g., "When my parents argue, I worry that they might get divorced"). In the present sample, reliability alpha coefficients for younger and older siblings were .91 and .91 for self-blame and .74 and .82 for perceived threat. Conflict properties, the third subscale, was calculated from the sum of 19 items intended to capture frequency, intensity, and resolution of conflict, such as "I often see my parents arguing" and "My parents get really mad when they argue" ($\alpha = .93$ and .91).

Observed sibling relationship quality—A coding system was developed for the present study to assess positive and negative behaviors in the videotaped sibling interaction. The coding system consisted of seven codes, which were collapsed on an a priori basis into two dyad-level dimensions, observed positivity and observed negativity. Some codes were rated at the individual level whereas others were rated at the dyad level. Coders took into account the frequency and intensity of the behavior observed and rated the behavior on a 0 to 3 scale ranging from *none* to *a lot*. Each interaction was watched three times, once just to observe, next to code one sibling, and again to code the other; dyad-level codes were assigned during the third viewing. During each 15-minute task, codes were rated per five-minute interval resulting in three repeated measures for each code. Each interaction was coded separately by two trained undergraduate raters who were unfamiliar with study hypotheses, and their scores were averaged together. Inter-rater reliability was calculated with intra-class correlations per interval; these ranged .79–.85 for observed positivity and .83–.87 for observed negativity across the three time intervals, indicating good reliability. The repeated measures structure of the data set was maintained, resulting in three dyad-level scores per 15 minutes, for both observed positivity and observed negativity.

Observed positivity: This dimension was created from collapsing four codes. Coders assigned three of these at the individual level. Validation occurred when the child praised the sibling, such as with compliments or “high-fives.” Engagement was scored when the child displayed motivation and diligence in working with the sibling. Warmth reflected use of affectionate responses to the sibling. A fourth code, cooperation, was scored per dyad and was based on the pair’s degree of collaboration and communication. The six individual scores and one dyadic score were averaged to form one observed positivity score. Inter-item reliability (Cronbach’s alpha) coefficients, computed at the interval level, ranged from .69 to .75.

Observed negativity: Three codes were collapsed to create this variable. Two of these codes were rated at the individual level. Criticism of the sibling applied to statements such as, “You’re stupid!” whereas criticism of ideas was scored for remarks such as, “That won’t work.” A third conflict code was scored dyadically based on physical aggression and arguing between the dyad. The observed negativity score was computed by averaging the four individual scores and one dyadic score per five-minute interval ($r = .76-.79$).

Self-reported sibling relationship quality—To lend support to the validity of the coded sibling interaction behavior measure, similar constructs were assessed through self-report. Participants completed the commonly used Sibling Relationship Questionnaire (SRQ; Furman & Buhrmester, 1985b), yielding two scores, warmth/closeness and conflict, which were based on the SRQ authors’ prior factor analysis. Warmth/closeness was the mean of 14 items assessing helping, affection, companionship, similarity, intimacy, and admiration between siblings ($r = .92$). Conflict was averaged from 6 items on arguing, competition, and hostility ($r = .77$). Each child was asked how much his or her sibling relationship featured the given dimension on a five-point scale (*hardly at all to extremely much*).

Anxiety—All children completed the 20-item trait scale on the State Trait Anxiety Inventory for Children (STAIC; Spielberger, 1973). This measure was designed to differentiate characteristics of children’s anxiety that are stable, as opposed to momentary changes that might be related to the assessment situation. Items included “I am secretly afraid” and “I worry too much.” These were scored on a 1 to 3 scale (*hardly ever, sometimes, often*). Reliability alpha coefficients in the present sample for younger and older siblings were .90 and .89, respectively. We used child reports of anxiety because of previous findings that parents can have difficulty providing information about children’s inner states, such as anxiety (Comer & Kendall, 2004).

Sex, birth order status, and age—Dichotomous variables were effect coded. Sex was $-.5$ for boys and $.5$ for girls. This approach was also used to code the sex of each participant’s sibling to use as a covariate in analyses. Two additional variables captured birth order status: first-born status was coded $.5$ for children who were the oldest among all their siblings (otherwise it was $-.5$), and younger-older status was assigned $-.5$ for younger siblings and $.5$ for older siblings. Age difference between siblings was a continuous variable.

Analytic Approach

In preliminary analyses, means, standard deviations, and correlations were computed for all study variables. Separate statistics were prepared for younger and older siblings, as well as for siblings in combination or, as in the cases of observed positivity and observed negativity, as a dyad. Correlations were used to assess basic associations between constructs and to examine possible influences of other variables such as age, age difference, sex, and sibling’s sex. Substantive analyses were performed in Stata 11 (StataCorp, 2010) using a nested data

structure, with the two siblings and repeated measures of observed positivity and observed negativity nested within dyads. Multiple regression analyses were conducted using clustered robust standard errors. This multilevel modeling technique allowed for analysis of the full sample size while correcting for non-independence of siblings' data. All continuous variables were centered prior to computing interaction terms. Effects that were specific to younger or older siblings were assessed in all models by including interaction terms in which younger-older status was multiplied by predictor variables being tested. To examine the effect of sex composition in the dyad, a Sex \times Sibling's Sex interaction term was included. Positive skew in several of the predictor variables (perceived threat, self-blame, and observed negativity) were corrected through log transformations. However, given that this step did not significantly alter results, analyses with the untransformed variables are presented below.

Results

Preliminary Analyses

Descriptive statistics are presented in Table 1, including Pearson's r correlations between older and younger siblings on study variables. Older siblings were more likely to be boys and younger siblings more likely to be girls, $\chi^2(1) = 5.55, p = .019$. Younger and older siblings reported similar mean levels of conflict properties, self-blame, perceived threat, and anxiety. Zero-order correlations between siblings indicated low agreement on perceived threat and a non-significant association on ratings of self-blame. A moderate correlation existed between siblings on conflict properties. Mean levels of anxiety were similar when comparing younger and older siblings, but within sibling pairs, older and younger siblings' anxiety was not related to each other. Table 2 presents bivariate associations among variables within younger and older siblings separately. Being female was correlated with age in older siblings. Observed positivity and observed negativity were weakly and non-significantly associated, $r = -.11, p = .43$. Overall patterns of coefficients were similar across younger and older siblings, indicating basic replication of these associations. In T tests, older siblings who were first-born in their families did not differ on study variables from those who were not born first, all t s $< 1.50, p$ s $> .14$. Conflict properties, self-blame, and perceived threat were moderately inter-correlated. Some bivariate results provided initial support for hypothesized relations. These included moderate correlations between interparental conflict appraisals and anxiety, as well as an inverse association between observed positivity and younger siblings' anxiety, indicating a protective effect for this group. Due to these associations, the models tested below initially included the following covariates: age, age difference, first-born status, sex, sibling's sex, and Sex \times Sibling's Sex. These were later dropped if their inclusion did not significantly affect the associations of interest.

Validity Analysis

Separate correlation analyses were conducted to assess the relations between coded behavioral observation and self-report measures of sibling relationship quality. Observed positivity was expected to be positively correlated with reported warmth/closeness and negatively correlated with reported sibling conflict, whereas observed negativity was expected to have the opposite associations. Coefficients were generally weak to moderate but consistent with expected associations. Significant associations were found: between observed positivity and older siblings' reports of warmth/closeness, $r = .27$; between observed negativity and reports of warmth/closeness, $r = -.29$ (younger siblings), $r = -.30$ (older siblings); and, between observed negativity and younger siblings' reports of conflict, $r = .32$ (all one-tailed p s $< .05$). In addition, self-reported warmth/closeness was strongly inversely correlated with self-reported conflict, $r = -.55$ (younger siblings), $r = -.46$ (older

siblings), $p_s < .001$. It therefore appeared that the coded behavioral observation measure captured overlapping but also distinct information about sibling relationship quality as compared to the self-report measure. Also, unlike the coded measure, the self-report measure presented a more polarized view of positive and negative sibling relationship dimensions, i.e., siblings who endorsed high levels on one dimension tended to endorse low levels on the other.

Associations Between Interparental Conflict Appraisals and Anxiety

We expected to find a direct link between interparental conflict appraisals and anxiety. Results demonstrated this effect consistently for both younger and older siblings. Due to collinearity, we tested self-blame and perceived threat in separate models. Regression models were run with covariates, younger-older status, the appraisal term, and a younger-older status by appraisal interaction term. None of the interaction terms, nor the sex, age, or first-born status variables were significant in models, and therefore were dropped. Anxiety was associated with perceived threat, $\beta = .56, p < .001$, with a small additional main effect for being the older sibling, $\beta = .17, p = .043$, meaning that older sibling status was associated with higher anxiety when perceived threat was held constant, $F(2, 51) = 26.90, R^2 = .30, p < .001$. Anxiety was related to self-blame, $\beta = .33, p = .001, F(1, 51) = 13.36, R^2 = .11, p = .001$. In a model including younger-older status, this predictor was not significant, $\beta = .05, p = .52$.

Main and Interactive Effects of Observed Sibling Positivity

First, we tested the hypothesis that observed sibling positivity would be inversely associated with anxiety. Covariates, younger-older status, observed positivity, and Younger-Older Status \times Observed Positivity term were entered into the model. After the non-significant covariates, older-younger status, and interaction terms were trimmed from the model, only a main effect for observed positivity remained. Children with more observed sibling positivity reported less anxiety, $\beta = -.22, p = .014, F(1, 51) = 6.50, R^2 = .05, p = .014$.

Next, two separate models, one for self-blame and one for perceived threat, were specified to test the interactive effects of observed positivity with interparental conflict appraisal. Models consisted of covariates, younger-older status, observed positivity, appraisal, and all two-and three-way interaction terms for younger-older status, observed positivity, and appraisal. Results for self-blame are shown in Table 3. Sex and age were kept in the model because a main effect of being female was significant only when age was included and because this pair of variables contributed significantly to variance explained, $F(2, 51) = 3.88, p = .027$. Main effects were found for self-blame and observed positivity. At average levels of all other variables, children were: more likely to report anxiety as their levels of self-blame increased; and, independently of self-blame, less likely to report anxiety as their levels of observed positivity with a sibling increased. Additionally, a significant Younger-Older Status \times Self-Blame \times Observed Positivity interaction was found. In post-hoc analyses recommended by Dawson and Richter (2006), the three-way interaction was plotted at high and low levels of self-blame and observed positivity (1 *SD* above and below the mean) for younger and older siblings. Simple slopes were calculated to determine which bivariate associations significantly differed from zero at these levels. These plots are presented in Figure 1, and reveal that distinct interaction effects occurred for younger and older siblings with regards to self-blame and observed positivity. For younger siblings, less positive behavior with a sibling corresponded with a high and flat-line association with anxiety, regardless of level of self-blame, $B = .09, p = .77$. This result was consistent with the inverse association found between observed positivity and anxiety in only younger siblings previously described in Table 2, and may also reflect a ceiling effect, i.e., increased levels of self-blame do not contribute to greater anxiety for younger siblings who already show less

positive behavior with a sibling. In contrast, for older siblings, a buffering effect was observed such that, for youth who had more observed positivity with a sibling, there was a weakened and non-significant relation between self-blame and anxiety, $B = .88$, $p = .06$, but for those with less observed positivity, there continued to be a direct association, $B = 1.55$, $p = .003$.

No three-way interaction was observed for Younger-Older Status \times Perceived Threat \times Observed Positivity, nor were there any significant two-way interactions. After non-significant effects were dropped from the model, there was a direct association between perceived threat and anxiety, $\beta = .54$; $p < .001$, a small main effect for younger-older status, $\beta = .17$, $p = .048$, and a non-significant main effect for observed positivity, $\beta = -.16$, $p = .07$; $F(3, 51) = 20.86$, $R^2 = .33$, $p < .001$. Therefore, interparental conflict threat appraisal continued to have a moderate relation with anxiety, even after observed sibling positivity was taken into account.

Main and Interactive Effects of Observed Sibling Negativity

We hypothesized that observed sibling negativity would be directly associated with children's appraisals of interparental conflict. Covariates, younger-older status, appraisal, and a younger-older status by appraisal interaction term were entered into a model predicting observed negativity. Consistent with correlation analyses presented in Table 2, no significant associations were found between these variables and observed negativity. An additional analysis using conflict properties instead of appraisal was conducted, which yielded no significant effects. There was no evidence that siblings who reported higher self-blame, perceived threat, or higher levels of exposure to interparental conflict had more negative interactions with a sibling.

We also sought to test the hypothesis that higher observed negativity would potentiate an association between interparental conflict appraisals and anxiety. Similar to the observed positivity-as-moderator models discussed above, we entered covariates, younger-older status, interparental conflict appraisal, observed negativity, and interaction terms into a model predicting anxiety. Results for self-blame are shown in Table 4. After non-significant terms were trimmed from the model, there was a significant Self-Blame \times Observed Negativity interaction. To aid in interpretation, the interaction was plotted at high and low levels of self-blame and observed negativity (1 *SD* above and below the mean) and simple slopes at these levels were calculated. The interaction effect that emerged in this analysis was contrary to expectation. Rather than being associated with a stronger link between self-blame and anxiety, higher observed negativity was associated with a weaker link. As Figure 2 illustrates, for children who had more negative behaviors with a sibling, there was no significant relation between self-blame and anxiety, $B = .23$, $p = .41$. In contrast, for children represented by the low observed negativity slope, there was a positive association between self-blame and anxiety, $B = 1.22$, $p < .001$.

In a parallel analysis with perceived threat, observed negativity, and younger-older status, there were no significant interaction effects once non-significant effects were trimmed. In the final model, anxiety was related to being an older sibling, $\beta = .17$, $p = .043$, and to perceived threat, $\beta = .56$, $p < .001$, but not to observed negativity, $\beta = -.03$, $p = .67$; $F(3, 51) = 19.22$, $R^2 = .30$, $p < .001$.

Discussion

The sibling relationship is one of the first and most enduring in many people's lives. In the context of a well-known stressor, interparental conflict, siblings may look to one another for signs of how to adjust while taking into account their own individual interpretations of

events. This study is the first to examine how child anxiety in the context of interparental conflict may be moderated by the quality of siblings' observed interactions. Moderation consistent with a buffering effect was found for both positive and negative sibling behavior. The clearest evidence of a hypothesized buffering effect for positive interaction behaviors was found for older siblings; they did not exhibit a significant association between self-blame and anxiety when their sibling interaction was highly positive. Although this moderation was not observed for younger siblings, there did remain an inverse association between positive interaction behaviors and anxiety, which persisted after accounting for self-blame. Indeed, for both younger and older siblings who reported an average level of self-blame for interparental conflict, they were less likely to report anxiety if they had more positive interaction behaviors with a sibling. These effects highlight the distinct ways that a positive relationship with a sibling may be beneficial, not only as a buffer of risk posed by interparental conflict, but also as a resource that confers benefits independently of this risk and additively with other compensatory factors (Masten, 2001). Contrary to expectation, negative sibling interaction behaviors also had a buffering effect. For children who experienced more negative behavior with their siblings, there was an attenuated link between self-blame and anxiety. These findings underscore the value of the sibling relationship as a source of resilience. In more conflictual families, high engagement with a sibling, whether positive or negative, may help counterbalance the effects of responsibility and guilt that children feel in response to parental discord.

The mechanisms of this protective sibling effect remain to be better understood. Theories of emotional security hold that children sometimes react to parents' fighting by seeking ways to control and reduce distressing conflict (Davies & Cummings, 1994). Ultimately, children's attempts to distract parents from their disagreements (e.g., by "acting out") are ineffectual and may result instead in learned patterns of emotional and behavioral dysregulation. The sibling relationship offers a contrasting relationship dynamic, one in which children have a greater say in how interactions develop, and one in which conflict is less likely to lead to family dissolution. A close sibling relationship may thus offer a welcome distraction from parental disharmony and a safe context in which to negotiate interpersonal conflict, thus reducing children's reliance on more maladaptive coping strategies. This benefit may be especially salient for the older sibling who, of the two, may assume more responsibility in the dyad. Older siblings might receive a boost from highly engaged sibling interactions in which they have a greater sense of influence or care-taking in the relationship. Indeed, in the present study, it was older siblings who appeared to be protected from self-blame-related anxiety when their sibling interaction was positive. Other research has also found that older siblings receive greater adjustment benefits from the sibling relationship compared to their younger siblings (Pike et al., 2005; Soli, McHale, & Feinberg, 2009), including in the context of interparental violence (Piotrowski, 2011).

The present findings contribute to a small but recently growing literature on the role of sibling relationships in adolescence (see Feinberg, Solmeyer, & McHale, 2012). Studies of observed sibling behavior seldom include adolescents, and less is known about how such interaction behaviors relate to family stressors and adjustment. Adolescence brings changes to the sibling relationship that may change the meaning and impact of how siblings interact. Although adolescents are engaged in a process of seeking greater independence from their parents, they are nevertheless interconnected with their siblings in day-to-day family life. They may even have aspects of their sibling relationship that help them exercise autonomy, such as common experiences, language, or inside jokes, to which their parents are not privy. As siblings enter adolescence, the developmental differences between them become less drastic, resulting in a more equitable, balanced relationship (Buhrmester & Furman, 1990). The effects of positive and negative interaction behavior found in this study may be unique to this age group in part because the sibling relationship is transitioning out of childhood and

is beginning to resemble other symmetric relationships outside of the family such as those with peers.

In the present study, negative sibling interaction behaviors appeared to buffer an association between self-blame and anxiety. Although it may seem counterintuitive that sibling negativity would serve a protective function, this finding echoes past work that has recognized potential benefits of sibling conflict (e.g., Brody, 1998). The negative behaviors observed in this study—e.g. name-calling, one-upmanship, bickering—should not be confused with the kind of malicious and unidirectional aggression that characterizes sibling violence and is tied to later emotional difficulties (Caffaro, 2011). Past studies have found unexpected positive or neutral associations between moderate sibling negativity and desirable adjustment outcomes (e.g., East & Khoo, 2005; Pike et al., 2005). These findings run counter to an implicit assumption in some clinical literature that children would benefit from fighting less with brothers and sisters (e.g., Kennedy & Kramer, 2008). Although tales of intense devotion or rivalry have characterized the sibling relationship narrative since antiquity (e.g., Artemis and Apollo, Cain and Abel, to name a few archetypes), the reality may not be so polarized; in day-to-day life, sibling interactions contain a mix of positive and negative dimensions (Buhmester, 1992). In the present study, this mixed nature was reflected by the lack of correlation between positive and negative sibling behavior when it was coded by an independent observer. (Indeed, this mixture may not be evident to the siblings themselves, given that on the self-report measure, positive and negative relationship dimensions were inversely correlated.) A moderate amount of sibling conflict may present adaptive advantages. For example, fighting with a sister or brother might help children learn strategies for how to manage interpersonal conflict (Brody, 1998; Katz, Kramer, & Gottman, 1992) and may help children understand that relationships can be characterized by both conflict and affection. Conflict might also help siblings set limits for each other regarding what is considered acceptable behavior (Raffaelli, 1992).

This study contributes to a body of research highlighting the range of reactions children may have when responding to the same stressor within a family. Consistent with past findings (Richmond & Stocker, 2003; Skopp et al., 2005), we found that inter-sibling correlations on subjective appraisals of threat and self-blame were low even though the more objective reports of amount of interparental conflict were moderately similar. Likewise, within sibling pairs, older and younger siblings' anxiety was not significantly correlated with each other. These results are consistent with past findings that siblings' adjustment reflects a combination of shared and non-shared genetic and environmental factors (Plomin, Asbury, & Dunn, 2001), and underscores the value of sibling research to identify sources of individual resilience in the face of a shared stressor. Additionally, given that appraisals appear to account for some of the variation in children's adjustment to interparental conflict (Skopp et al., 2005), it would be valuable for future research to assess the distinct perspectives of multiple children in a family when evaluating the impacts of conflict in the home. Interestingly, moderating effects were observed for self-blame but not threat-related linkages with anxiety. Indeed, threat appraisal maintained a robust association with anxiety in all analyses, regardless of the inclusion of a moderator variable. Past research has suggested that threat and self-blame appraisals, although related, may tap distinct cognitive and emotional phenomena; whereas threat elicits feelings of powerlessness in the face of the stressor, self-blame calls into question the child's own self-worth (Grych et al., 2000). In light of the current findings, it is possible that the emotional consequences of self-blame are more easily balanced by the countervailing influences of the sibling relationship, perhaps because it, too, has the potential to enhance or degrade a child's sense of self-worth. Future studies could examine this potential mechanism by assessing self-esteem and self-efficacy in the context of sibling interaction.

Limitations

Several limitations of the present study should be considered when interpreting these results. One limitation is that these data were all collected at the same time, thus limiting what can be stated about the direction of effects across variables. Another is that behavior was observed between siblings but not within the wider family. Although the task was able to characterize positive and negative interaction behaviors between siblings, it is unknown how these dimensions might influence or spill over into other family relationships, such as that between parents and children, and between parents themselves. Although negative sibling interaction behavior was unrelated to child anxiety (and even appeared to be a protective factor), there may be problematic correlates of this behavior that were not observed, such as increased parent-child conflict about sibling issues.

The sample size did not allow for analysis of contextual variables such as ethnicity, culture, and SES, although in contrast to much past research, the present sample was ethnically and socioeconomically diverse. Sibling relational processes may be especially relevant in cultural groups where family size is expected to remain large relative to national trends of decreasing household size, and cultural norms place high importance on family closeness, as in the case of Latinos (Day, 1996; Updegraff, McHale, Whiteman, Thayer, & Delgado, 2005). Notably, the participants in the present study were not drawn specifically from high-conflict families, such as in the shelter samples used in past studies (e.g., Skopp et al., 2005); however, selection effects may exist as with other studies in which families commit to participate in a longitudinal study requiring involvement of multiple family members.

The confounding of age and birth order is a frequent limitation in sibling research. Two-thirds of older siblings in this study were the first child born in their families. Although the present study did adjust statistically for first-born status while also examining differential effects for older versus younger siblings, a greater sampling of non-first-born older siblings would be needed to disentangle these effects. Sex and sex composition of the dyad were included as covariates in analyses, but a larger sample would likely be needed to detect significant effects of these, as well as to test interactive effects of sex with birth order and other predictors, such as sibling relationship quality. The present study did not examine differences due to family size or relationship quality among other combinations of siblings in the family. Designs that include multiple pairings of siblings from the same family are useful for disentangling individual-, sibling pair-, and family-level effects (Jenkins, Dunn, O'Connor, Rasbash, & Behnke, 2005). Finally, this study could not examine the potential influence of biological relatedness on the effects found here; future studies including adoptive and stepchildren would be helpful, not only to isolate genetic from environmental factors but also to examine other risk issues related to interparental conflict, namely divorce, remarriage, and the blending of families.

Conclusion

With its use of an ecologically valid sample of sibling behavior and focus on an early adolescent and his or her sibling, the present work adds meaningfully to current clinical knowledge about sibling relationships and adolescent development. There has been renewed interest in how sibling relationship quality contributes to not only children's normative development but also to children's adjustment to difficult life circumstances (Whiteman, Becerra Bernard, & Jensen, 2011). At the same time, there is surprisingly little empirical data about how sibling relations can be improved through clinical intervention. Given a dearth of intervention studies (cf. Kennedy & Kramer, 2008), recommendations directed towards practitioners have needed to draw heavily from a blend of theory and conventional wisdom, sometimes leading to contradictory inferences. For example, children are thought to benefit from helping a sibling in need (Kramer, 2011), but maladjustment may result

when some siblings assume too parent-like a role (Ehrenberg & Regev, 2011). Nevertheless, for many families, sibling caregiving duties are culturally normative and may offer advantages for adjustment (Watson & McGoldrick, 2011). Clearly there are numerous processes at work in the relationships of sisters and brothers, many of which defy easy generalizations. The present study contributes to a rekindled investigative interest in siblings as a positive influence on child adjustment (Caspi, 2011) and provides evidence that sibling relationship quality has potential as a goal for intervention. Future research should continue to employ naturalistic observation of siblings' interactions, in all of their fractious and caring intensity. Omnipresent in children's lives yet invisible in much developmental research, siblings deserve a closer look.

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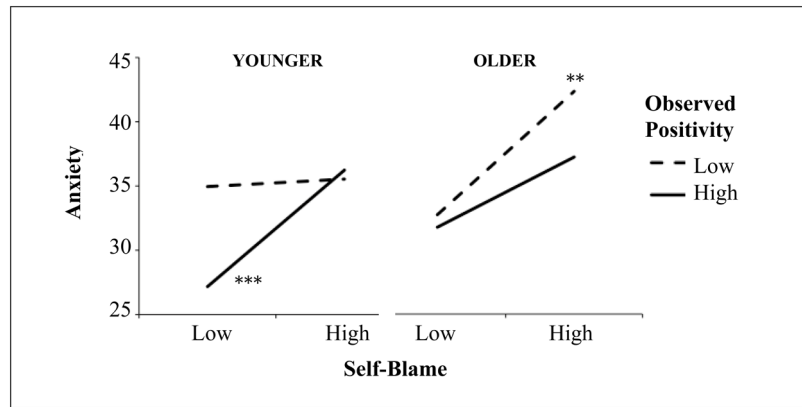


Figure 1. Anxiety related to self-blame and observed positivity, in younger and older siblings. Asterisked slopes are significantly different from zero. * $p < .05$. ** $p < .01$. *** $p < .001$. Two-tailed significance.

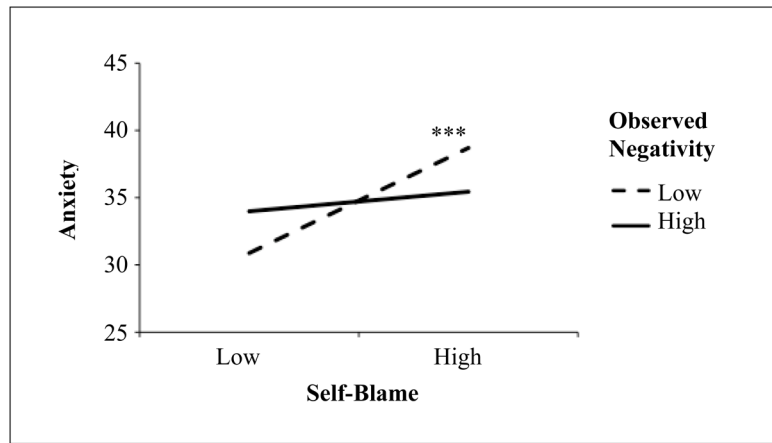


Figure 2. Anxiety related to self-blame and observed negativity. Results did not differ between older and younger siblings. The asterisked slope (***) is significantly different from zero at $p < .001$. Two-tailed significance.

Table 1

Descriptive Statistics by Younger-Older Status and By Dyad

	<u>Younger siblings</u>	<u>Older siblings</u>	<u>Combined or by dyad</u>	
	31 girls, 21 boys <i>M (SD)</i>	19 girls, 33 boys <i>M (SD)</i>	10 girl-girl 12 boy-boy 30 girl-boy <i>M (SD)</i>	Inter-Sibling correlation
Age	11.33 (1.55) _a	13.81 (1.60) _b	12.57 (2.00)	.79 ^{***}
Age difference	—	—	2.47 (1.03)	—
Conflict properties	33.12 (8.36)	33.46 (8.00)	33.29 (8.14)	.55 ^{***}
Perceived threat	20.75 (4.77) _c	18.94 (4.61) _d	19.85 (4.76)	.28 [*]
Self-blame	11.92 (3.14)	12.17 (3.34)	12.05 (3.23)	.22
Observed positivity	—	—	1.97 (.45)	—
Observed negativity	—	—	.70 (.55)	—
Anxiety	34.38 (8.24)	35.44 (7.84)	34.91 (8.02)	.23

Note. Observed positivity and observed negativity were averaged across the three observation intervals. In paired-samples t-tests _{cd} means differed at $p < .05$; _{ab} means differed at $p < .001$. Two-tailed significance.

^{*}
 $p < .05$.

^{**}
 $p < .01$.

^{***}
 $p < .001$.

Table 2

Bivariate Associations Among Sex, Age and Study Variables

	1	2	3	4	5	6	7	8	9
YOUNGER SIBLINGS									
1. Sex	—								
2. Age	-.09	—							
3. Age difference	-.09	-.28*	—						
4. Conflict properties	.15	.13	-.24	—					
5. Perceived threat	.09	-.25	-.25	.55***	—				
6. Self-blame	-.23	-.04	-.06	.40**	.35*	—			
7. Observed positivity	.06	-.01	<.01	-.18	-.25	-.10	—		
8. Observed negativity	.07	.07	-.14	-.01	.10	-.04	-.09	—	
9. Anxiety	.21	-.21	.21	.44**	.49***	.22	-.29*	.12	—
OLDER SIBLINGS									
1. Sex	—								
2. Age	.29*	—							
3. Age difference	.45**	.37**	—						
4. Conflict properties	.10	.29*	.14	—					
5. Perceived threat	-.14	.01	.09	.57***	—				
6. Self-blame	-.21	.20	.06	.35*	.48***	—			
7. Observed positivity	.10	-.01	<.01	-.06	-.04	.03	—		
8. Observed negativity	-.21	-.01	-.12	-.09	-.09	-.22	-.11	—	
9. Anxiety	-.06	.07	.06	.47***	.61***	.44**	-.20	-.18	—

Note. Observed positivity and observed negativity were averaged across the three observation intervals.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Two-tailed significance.

Table 3

Anxiety Related to Self-Blame, Observed Positivity and Younger-Older Status

Outcome: Anxiety	<i>B</i> (<i>SE</i>)		<i>T</i>
Intercept	35.04 (.74)	—	47.39***
Sex	2.96 (1.42)	.18	2.08*
Age	-.67 (.42)	-.17	-1.58
Younger-older status	3.01 (1.82)	.19	1.66
Self-blame	.98 (.18)	.40	5.34***
Observed positivity	-3.43 (1.26)	-.21	-2.71*
Younger-older status × self-blame	.47 (.40)	.09	1.19
Younger-older status × observed positivity	.38 (2.03)	.01	.19
Self-blame × observed positivity	.33 (.43)	.06	.77
Younger-older status × self-blame × observed positivity	-2.03 (.82)	-.19	-2.49*
<i>R</i> ²			.25
<i>F</i> (9, 51)			10.82***

Note.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Two-tailed significance.

Table 4

Anxiety Related to Self-Blame and Observed Negativity

Outcome: Anxiety	<i>B</i> (<i>SE</i>)		<i>T</i>
Intercept	34.75 (.78)	—	44.60***
Self-blame	.72 (.20)	.29	3.58**
Observed negativity	-.06 (1.01)	<.01	-.06
Self-blame × observed negativity	-.79 (.22)	-.20	-3.50**
<i>R</i> ²			.15
<i>F</i> (3, 51)			12.22***

Note.

*
p < .05.

**
p < .01.

p < .001.

Two-tailed significance.