Sibling relationships as sources of risk and resilience in the development and maintenance of internalizing and externalizing problems during childhood and adolescence

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HIGHLIGHTS

- Sibling interactions contribute uniquely to the development of symptomatology
- Measures differentiating normative from pathogenic sibling conflict would be useful
- Preliminary evidence indicates that interventions can improve sibling relationships
- Strengthening sibling relationships could confer broader socio-emotional benefits

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ABSTRACT

Sibling relationships are a unique and powerful context for children's development, characterized by strong positive features, such as warmth and intimacy, as well as negative qualities like intense, potentially destructive conflict. For these reasons, sibling interactions may be both a risk and a protective factor for the development and maintenance of emotional and behavioral dysfunction. We review evidence indicating that sibling interactions are linked to internalizing and externalizing symptoms and identify possible mechanisms for these associations. Sibling conflict contributes uniquely to symptomatology and may be particularly problematic when accompanied by lack of warmth, which is generally associated with decreased internalizing and externalizing problems. On the other hand, greater warmth can be associated with heightened externalizing symptoms for later-born children who may model the behavior of older siblings. Although it will be important to monitor for increased sibling collusion, several intervention studies demonstrate that it is possible to reduce conflict and increase warmth between brothers and sisters, and that improving sibling interactions can teach children social-cognitive skills that are beneficial in other relationships (e.g., friendships). Developing brief assessment tools differentiating normative from pathogenic sibling conflict would assist clinical decision making. Future intervention work could provide a more stringent test of the hypothesis that strengthening sibling relationships improves children's socio-emotional adjustment.

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Sibling relationships are a critical interpersonal context for children's development. In the United States, 78% of children have at least one sibling (Kreider & Ellis, 2011) and children spend more time with their siblings than anyone else, including parents (Buist, Deković, & Prinzie, 2013). Sibling interactions are characterized by both strong positive features, such as warmth and intimacy, as well as negative qualities, such as intense conflict, which are associated with children's well-being (Feinberg, Solmeyer, & McHale, 2012). Despite the important role of sibling relationships across the lifespan, they have received far less attention than other relationships in children's lives (e.g., friendships, parent–child relationships). Understanding how and why sibling relationships contribute to the onset and maintenance of children's emotional and behavioral problems will provide critical information for clinicians, such as knowing when and how to intervene into sibling conflicts. We provide a critical synthesis of the literature linking features of sibling interactions to internalizing and externalizing symptomatology in childhood and adolescence. Specifically, we review evidence that sibling relationships make a unique contribution to the development of behavioral and emotional problems, and we identify possible mechanisms to explain these associations, as well as describe clinical implications and avenues for future research.

1. The sibling relationship as a unique developmental context

Relationship theorists argue that children's development occurs within the context of intimate relationships with family members, including siblings (Carpendale & Lewis, 2004; Dunn, 2002a). During their ongoing interactions, children construct an increasingly sophisticated understanding of their social and psychological worlds, encompassing knowledge of their own and others' cognitions, motivations, and emotions, and how they are intertwined with behavior. Siblings spend a great deal of time together and know one another intimately via repeated positive (e.g., play) and negative (e.g., conflict) interactions; as such, they are important influences upon one another's development (Howe, Ross, & Recchia, 2011). This intimate bond is evident in early childhood and persists into middle childhood and adolescence (Dunn, Slomkowski, & Beardsall, 1994; McGuire, McHale, & Updegraff, 1996).

Several characteristics of sibling relationships make this a unique developmental context, involving processes and provisions not present in other relationships. Hinde (1979) defined close relationships as involving two kinds of interactions. Reciprocal interactions, typical of peers, are characterized by equal and returned exchanges evident during play or conflict. Complementary interactions, characteristic of parent–child relationships, are defined by unequal distributions of power and knowledge due to age and experience differences, which are evident during guidance, instrumental assistance, and teaching. The sibling relationship is uniquely characterized by both reciprocal and complementary interactions (Howe & Recchia, 2005). Siblings are often close in age, thus they share many common interests, which gives rise to reciprocal interactions, such as the exchanges during extended sequences of play, games, and conflict. These experiences afford important

opportunities to develop social understanding and knowledge about the behavioral dynamics of relationships, which rely on understanding the partner's perspective, thoughts, and feelings (Dunn, 1983; Howe et al., 2011).

Siblings also differ in age, abilities, and knowledge, which are features that make complementary exchanges a core component of their relationship. For example, Howe, Della Porta, Recchia, Funamoto, and Ross (2015) observed that 6-year-olds engaged in an average of 2.27 teaching interactions per hour with their 4-year-old siblings. Thus, children gain a significant amount of knowledge during sibling interactions. The power imbalance between siblings may also create problematic behavior patterns; for example, older siblings may dominate during conflicts (Siddiqui & Ross, 1999). Although Dunn (1983) argued that reciprocal interactions are the "building blocks" of relationships because of the opportunities they afford for developing social understanding, complementary interactions are also important. The degree to which reciprocal or complementary elements predominate in exchanges may be critical in distinguishing their role as potential developmental mechanisms.

Beginning in the early years, two other characteristics distinguish sibling relationships from other interpersonal contexts. First, unlike friendships, sibling relationships are involuntary and lifelong (Hartup, 1979). Young siblings are part of the same family and share living space, making it hard to withdraw from one another. Even as their primary social group shifts away from the family, siblings typically maintain frequent contact throughout their lives because of their familial bonds, and can be an important source of social support during adulthood (Carstensen, 1992). For these reasons, learning to get along is an important challenge of growing up together. Second, due to the amount of time that siblings spend together, they co-construct an intimate and common history, rich territory for playing and fighting. Although adolescents may spend increasing time with friends, siblings' long co-constructed history may be deeply embedded in defining their relationship quality (Dunn et al., 1994).

To understand sibling dynamics fully, it is crucial to recognize that their interactions are situated within a broader network of family relationships. Interactions between parents are intimately connected to the relationships among their children; for example, increased marital conflict is associated with greater hostility between brothers and sisters (Brody, 1998). Moreover, psychoanalytic perspectives on sibling conflict have postulated that some features of sibling interactions may reflect competition for parents' love (e.g., Adler, 1924), thus underscoring that sibling relationships are intertwined with parental relationships. There is evidence that rivalry and jealousy play an important role in sibling interactions (Howe et al., 2011). Firstborns often react negatively to a sibling's birth (Dunn & Kendrick, 1982) and younger siblings also become jealous when parents direct exclusive attention to their older sibling (Miller, Volling, & McElwain, 2000; Volling, McElwain, & Miller, 2002). It is normative and expected for parents to treat their children differently (e.g., a 5-year-old has different needs than an 8-year-old), but if parents are favoring one child, or if children perceive differences in parental treatment to be unfair, it may be detrimental to family functioning, and

specifically to the sibling relationship (Kowal & Kramer, 1997). Differential parental treatment has been linked to greater sibling conflict, antagonism, and controlling behaviors (Brody, Stoneman, & McCoy, 1992; Furman & Buhrmester, 1985). These negative interactions may explain, in part, the associations between greater differential parental treatment and higher internalizing and externalizing symptoms revealed in a recent meta-analysis by Buist et al. (2013). The link between differential treatment and internalizing symptoms was stronger for brother–brother pairs, perhaps because boys are more likely to be competitive than are girls (Hibbard & Buhrmester, 2010), as well as for children, compared to adolescents. Younger children may be more susceptible to differential treatment because they have not had the opportunity to develop high-quality friendships, which can protect children from negative family dynamics (Gauze, Bukowski, Aquan-Assee, & Sippola, 1996).

Sibling relationships often involve managing significant negative affect, including jealousy and anger, which poses a risk, as these intense emotions can be associated with problematic behaviors such as aggression (Cole & Deater-Deckard, 2009). However, the range of positive and negative sibling interactions presents an opportunity to develop social-cognitive and behavioral skills that promote successful relationships (Kramer, 2014). Moreover, the positive features of sibling relationships can be a source of social support that may facilitate social–emotional well-being. In the next sections, we review literature linking the two central dynamics of sibling interactions – conflict/aggression and warmth – to internalizing and externalizing symptoms. We also examine whether sibling relationships are beneficial for children's functioning in other relationships, and their socio-emotional well-being, more broadly.

2. Associations between features of sibling relationships and internalizing and externalizing symptoms

2.1. Sibling conflict and aggression

Sibling exchanges may be imbued with a level of conflict and hostility rarely observed in children's interactions with parents or friends. In the preschool years, sibling conflicts occur more than once every 10 minutes (Perlman & Ross, 2005) and are so common that fighting and aggression are seen as normative (Caspi, 2011). In fact, the DSM-5 criteria for oppositional defiant disorder specify that children who display symptoms (e.g., anger, vindictiveness) only with siblings should not receive the diagnosis (American Psychiatric Association, 2013).

Buist et al. (2013), however, established medium-sized associations between greater sibling conflict during childhood and adolescence and higher externalizing and internalizing symptoms. The relationship between conflict and internalizing symptoms was stronger when the sibling age gap was smaller, perhaps because siblings close in age fight more (Furman & Buhrmester, 1985). This heightened hostility may be due to greater competition for shared resources, or simply because they spend more time together (Volling, 2003). The greater intimacy of closely spaced dyads (Buhrmester & Furman, 1990) may also increase the affective intensity of their disputes (Recchia, Wainryb, & Pasupathi, 2013). Associations between sibling conflict and psychological symptoms were not moderated by gender constellation suggesting that conflict is problematic in all dyads, nor by developmental period. Although sibling conflict decreases in frequency from childhood to adolescence, it continues to be emotionally charged, characterized by destructive patterns of interaction, and associated with negative outcomes (Buhrmester, 1992; Updegraff, McHale, & Crouter, 2002).

These links between sibling conflict and emotional and behavioral symptomatology indicate that some disputes may be harmful, or indicative of significant underlying dysfunction. A key goal for researchers and clinicians will be to differentiate "typical" from clinically concerning conflict (Wakschlag, Tolan, & Leventhal, 2010); such information may also be beneficial for parents, who often seek guidance on when to intervene in their children's disputes (Kramer & Baron, 1995). One useful marker may be the type of conflicts in which siblings engage. Constructive conflicts, which focus on a specific issue, are often less affectively intense, and more likely to be resolved to satisfy both siblings (Deutsch, 1977); these conflicts are an important context for the development of social skills, as they help children learn to assert their rights and justify their actions appropriately, while responding to others' needs (Ross & Lazinski, 2014; Smith & Ross, 2007). Destructive conflicts, on the other hand, spread to involve multiple issues and high levels of negative affect, and tend to escalate to coercion, yielding either an outcome with a clear winner and loser or a lack of resolution (Howe, Rinaldi, Jennings, & Petrakos, 2002). Expectedly, more frequent destructive conflicts between siblings are associated with internalizing and externalizing problems (e.g., Garcia, Shaw, Winslow, & Yaggi, 2000; Stocker, Burwell, & Briggs, 2002).

Sibling conflicts might also be differentiated on the basis of their topic. In childhood, most conflicts center on issues of property (e.g., taking another's possessions) and negotiating use of joint resources, such as television (Recchia & Howe, 2010). Equitable and fair use of shared resources also emerges as a central conflict theme during adolescence, as does invasion of the personal domain (e.g., hanging around the other's friends, teasing, and being mean; Campione-Barr & Smetana, 2010). The topics of adolescent sibling conflicts are differentially associated with symptoms of anxiety and depression: more frequent conflicts about personal-domain incursions predicted subsequent anxiety, whereas adolescents who fought about equality and fairness were more likely to experience increased depressive symptoms over time (Campione-Barr, Greer, & Kruse, 2013). These findings, along with evidence that the resolution strategies siblings use vary as a function of the conflict content (Recchia & Howe, 2010), suggest that future work examining the associations between conflict topics and socio-emotional outcomes may provide important guidance about when to intervene in sibling disputes.

Regardless of content, the severity of conflict behaviors is likely to be an indicator of whether siblings' interactions are pathogenic. Compared to conflict with friends, children describe their own harmful actions against siblings as stemming from overwhelming negative emotions (e.g., rage) and as characterized by a lack of concern for the other (Recchia et al., 2013). This may be one reason that sibling disputes escalate into violence more frequently than do children's conflicts with parents or peers (Caspi, 2011; Laursen, Finkelstein, & Betts, 2001). Intense aggression between siblings is fairly common, even among adolescents (Tucker, Finkelhor, Turner, & Shattuck, 2013). For example, 35% of youth aged 6 to 17 years reported being hit by a sibling in the last year (Finkelhor, Ormrod, Turner, & Hamby, 2005); and 40% of parents also stated that a child hit a sibling with an object during the last 12 months (Straus, Gelles, & Steinmetz, 1980). Due to the power imbalance between older and younger siblings, particularly in early childhood, older siblings are more likely to be physically aggressive (Martin & Ross, 1995). Physical aggression is also more commonly perpetrated by boys, especially in the preschool years, although sex differences are often moderated by the sibling gender constellation and are observed less consistently among siblings than among peers (Martin & Ross, 2005). Aggression is not limited to physical altercations: siblings also engage in property damage and theft (Finkelhor et al., 2005); psychological aggression, such as mean comments and telling siblings they are not wanted or loved (Howe et al., 2002; Tucker et al., 2013); and relational aggression, in which a child damages a sibling's social relationships, for example, by revealing secrets (Stauffacher & DeHart, 2006; Updegraff, Thayer, Whiteman, Denning, & McHale, 2005).

Not surprisingly, these behaviors are associated with poorer socio-emotional adjustment for the victims. Tucker et al. (2013), employing a large, nationally representative sample of American youth, documented that physical aggression, property damage, and psychological aggression by a sibling were each associated with greater mental-health distress (a composite index reflecting anger, depression and anxiety),

even after accounting for other types of victimization. When physical aggression was less severe (i.e., did not involve a weapon), the association between victimization and poorer mental health was stronger for children younger than age nine, belying the common belief that aggression among younger children is not harmful (Finkelhor, Turner, & Ormrod, 2006). In fact, younger children may have fewer coping strategies for managing these situations, as well as fewer supports outside of the family (Gauze et al., 1996), which may contribute to increased distress. More recently, in a large birth cohort of English children, Bowes, Wolke, Joinson, Lereya, and Lewis (2014) reported sibling bullying at age 12 predicted greater depression and self-harm at age 18, controlling for earlier symptomatology, peer victimization, and other demographic and family characteristics. Sibling aggression has also been linked to greater substance use, delinquency, and aggression (Button & Gealt, 2010).

Thus, although limited research has examined the links between sibling aggression and psychological symptoms (Tucker et al., 2013), evidence clearly indicates that these behaviors may be harmful. Disentangling the direction of associations among sibling conflict and children's emotional and behavioral adjustment is critical. If hostile sibling interactions maintain or exacerbate symptomatology, rather than only resulting from maladaptive behavior by one or both children, they could be an important target for intervention. Little is known about whether children's psychological symptoms contribute to the worsening of sibling conflict over time (Campione-Barr et al., 2013), although difficult temperament in younger siblings during middle childhood predicts increased negativity with their brother or sister during early adolescence (Brody, Stoneman, & McCoy, 1994), and symptoms of both anxiety and depression are linked to subsequent increases in adolescent sibling conflict (Campione-Barr et al., 2013).

Crucially, research has demonstrated that sibling conflict, hostility, and negativity prospectively predict increases in internalizing and externalizing symptoms, after accounting for earlier psychological adjustment and indices of family functioning, suggesting that sibling interactions make a unique contribution to the development of symptomatology. For example, Stocker et al. (2002) reported that conflict when older siblings were aged 9 to 12 predicted greater anxiety, depression, and delinquent behavior for those children two years later, after controlling for symptoms at Time 1, maternal hostility, and marital conflict (also see Bank, Burraston, and Snyder (2004); Campione-Barr et al. (2013); Criss and Shaw (2005); Harper, Padilla-Walker, and Jensen (2014); Kim, McHale, Crouter, and Osgood (2007); Solmeyer, McHale, and Crouter (2014); Whiteman, Solmeyer, and McHale (2015); see Pike, Coldwell, and Dunn (2005); Defoe et al. (2013); and Richmond, Stocker, and Rienks (2005), for exceptions). Work with a genetically informed sample has indicated that associations between sibling negativity and both depression and antisocial behavior are explained primarily by shared environmental influences, not by shared genes (Pike, McGuire, Hetherington, Reiss, & Plomin, 1996). Moreover, sibling aggression predicted externalizing behavior three years later, after controlling for the intraclass correlations between siblings, as well as harsh maternal parenting, and earlier externalizing behavior (Natsuaki, Ge, Reiss, & Neiderhiser, 2009).

A number of studies have tested whether structural features of the sibling relationship, such as gender composition of the dyad and birth order, qualified the associations between sibling negativity and individual adjustment. Some significant findings have been reported; for example, Solmeyer et al. (2014) found that greater conflict was associated with increased risky behavior for second-born children, and for first-borns with younger sisters, but not younger brothers. However, a consistent pattern of moderators has not yet emerged.

2.2. Sibling warmth

Sibling conflict and aggression may be particularly problematic in a relationship also lacking in warmth (Buist & Vermande, 2014). Despite the potential for hostility between sisters and brothers, many sibling relationships are also loving and playful. Warmth between siblings, a relationship dimension clearly distinct from hostility (Furman & Buhrmester, 1985), may positively influence children's development. Indeed, Buist et al.'s (2013) meta-analysis confirmed that greater warmth is associated with reduced internalizing and externalizing problems, associations that were comparable for children and adolescents, and for dyads of different gender compositions.

As is common practice, these authors analyzed warmth and conflict separately; yet, it is important to consider these factors in conjunction with one another. Sibling relationships can be harmonious (high warmth, low hostility), affectively intense (high warmth and hostility), hostile (low warmth, high hostility), and uninvolved (low warmth and hostility; McGuire et al., 1996); the first three patterns are evident in childhood, but the last is typically apparent only in older adolescents (Buist & Vermande, 2014). There may be predictive utility associated with considering these two dimensions simultaneously, as the clinical correlates of warmth and conflict may differ depending on the intensity of each variable.

In fact, the sibling relationships of aggressive children appear to be characterized by high conflict and low warmth (Aguilar, O'Brien, August, Aoun, & Hektner, 2001; Buist & Vermande, 2014). The presence of warmth, even when accompanied by significant conflict, is associated with less aggression, as well as with fewer internalizing symptoms (Buist & Vermande, 2014). Moreover, Stormshak, Bellanti, Bierman, and the Conduct Problems Prevention Research Group (1996) found aggressive children whose interactions with brothers and sisters were characterized by high conflict and low warmth experienced more peer rejection and were perceived as less socially competent than children who were comparably aggressive but who experienced moderate conflict and moderate warmth with their siblings, again suggesting that lack of warmth is linked to poorer adjustment (Aguilar et al., 2001).

Positive sibling relationships, broadly construed, are also uniquely associated with improvements in emotional well-being over time. For example, Kim et al. (2007) demonstrated that, for girls, increases in sibling intimacy over time were linked to decreases in depressive symptoms, controlling for sibling depression and parent–child relationship quality, and Richmond et al. (2005) documented that improvement in sibling relationship quality over time, indexed as the ratio of warmth to conflict, predicted decreases in the depressive symptoms of both older and younger siblings (also see Harper et al. (2014); see Branje, van Lieshout, van Aken, and Haselager (2004) and Whiteman et al. (2015), for exceptions). Associations between positive sibling relationships and emotional and behavioral problems did not vary consistently as a function of dyadic characteristics or birth order.

Although less work has examined positive facets of sibling relationships (Whiteman et al., 2015), evidence indicates that greater sibling warmth is associated with better individual adjustment. Moreover, a high-quality sibling relationship might protect children from challenges in other interpersonal contexts. For example, Wolke and Samara (2004) found that early adolescents who reported being victimized by siblings and peers had greater self-reported psychological symptoms than those victimized in only one context. Stocker (1994) examined links between second-graders' reports of relationship quality with their mothers, siblings, and friends. A significant interaction between warmth with friends and siblings predicted children's behavioral conduct; specifically, children who experienced low warmth in both relationships reported poorer conduct compared to those who had a warm relationship with either a sibling or a friend. This pattern did not extend to loneliness, depression, or anxiety.

Other studies using multi-method measurement strategies, as opposed to self-reports, also indicate that a positive sibling relationship may prove protective, although findings are not unequivocal. McElwain and Volling (2005) documented an interaction between the quality of 4-year-olds' observed behavior with older siblings and friends, such that when friendship quality was low or moderate, more positive sibling

interactions predicted less aggressive behavior, although there was no association between sibling relationship quality and internalizing symptoms. For sixth-graders who were socially isolated at school, greater sibling support was associated with reduced anxiety, although this pattern did not emerge for a number of other variables (East & Rook, 1992). Perceived support from a friend outside of school did not provide the same buffer, suggesting that there may be something unique about the sibling relationship. Clearly additional research is required before strong conclusions can be drawn about the extent to which a high-quality sibling relationship affords compensatory provisions for children struggling with peers and friends. Longitudinal investigations are needed, as are intervention studies in which investigators target sibling dynamics and measure peer outcomes, which would provide a more stringent test of the extent to which a high-quality sibling relationship improves individual socio-emotional adjustment, as well as interpersonal functioning in other domains.

Data from longitudinal studies do support the hypothesis that sibling relationships can provide protection against other family stressors. Gass, Jenkins, and Dunn (2007) reported that sibling affection moderated the association between marital quality and children's subsequent internalizing, although not externalizing, symptoms, independent of mother–child relationship quality. Garcia et al. (2000) examined the links between sibling conflict and rejecting parenting when boys were 2-years-old and parent and teacher reports of aggressive behavior at ages five and six. Rejecting parenting predicted subsequent aggression only when the level of destructive sibling conflict was high, indicating that a low-conflict relationship may be beneficial. In a longitudinal study of adolescent boys, sibling conflict and ineffective parenting, both indexed by multi-informant composites, interacted to predict changes in antisocial behavior over time as measured by multiple indicators (Bank et al., 2004). The limited studies have mostly focused on boys, but this work indicates the promise of sibling relationships as a source of resilience. The clinical utility of these findings will be strengthened by work mapping key moderators of these associations. For example, the ameliorative effects of a high-quality sibling relationship may be stronger for younger children who spend more time together (Volling, 2003).

3. Potential mechanisms linking sibling relationships to internalizing and externalizing problems

While sibling interactions make a unique and meaningful contribution to the development and maintenance of internalizing and externalizing symptoms, little is known about why these associations exist. Specifying the processes linking sibling experiences to psychological adjustment contributes to our theoretical understanding of the relationship, and provides a foundation for developing targeted interventions for problematic family dynamics.

3.1. Behavioral modeling

Sibling interactions can change children's behavior. Patterson's (1982) pioneering work on sibling conflict provided evidence that coercive cycles between siblings serve as a training ground for aggression, since children model and reinforce each other's aversive behavior. Behavioral changes resulting from these hostile interactions contribute directly to externalizing (e.g., aggression) and internalizing (e.g., withdrawal) behaviors (Compton, Snyder, Schrepferman, Bank, & Shortt, 2003). Bullock and Dishion (2002) suggest that as negative behaviors escalate, siblings may begin to collude, forming a bond based on deviancy. This may increase sibling warmth and intimacy, but paradoxically, these positive features may then contribute to undesirable behaviors.

Longitudinal studies have established that older adolescent siblings' externalizing behavior is a risk factor for externalizing behavior by their younger siblings, a pattern evident in all dyadic gender combinations (Buist, 2010; Compton et al., 2003; Defoe et al., 2013). Moreover, these associations are due to relationship and not genetic effects (Rende, Slomkowski, Lloyd-Richardson, & Niaura, 2005; Slomkowski, Rende, Novak, Lloyd-Richardson, & Niaura, 2005). This behavioral modeling, which typically involves the older sibling influencing the younger (Buist, 2010), is more likely in a warm relationship (Whiteman, McHale, & Crouter, 2007). For example, Criss and Shaw (2005) reported that greater sibling warmth predicted increased antisocial behavior and more affiliation with antisocial peers among lower-income boys. This pattern may vary as a function of gender. Solmeyer et al. (2014) reported that sibling intimacy was associated with greater risky behavior only for brother–brother pairs. Similarly, Slomkowski, Rende, Conger, Simons, and Conger (2001) revealed that the older brother's delinquent behavior predicted the younger brother's behavior when the relationship was high in both hostility and warmth. In contrast, the younger sister's delinquent behavior was predicted by the older sister's delinquency when the relationship was high conflict–low warmth. For brothers, in particular, conflictual relationships early in childhood may contribute to the development of externalizing behavior, and with age, they join forces and engage in delinquent behavior, thus increasing their warmth and closeness during adolescence (Bullock & Dishion, 2002). Obtaining a more nuanced understanding of the developmental sequence linking sibling interactions to externalizing behavior will allow us to intervene on the right process at the appropriate time.

Researchers should examine whether sibling modeling, after accounting for genetic influence, occurs for internalizing symptoms, given evidence for contagion of both depression and anxiety between peers (Schwartz-Mette & Rose, 2012; Van Zalk, Van Zalk, & Kerr, 2011). Moreover, co-rumination – excessive discussion of interpersonal problems and negative feelings – is associated with high-quality friendships, but also greater internalizing symptoms (Rose, Carlson, & Waller, 2007). This dynamic could emerge between close siblings, who spend significant time discussing intimate details of their lives (Tucker & Winzeler, 2007). In general, it is important to consider the processes contributing to and resulting from warm sibling relationships, as positive interactions may be associated with trade-offs for adjustment.

3.2. Emotion

Emotion regulation, which has been implicated in both internalizing and externalizing syndromes (Cole & Deater-Deckard, 2009), is another likely mechanism linking experiences with siblings to psychological adjustment. Family interactions are a critical context in which children learn emotion-regulation strategies (Morris, Silk, Steinberg, Myers, & Robinson, 2007). Much of this work has focused on parent–child relationships and inter-parental dynamics (e.g., marital discord), but siblings play an active role in the family, and their interactions and behaviors could also contribute to children's emotional development. Younger siblings may model the emotion-regulation strategies of their elder brothers and sisters, and siblings could help each other respond to negative affect effectively. Moreover, the affective climate of the family contributes to emotion regulation; in environments characterized by pronounced negative emotionality, children may become highly emotionally reactive (Morris et al., 2007). The intense fighting that can occur between siblings will heighten the negative emotion expressed in the home. In fact, parents often report that conflict between their children is the most problematic dynamic in the family (Feinberg et al., 2012).

Frequent exposure to intense negative affect also shapes children's understanding of emotion, which has consequences for their well-being. For example, physically abused children are biased towards attributing anger to others (Pollak, Cicchetti, Hornung, & Reed, 2000), and are quicker than non-abused children to identify facial expressions of anger, but slower to detect sadness (Pollak & Sinha, 2002). These studies focused on children experiencing extreme parental anger and

aggression, but sibling aggression is the most common form of family violence (Straus et al., 1980). Repeated sibling victimization may impact emotional understanding.

3.3. Social cognition

Sibling dynamics may also contribute to the development of social-cognitive biases, which may, in turn, exacerbate socio-emotional distress. The social information-processing (SIP) model (Crick & Dodge, 1994) posits that a number of cognitive steps occur between encountering a social stimulus and enacting a behavioral response. Biases in these processes, such as a tendency to interpret other's actions as hostile, are implicated in both internalizing and externalizing symptomatology (Crick & Dodge, 1994). Children's interpersonal experiences shape their SIP; for example, peer rejection predicts increased attribution of hostile intent for others' behavior, decreased generation of competent solutions to interpersonal situations (Dodge et al., 2003), and more negative expectations of peers (Salmivalli & Isaacs, 2005).

Given the amount of time siblings spend together and the affectively charged nature of their interactions, it seems likely that this relationship could contribute to SIP biases, but to our knowledge only one study has tested this speculation. Recchia, Rajput, and Peccia (in press) revealed a link between affective features of sibling interactions and children's tendency to attribute hostile intent to their brother or sister, suggesting a connection between siblings' behavioral histories and interpretive processing. Moreover, SIP patterns with siblings differed from those with peers, implying relationship-specific processes. Further work is needed to elucidate the causal mechanisms underlying these associations, as well as to examine links between sibling interactions and other steps of the SIP model.

3.4. Morality

Although theorists have posited that relationships with other children are important contexts for moral development (Piaget, 1932; Sullivan, 1953), little work has examined this issue with respect to sibling interactions. For instance, given the hostility that permeates some sibling conflicts, are these events likely to alter children's moral concepts? Research with community samples implies that under normal circumstances they do not. Although many children occasionally engage in harmful behaviors that demonstrate a lack of concern for their sibling, they often feel remorseful in the aftermath and judge their behaviors to be wrong (Recchia et al., 2013). On the other hand, the same patterns may not extend to families whose interactions are routinely characterized by coercive cycles of conflict and hostility. In particular, children exposed to violence and aggression are more likely to endorse retaliation as an acceptable response to provocation, and in turn, beliefs about the legitimacy of retaliation are linked to children's own aggressive behavior (Guerra, Huesmann, & Spindler, 2003). In sum, when youth view their social relationships as characterized by coercion rather than caring, they may apply their moral concepts in distorted ways that serve to justify retaliatory violence (Wainryb & Recchia, 2013), thus increasing externalizing problems.

3.5. Disruption of effective parenting and parent–child relationships

Hostile parent–child relationships have been robustly linked to negative sibling processes, whereas positive ones predict greater sibling warmth (Brody, 1998; Stormshak, Bullock, & Falkenstein, 2009). One might argue that parenting is the causal agent in these associations, and longitudinal studies indicate that parent–child relationships predict changes in sibling relationship quality (Brody, Stoneman, McCoy, & Forehand, 1992; Dunn, Deater-Deckard, Pickering, Golding, & ALSPAC Study Team, 1999; Jenkins, Rasbash, Leckie, Gass, & Dunn, 2012). A relatively unaddressed question is whether sibling hostility may also exert a negative influence on family climate (Feinberg et al., 2012), although

some cross-sectional research suggests that sibling relationships predict other family dynamics. For example, Patterson, Dishion, and Bank (1984) identified a bidirectional association between siblings' negative interactions and inept parenting in a sample of boys; also in a study of preschoolers, better sibling relationships predicted warmer parenting (Yu & Gamble, 2008), although the alternative model (i.e., warmer parenting predicted better sibling relationships) also fit the data. Nonetheless, disruption of other family dynamics by sibling hostility represents another plausible mechanism linking sibling relationships and emotional and behavioral problems.

4. Clinical implications

4.1. The risks of sibling relationships for the development of internalizing and externalizing symptoms

Pinpointing mechanisms explaining how sibling experiences contribute to psychological symptoms will help practitioners identify therapeutic targets. One likely point of clinical leverage is sibling conflict. To know when to intervene, we must develop tools that allow clinicians to differentiate reliably between normative and clinically concerning sibling conflict. We have identified the type, content, and severity of sibling disputes as potential features for making this distinction. Lack of sibling warmth is also critical and should be considered by clinicians. Currently, there is no "gold standard" measure of sibling relationship quality for use in clinical settings, but several research scales could be adapted. For example, the 20-item Conflict Strategies Scale (CSS; Smith & Ross, 2007) asks how often children engage in positive and negative conflict tactics with a sibling. The widely used Sibling Relationship Questionnaire (SRQ; Furman & Buhrmester, 1985) has 45 items covering four factors of sibling relationships: warmth/closeness, relative power/status, conflict, and rivalry. An ideally suited clinical tool may combine the CSS, with a few items from the SRQ assessing the frequency of constructive and destructive conflicts, as well as the warmth/closeness scale. In developing this new measure, it will be important to translate the rich observational and interview data that have been collected on sibling interactions into items that capture the quality of their exchanges and not just the frequency. For example, when asking about destructive conflict, it may be important to consider the extent to which children show remorse for their aggression (Recchia et al., 2013), because consistent disregard for siblings' feelings may be a marker of clinically concerning conflicts.

A clinically meaningful assessment of sibling relationship quality would also help to identify pathogenic behaviors. If this measure were administered to a large, representative community sample, item response-theory analyses could establish thresholds at which the display of a behavior becomes abnormally high or low (e.g., less than 5% of the sample engage in this behavior; see Wakschlag et al. (2014)). For example, endorsement of aggression with an object may be rare, and of clinical concern, but some degree of destructive conflict (e.g., hitting), accompanied by remorse, may be common, such that this behavior only becomes concerning when it occurs frequently and is not accompanied by guilt. Answers to these questions are theoretically important and will guide clinical decision making.

Decisions about whether and when to intervene would also be informed by clarifying moderators of associations between sibling relationships and psychological symptomatology. Some, but not all, researchers have tested whether structural features of the sibling dyad qualify these associations. Younger siblings may be especially vulnerable when older siblings engage in externalizing behavior (Buist, 2010) and some evidence reveals that greater intimacy may be more strongly linked to externalizing behavior for brother pairs (Slomkowski et al., 2001; Solmeyer et al., 2014), but other clear patterns of moderators have not emerged. Thus, it would be premature to conclude that some siblings are at greater risk than others, particularly given that most work has been conducted with community

samples, in which emotional and behavioral problems will be less frequent and less severe. This issue should be re-visited as new data become available, given the complexity of the models under study, and the dependency inherent in the study of dyads that further reduces analytic power.

It is also possible that some children will be more vulnerable to negative sibling experiences, or more likely to benefit from positive interactions. As Belsky and Pluess (2009) reviewed, some characteristics (e.g., temperament), may be a risk factor under some conditions, but advantageous under others. Consistent with this hypothesis, Morgan, Shaw, and Olino (2012) reported that for 5-year-old boys, the association between their sibling interactions and internalizing symptoms one year later was moderated by their negative emotionality (NE), or the tendency to experience sadness, anger, frustration, and fear. Specifically, only for boys high on NE, destructive conflict was associated with increased internalizing symptoms. Perhaps more intriguingly, these boys experienced *decreased* internalizing symptoms in the context of a positive sibling relationship, which was not evident for boys low on NE. Such findings highlight the clinical potential of the sibling relationship as a source of both risk and resilience, and suggest that significant gain will result from identifying children who will be particularly likely to benefit from interventions promoting healthier sibling interactions.

4.1.1. Interventions with siblings

After establishing that intervening in sibling interactions may be beneficial, the next step is to decide how to help. A handful of studies have demonstrated that training parents in behavioral management techniques specifically targeting aspects of the sibling relationship can reduce sibling aggression and conflict (Kramer, 2004). These findings, in conjunction with a large literature establishing the efficacy of parent management training for reducing younger children's externalizing and oppositional behavior more broadly (Comer, Chow, Chan, Cooper-Vince, & Wilson, 2013), indicate that behavioral techniques should work to reduce problematic sibling behaviors.

Reducing aggression is important, but an exclusive focus on this goal is limited for two reasons. First, it emphasizes that what matters is not fighting. Healthy sibling relationships are marked not only by a low frequency of hostile behaviors, but also by the ability to negotiate conflict effectively, and the presence of warm interactions. Kramer (2010) concluded that targeting negative behaviors exclusively will not necessarily translate into a more positive relationship. For example, Leitenberg, Burchard, Burchard, Fuller, and Lysaght (1977) had six mothers intervene in sibling conflicts, alternating between providing positive reinforcement (a) for each one minute interval in which children did not fight, and (b) when children engaged in appropriate interactions. Both procedures reduced conflict, but only the latter was associated with increased positivity. Children interacted less when they were being rewarded for not fighting, an undesirable outcome given the benefits afforded by positive sibling interactions.

Second, teaching children not to fight will not help them learn the skills necessary to interact effectively with siblings (Kramer, 2010). Sibling interventions are rare (Feinberg et al., 2012), but two teams have developed programs to help children develop the competencies that contribute to high-quality sibling relationships. *More Fun with Sisters and Brothers* (*MFWSB*; Kennedy & Kramer, 2008; Kramer & Radey, 1997) and *Siblings are Special* (*SIBS*; Feinberg et al., 2013) are prevention programs for children aged 4 to 9 years. Facilitators work with small groups of siblings to help them learn to interact positively (e.g., how to initiate play and negotiate conflict), and to develop important individual skills (e.g., problem-solving). The *SIBS* program also includes modules for parents on conflict intervention. Randomized control trials of each program indicated that treatment-group siblings engaged in more positive interactions post-treatment than those in a wait-list control group (*MFWSB*, Kennedy & Kramer, 2008) or a no-treatment control group (*SIBS*, Feinberg et al., 2013). Neither treatment affected observed negativity, indicating that there may be gains associated with combining these treatments with additional sessions to teach parents behavioral tools for managing aggression.

Given the links between sibling relationships and emotional and behavioral problems, we argue that increasing warmth and reducing conflict may be levers for changing internalizing and externalizing symptoms. While Kennedy and Kramer (2008) did not assess children's psychological symptoms, Feinberg et al. (2013) demonstrated that children who received the *SIBS* intervention had fewer internalizing symptoms, according to maternal reports, but did not differ from the control group on paternal reports of internalizing symptoms, or externalizing behaviors. Longer-term follow-ups might yield stronger findings, as it may take time for improvements in sibling relationships to impact children's socio-emotional adjustment.

Another reason for the limited effects of the SIBS intervention on psychological symptoms is that they recruited a community sample in which levels of symptomatology would be low. In general, both the *SIBS* and *MFWSB* investigators recruited low-risk, 2-parent, middle-income families. Attempting to build more positive, engaged sibling relationships may yield different outcomes in higher-risk samples. For example, when older siblings engage in significant externalizing behavior, creating warmer interactions could increase problem behavior for younger siblings, who may model the behavior of their elder brothers and sisters. Similar processes may occur when one sibling has depression or anxiety: increased warmth might contribute to co-rumination.

Stormshak et al. (2009) noted that when a child's or adolescent's behavior poses a risk for externalizing behavior by a younger brother or sister, it may be optimal to limit the amount of time they spend together, and also improve parental behaviors (e.g., monitoring). Another strategy would be to intervene with the younger sibling. Brotman, Dawson-McClure, et al. (2005a), and Brotman, Gouley, et al. (2005b) found that a combination of social-skills training for younger brothers and sisters and behavioral training for parents improved target children's behavior and reduced negative parenting. It also benefited the non-targeted adolescent sibling. Older siblings were invited to learn the skills taught to parents, practice with their younger sibling, and become assistant leaders in the preschool behavioral groups. Eight months post-intervention, adolescent siblings engaged in less aggression and delinquency according to parents and teachers. Wagner, Borduin, Sawyer, and Dopp (2014) also demonstrated that directly targeting one child's externalizing behavior may benefit siblings: siblings of adolescents randomly assigned to multisystemic therapy were less likely to have been arrested 25 years later than were siblings of adolescents assigned to individual therapy.

Although the evidence is preliminary, interventions apparently can improve the quality of sibling relationships. Future studies should include psychological symptoms as outcome variables, longer-term follow-ups, and, crucially, more diverse samples. Sibling interventions have been tested with younger children, but adolescents could also benefit from improved sibling relationships, although the program content and delivery may need to be modified. It will also be important to recognize different family structures when testing these programs, such as those headed by a single mother, or newly formed step-families, for whom sibling relationships may be a considerable challenge (Deater-Deckard, Dunn, & Lussier, 2002; Dunn, 2002b). More generally, researchers should clarify circumstances under which it may be beneficial to incorporate treatment components targeting family dynamics or contextual features that may be facilitating sibling negativity. For example, it may be difficult to improve sibling interactions when a parent clearly favors one child. Additional treatment studies will be helpful to clinicians seeking to understand how working with siblings could provide an avenue to improve psychological symptoms, as well as what types of treatment strategies might be most effective.

4.2. Sibling relationships as an opportunity to improve emotional and behavioral well-being

Although hostility and low warmth between brothers and sisters are risk factors for psychological symptoms, high-quality sibling relationships are an opportunity to develop important skills and to receive social support, a feature upon which clinicians could capitalize (Feinberg et al., 2012; Stormshak et al., 2009). Given evidence that sibling relationships may provide a source of protection for children experiencing other stressors, fostering positive, or less negative, interactions between siblings may prove salutary.

Moreover, if the behaviors children learn with siblings inform their interactions with classmates and friends, improving sibling interactions may also be beneficial for other relationships (Kim et al., 2007). The research examining links between sibling and peer interactions is mixed. Some studies have suggested similarities between children's experiences with siblings and peers, as measured by global reports of relationship quality. In a sample of adolescent twins, participants' reports of sibling affection predicted greater positivity in their best friendships, whereas greater sibling hostility was associated with lower positivity and greater conflict and betrayal with friends (Pike & Atzaba-Poria, 2003; also see Yeh and Lempers (2004)). McCoy, Brody, and Stoneman (1994) studied younger siblings (aged 4 to 11 years), indexing sibling warmth and conflict; the former was associated positively and the latter negatively with the target child's report of best friendship quality (but see Lockwood, Kitzmann, and Cohen (2001)). Some research has documented continuity across youths' experiences with siblings and romantic partners, who become increasingly important during adolescence. Doughty, Lam, Stanik, and McHale (2014) examined changes in sibling intimacy and conflict, as well as self-perceived romantic competence, from adolescence to young adulthood; increases in intimacy were associated with improvement in romantic competence, whereas, on average, greater conflict predicted lower competence (also see Doughty, McHale, and Feinberg (2015)).

On the other hand, some studies examining behavior have suggested the independence of relationships with siblings and with peers. For children (aged 4–10) there are limited associations between observed communication, conflict, cooperative pretend play, or prosocial and agonistic behavior across sibling and friend dyads (Cutting & Dunn, 2006; Howe et al., 2011; McElwain & Volling, 2005; Volling, Youngblade, & Belsky, 1997). Stocker and Dunn (1990) observed that children's behavior with siblings was linked only to mothers' reports of their friendships; however, associations were not straightforward. Specifically, sibling competition and control were associated with more positive friendships. These authors note that friendships, which are voluntary, place different demands on children than do sibling relationships; thus, the strategies used in one relationship may not translate directly to the other. Among older youth, Conger, Cui, Bryant, and Elder (2000) reported no association between affective behavior towards a sibling in adolescence and a romantic partner in adulthood, again indicating that sibling interactions may not share a one-to-one correspondence with behavior in other relationships.

Bullying, aggressive behaviors, and victimization experiences may be particularly likely to generalize across interpersonal contexts. Children who are aggressive towards or victimized by their siblings are more likely to experience similar dynamics with peers (e.g., MacKinnon-Lewis, Starnes, Volling, and Johnson (1997); Tucker, Finkelhor, Turner, and Shattuck (2014); Wolke and Samara (2004)). Among college students, retrospective reports of violence towards a sibling during early adolescence predicted current perpetration of dating violence (Noland, Liller, McDermott, Coulter, & Seraphine, 2004). Some longitudinal research suggests that sibling aggression may contribute to hostile peer interactions. Ensor, Marks, Jacobs, and Hughes (2010) reported that trajectories of children's antisocial behavior towards an older sibling from ages 3 to 6 years predicted greater observed bullying and refusal to share with an unfamiliar peer at age

6, independent of concurrent antisocial behavior. A second investigation revealed that children with a younger sibling engaged in significantly more relational aggression than those with an older sibling; in pre-school this aggression was directed more often at siblings, whereas in middle childhood it occurred just as frequently with friends (Stauffacher & DeHart, 2006). Perhaps children learn to use relational aggression with siblings, a relationship that provides a fertile training ground for such behavior, given the intimate knowledge that siblings have of each other, and transition to using these behaviors with friends.

If sibling aggression carries over into peer relationships, reducing it could pay wider social dividends. Moreover, targeting the sibling relationship may be easier than intervening with friends and peers, particularly in the context of individual or family therapy, because siblings can interact and practice their new skills while being coached. The sibling relationship also provides an ideal context in which to learn important social-cognitive skills such as perspective-taking and emotional understanding, which contribute to success in many interpersonal relationships (Dunn & Cutting, 1999; Howe & Ross, 1990). Interventions focused on improving sibling relationships will appeal to parents, for whom sibling conflict is a major concern (Feinberg et al., 2013).

Training parents to mediate their children's disputes is an effective intervention that yields improvements in social-cognitive skills. In three studies, Ross and colleagues randomly assigned parents of 3.5-to-11-year-old children to one mediation skills training session, which included helping children to clarify their positions, to develop empathy and understanding for the other, and to generate reasonable resolutions. Control-group parents were told to intervene in their children's conflicts as they normally would. Smith and Ross (2007) showed that children in the mediation group developed a better general understanding that two people in a conflict could have different perspectives, and specifically of their sibling's perspective. Observers also rated sibling conflict negotiations in the mediation group to be less negative than in the control group. Siddiqui and Ross (2004) reported that children whose parents were trained in mediation spent more time talking about emotions during conflict negotiation (see also Ross and Lazinski (2014)). Mediation was beneficial for both older and younger siblings, although in different ways; whereas older siblings became increasingly other-oriented in their negotiations (e.g., by discussing their sibling's goals and interests), younger siblings were empowered to participate more fully in negotiations (e.g., initiating more resolutions). Thus, working with young siblings could benefit not only family interactions, but children's functioning in their broader social world. Whether such programs would benefit adolescents is not as clear, given that they have well-established peer reputations and relationships, and spend more time out of the home.

5. Future directions and conclusions

In summary, a rich theoretical and empirical base supports the design of interventions targeting sibling relationships. Rigorous evaluation will provide the basis for strong clinical recommendations, and the opportunity to test theoretical mechanisms that are difficult to assess with correlational designs (Kramer, 2004). Clearly, more diverse samples must be recruited. Most studies are based on Caucasian children from maritally intact, middle-class families. The generalizability of these findings is limited, as the contexts in which children are embedded, including families, neighborhoods, and culture, will shape their experiences with their siblings and the ways in which this relationship influences their development (McGuire & Shanahan, 2010). Warmth and conflict are key characteristics of sibling relationships in families of different ethnicities, including Mexican–American (e.g., Updegraff, McHale, Whiteman, Thayer, & Delgado, 2005), and African–American (e.g., Whiteman et al., 2015); however, the correlates and consequences of these dimensions may differ. For example, Mexican–American families hold strong familial values (Updegraff, McHale, et al., 2005), and lower sibling warmth may be particularly detrimental. In addition,

other important sibling dynamics may emerge within different cultures and family structures. For example, in single-parent families, youth are more likely to be caretakers for younger siblings (East, 2010). In general, culturally informed research that helps us understand how siblings function within their families and communities will aid in the development of interventions that will be effective in their specific delivery context.

More research also needs to examine the sibling relationships of children experiencing clinically significant psychological symptoms. Although there is a growing literature assessing sibling dynamics when one child has autism (e.g., Rivers & Stoneman, 2008) or an intellectual disability (e.g., McHale & Pawletko, 1992), most work examining associations between sibling relationships and internalizing and externalizing symptoms has been conducted with low-risk community samples (Buist et al., 2013). The role of sibling relationships in the development and expression of psychological symptoms may differ when youngsters' adjustment is poorer.

The most immediate clinical benefits may derive from identifying markers distinguishing normative from pathogenic sibling processes, and developing tools for assessing these qualities in applied settings, as well as incorporating a focus on sibling relationships into existing evidence-based interventions, such as parent management training for disruptive behavior problems and interpersonal psychotherapy for depression. Helping youth learn to navigate the challenges and rewards inherent in the intimate bonds between siblings may yield both short- and long-term gain, laying the groundwork for a relationship that can be a source of support and enjoyment across the lifespan.

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Contributors

Mr. Persram identified relevant literature and prepared summaries of these studies. All authors contributed to literature review and synthesis, and each author wrote sections of the manuscript. Dr. Dirks was responsible for the preparation of the final draft. All authors approved the submitted manuscript.

Conflict of interest

No author has any conflicts of interest to declare.

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