MY BROTHER, MY FRIEND: POSITIVE SIBLING RELATIONSHIPS, PEER ACCEPTANCE, AND INTERNALIZING PROBLEMS IN LOW-INCOME BOYS

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Sara R. Nichols, Ph.D.

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80% of American children grow up in a household with one or more siblings (Dunn, 2000). These relationships are known to be intense and highly affectively-charged (Dunn, 1983) and are many individuals' longest-duration relationships, extending across the lifespan farther than most friendships, marital, or parental relationships (Dunn, 1998; Sroufe et al, 2005). A growing body of work suggests that sibling relationships contribute to children's social, cognitive and emotional development, as well as to eventual psychopathology outcomes (Brody, 1998). The current study examines low-income boys' sibling play interactions at age five as a predictor of their subsequent psychological adjustment in later childhood (N = 133). In particular, positive play is examined as a marker of high-quality sibling relationships. The study makes four primary contributions to the field: 1) Identifying child and family predictors of positive sibling interaction in a high-risk sample of young children observed during regular play; 2) Finding differences in positive sibling interactions between siblings with small and large age differences, older versus younger siblings, and African-American and European-American sibling dyads; 3) Demonstrating a relationship between positive sibling interaction at five years of age and absence of psychiatric diagnoses and fewer symptoms up to seven years later in boys at risk for psychopathology; and 4) Identifying the unique contributions of positive sibling relationships,

independent of family functioning and peer relationships, in buffering against the development of psychopathology in this high-risk sample. Results suggest that sibling interactions and in particular, resolution of conflict and negative affect during sibling play, are important directions for continued examination and intervention.

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1.0 INTRODUCTION

80% of American children grow up in a household with one or more siblings (Dunn, 2000). These relationships are known to be intense and highly affectively-charged (Dunn, 1983) and are many individuals' longest-duration relationships, extending across the lifespan farther than most friendships, marital, or parental relationships (Dunn, 1998; Sroufe, Egeland, Carlson & Collins, 2005). While sibling relationships and interactions have begun to garner increasing attention they have been comparatively ignored in studies of children's social environments, often trumped by focus on the parent-child relationship (Conger & Kramer, 2010). However, a growing body of work suggests that sibling relationships contribute to children's social, cognitive and emotional development, as well as to eventual psychopathology outcomes (Brody, 1998). Siblings act as caregivers, teachers, play partners, bullies, and models. In addition, while researchers have begun to shine the magnifying glass on sibling relationships and interactions, much of the extant literature has been conducted with low-risk, typically-developing children. This work does much to illuminate the course of sibling relationships in high-functioning families, however the role of sibling relationships may be even more important in lower-SES families where parental resources may be stretched thin and siblings may be expected or needed (for better or for worse) to pick up the slack in caring for younger children (Baydar, Hyle & Brooks-Gunn, 1997; Brody & Murry, 2001; Brodey, Stoneman, Smith & Gibson, 1999; Burton, 2007; East, 2010; East, Weisner & Reyes, 2006; McHale & Crouter, 1996 Maynard, 2002; Watson, 1998; Zukow, 1989;

Zukow-Goldring, 2002). Reports indicate that in middle childhood children actually spend *more* time in the company of siblings than they do with parents (Bank & Kahn, 1975; Larson & Richards, 1994; McHale & Crouter, 1996), a finding that has been extended to real-time EMA reports from children with major depression (Silk et al., 2009). Given how much time siblings spend together, their interactions with each other should be better understood.

Parents and researchers report that children are extremely interested in siblings and that as early as the second year of life, infants show signs of hyper-attentiveness to their siblings' behaviors and their emotion states (Dunn, 1988). In fact, sibling relationships have been linked to advances in preschool children's affective perspective taking and understanding (Cassidy, Fineberg, Brown & Perkins, 2005; Lewis, Freeman, Kyriakidou & Maridaki-Kassotaki & Berridge, 1996; McAlister & Peterson, 2007; Perner Ruffman & Leekam, 1994), which in turn has been linked to children's adjustment (Bretherton, Fritz, Zahn-Waxler & Ridgeway, 1986). Thus, there is evidence that sibling interactions promote a vital aspect of social competence, which may predict later social skills. Sibling interactions have also been linked directly to interactions with parents and peers, indicating that competence (or conflict) in one social arena may relate to competence or conflict in other social contexts (Erel et al., 1998). And both parenting history and peer competence have been found to relate strongly to children's psychiatric and behavioral outcomes (Rubin et al., 1998). In addition, there is ample evidence that sibling relationships and interactions are directly related to children's later adjustment outcomes, even after accounting for contributing variables such as harsh parenting and early child problem behavior (Bank, Burraston & Snyder, 2004; Criss & Shaw, 2005; Garcia, Shaw, Winslow & Yaggi, 2000; Ingolsby, Shaw & Garcia, 2001; Mackinnon-Lewis, Starnes, Volling & Johnson, 1997; Padilla-Walker, Harper & Jensen, 2010). The focus of this work has often been

on the detrimental effects of sibling conflict, yet positive relationships with siblings may promote psychological health, just as positive peer relations have been shown to do (Kramer, 2010; Volling, 2003). Indeed, sibling relations may function as very long-term, stable friendships. Likewise, children's friendships and peer functioning may account for or interact with their sibling relationships, when it comes to later adjustment outcomes.

In the current study I examine low-income boys' sibling play interactions at age five as a predictor of their subsequent psychological adjustment in later childhood. In particular, I examine positive play as a marker of high-quality sibling relationships and hypothesize that children with more positive sibling play will be buffered against later adjustment difficulties, and that middle-childhood peer acceptance will mediate and moderate relations between early childhood sibling relationships and later psychological functioning. The aim of the current study is to extend the extant literature to examine whether positive sibling relationships can protect from later internalizing outcomes in children who are at heightened risk for problematic psychological and behavioral adjustment. For purposes of clarity, I will divide the current project into two studies. Study 1 will examine aspects and correlates of sibling play interactions at age five that reflect positive relationship quality, probe the effects of demographic/structural variables (such as sibling age difference, race, gender and birth order) on these interactions, and examine possible child and family correlates of sibling interaction (including marital satisfaction, parent-child relationship and child social skills). Study 2 will test the potential protective effects of age five positive sibling relations on the development of internalizing disorders later in childhood and introduce acceptance from peers as a possible mediator or moderator of this relationship. I expect that gender, birth order, race and age difference will yield differences in play interactions and relationship quality in this low-income sample as they have been shown to

in other studies with community-based samples. I additionally expect that parents' marital satisfaction, the concurrent parent-child relationship, and child social skills will be associated with positive sibling play. Indeed, I expect family characteristics to contribute to sibling interaction even when children's social skills are controlled. In addition, I expect that with critical parenting as well as demographic/structural variables controlled, positive sibling interactions in early childhood will buffer against the development of internalizing symptoms and diagnoses at ages 10, 11 and 12. Finally, I expect that this relationship will be mediated by peer acceptance in middle childhood and that positive sibling relations may moderate the effects of low peer acceptance on internalizing outcomes in later childhood.

2.0 STUDY 1. WHEN SIBLINGS ARE FRIENDS: OBSERVATIONS OF SIBLING PLAY

Despite the documented quantity of time that children spend with siblings, and the potential importance of sibling relations in children's later adjustment, the study of sibling interactions has focused overwhelmingly on conflict and negative interactions. Far fewer empirical studies have been directed to questions of the dimensions that comprise positive sibling relations (Kramer, 2010; Volling, 2003), though such constructs have been well-explored in peer relationships (Ladd, Kochenderfer, & Coleman, 1996; Windle, 1994) . Moreover, much of the empirical work that has been conducted on dimensions of sibling relationships has employed self-report measures (Buhrmester & Furman, 1990; Stocker & Youngblade, 1999) with middle or upper-income, predominately European-American samples. While self-reported perceptions of relationship quality may be ecologically valid for older children, when examining children's relationships in early childhood, as in the current studies, observational research is the "gold standard" (Laursen & Pursell, 2009).

Examining positive sibling relations in early childhood may be of particular developmental interest because studies show that siblings spend peak amount of time together at or around the age of school entry (Dunn, Creps & Brown, 1996). Interestingly, though it has been documented that preschool and early school-aged children spend a great deal of time with siblings, relatively little is known about typical sibling play interactions at this age, whether

positive or negative. However, the friendship literature indicates that in early childhood friendship is characterized by "common activities" and "concrete reciprocity" (Hartup & Stevens, 1997). In other words, young children define friends in relatively concrete terms related to sharing and playing ,e.g., "And I give them food. So they give me food back" (Goodnow & Burns, 1985; Howes, 1983). This is likely the case for young siblings as well. Other, harder to observe, core components of relationship quality such as caretaking, warmth and intimacy might be more characteristic of positive sibling relations in older children and later in life, as is true for friendships (Hartup & Stevens, 1997).

Play interactions may provide a developmentally-sensitive window into children's early sibling relationships. Early to middle childhood is known to be an age of rich peer interaction and play and there is no reason to believe that these characteristics would be restricted to the peer domain. Qualitative improvements in peer play emerge in the late preschool period, including more frequent social exchange with longer sequences and turns (Blurton-Jones, 1972; Eckerman, Whatley & Katz, 1975; Holmberg, 1980; Rubin, Watson & Jambor, 1978). Research on friendships indicates that preschool children engage in more sophisticated play with high quality friends (Dunn & Cutting, 1999; Dunn, Cutting & Fisher, 2002), which might be expected with siblings as well. Indeed, positive sibling relations in early childhood can be thought of as resembling friendship, i.e., "the strong, positive affective bonds that exist between two persons and that are intended to facilitate the accomplishment of sociemotional goals" (Bukowski, Mutzoi & Meyer, 2009; Hartup & Stevens, 1997; Hinde, 1987).

How do we know when siblings are friends? The following review will begin with an overview of the behavioral components that might go into this relationship, based on prior literature. The second section will review known and expected demographic or structural effects

on these behavioral components of positive sibling interaction. Finally, it will conclude with a brief review and hypotheses about potential child and family correlates of positive sibling play.

2.1 CONCEPTUALIZING POSITIVE PLAY BETWEEN SIBLINGS

Cooperative play, conflict resolution, affect, communication and engagement have all been identified as important behavioral dimensions of positive sibling and friend interaction. Indeed, these behaviors distinguish between friends and non-friends, and also are associated with one another and maternal ratings of positive sibling relationship (Bukowski et al., 2009). In the current study these behaviors will be examined separately, and also in conjunction with each other. The purpose of this close examination is to identify behaviors that may indicate that siblings are also friends.

2.1.1 Cooperative Play

Observational studies of preschool and early childhood sibling interactions suggest that positive affect, pretend play, and collaboration occur relatively infrequently but in concert with each other, indexing cooperative play (Howe, Petrakos & Rinaldi, 1998; Howe & Recchia, 2005; Howe & Ross, 1990; Minnett, Vandell & Santrock, 1983; Vandell, Minnett & Santrock, 1987). There is evidence for considerable variability in observed cooperative play in siblings this age (McElwain & Volling, 2005). However, when cooperative play does occur between siblings, it is related to mother-reported positive sibling relationship quality (Cutting & Dunn, 2006; Youngblade & Dunn, 1995) as well as high-level conflict negotiations (Howe et al., 1998). Thus,

observational studies indicate that cooperative play may not occur frequently with siblings in the preschool years, but when it does it serves as a good indicator of sibling relationship quality. Given this evidence that cooperative play is correlated with overall relationship quality, the current study will examine how much time children spend playing cooperatively with their sibling.

2.1.2 Conflict Resolution

The issue of conflict is heavily loaded when it comes to sibling interactions. Many investigators have conceptualized high-quality sibling relationships as those high in positive features and low in conflict (Berndt, 2002; McElwain & Volling, 2005; Vandell & Bailey, 1992). However, there is considerable evidence that a high quality sibling relationship is high in positive features and can be either high or low in conflict (Kramer, 2010; Stormshak, Bellanti & Bierman, 1996; Vandell & Bailey, 1992). Indeed, good problem-solving skills and conflict negotiation can actually enhance positive sibling relations (Rinaldi & Howe, 1998). Likewise research shows that conflict is a regular feature in friendship. It appears that a key aspect of a good-quality sibling relationship or friendship is maintenance of the relationship or re-engagement after rupture/conflict occurs rather than absence of conflict (Hartup, Laursen, Stewart & Eastenson, 1988, Howe, Rinaldi, Jennings & Petrakos, 2002). In fact, research shows that friends, compared to non-friends will use negotiation and compromise to resolve conflict and will stay in proximity and continue to play after a dispute (Bukowski et al., 2009; Newcomb & Bagwell, 1995; Recchia & Howe, 2009). Positive conflict resolution strategies, such as negotiation, have been positively associated with sibling relationship quality while aggressive resolution of conflict has negative associations to relationship quality (Howe et al., 2002; Rinaldi & Howe, 1998). Thus the current

study employed conflict resolution as a marker of sibling relationship quality. In particular, based on the friendship literature (Bukowski et al., 2009; Newcomb & Bagwell, 1995) effective conflict resolution is conceptualized here as resulting in maintenance of proximity and expedient reengagement of play.

2.1.3 Affect

Positive affect is a face-valid marker of relationship quality. Siblings who are playing well display more positivity. As noted previously, positive affect has been shown to occur in conjunction with sibling cooperation and pretend play (Howe et al., 1998; Howe & Recchia, 2005; Howe & Ross, 1990). Likewise, in peer play it distinguishes between friends and non-friends (Bukowski et al, 2009). Positive affect has been included in broader conceptualizations of sibling "positive approach," along with other behaviors such as showing or giving objects, vocalizing, smiling, laughing, affectionate touching, helping, comforting, approaching, imitating while looking at sibling, and joint physical play or games (Brody et al., 1996; Kendrick & Dunn, 1983; Minnett et al., 1983; Vandell et al., 1987; Volling & Belsky, 1992). Inversely, negative affect is usually included in negative interaction factors, alongside behaviors and constructs like "dominance" and "control," thought to occur less frequently in high quality sibling interactions (Brody et al., 1996; Kendrick & Dunn, 1983; McElwain & Volling, 2005; Minnett et al., 1983; Vandell et al., 1987). Like conflict resolution, negative affect in a play interaction may not necessarily index low relationship quality or problematic behavior. Research shows that negative affect is normative in young children's sibling and friendship interactions (Dunn, 1983; Katz, Kramer & Gottman, 1992). In this sense, negative affect during play may actually indicate high levels of engagement – it could occur when children are disagreeing about which toy they want,

or whose turn it is, or what direction the pretend scenario will take. Instead of conceptualizing negative affect in sibling play as problematic, the current study sees the presence of negative affect as providing children with the opportunity to practice effective emotion regulation. Thus, the current study examines both positive and negative affect as markers of sibling relationship quality.

2.1.4 Communication

Communication between siblings may be closely related to the other behavioral dimensions described above including cooperative play, conflict resolution and positive and negative affect. It has been found that friends talk with each other more than non-friends (Bukowski et al., 2009). Research has also included sibling communication in broad positive relationship factor scores (Brody et al., 1996; Minnett et al., 1983; Vandell et al., 1987). In a small, mixed-income sample of 4-year-old children playing with an older sibling Cutting & Dunn (2006) found negative associations between mother-reported sibling positive relationship quality and non-communication between siblings, suggesting that communication may index high-quality sibling relationship. At the very least, absence of communication may indicate a problem in the play interactions of siblings. Thus, this study examines frequency and quality of communication between siblings during play.

2.1.5 Engagement

All of the above behaviors involve some amount of social engagement. Indeed, concepts such as "positive approach" depend on engagement with each other (Brody et al., 1996; Kendrick &

Dunn, 1983; Minnett et al., 1983; Vandell et al., 1987). As with the previous behaviors, positive engagement also distinguishes between friends and non-friends (Bukowski et al., 2009; Newcomb & Bagwell, 1995). However, even negative engagement , including conflict, suggests some level of interest in the play partner. Indeed, disengaged, parallel play is nominally low in conflict, but might reflect an underlying lack of interest in the play mate. Thus, in the current study the amount of either positive or negative engagement will be considered as siblings play with toys together.

Taken together, prior studies of sibling and friendship interactions highlight several specific behavioral domains that distinguish higher from lower quality relationships: cooperative play, conflict resolution, affect, communication and engagement. This study examines these domains during sibling play interactions in a low-income sample of boys in early childhood. Other studies have employed self-report measures, or utilized observational methods to examine just a few of these constructs with older children and/or middle and upper-class samples (Brody et al., 1996; Howe et al., 1998; Howe & Recchia, 2005; Howe & Ross, 1990; Kendrick & Dunn, 1983; Minnett et al., 1983; McElwain & Volling, 2005; Vandell et al., 1987; Volling & Belsky, 1992). The current study thus aims to extend extant understanding of the nature of early childhood sibling relationships by using established behavioral domains to index positive sibling interactions in a low-income, under-studied population.

2.2 STRUCTURAL/DEMOGRAPHIC VARIABLES

Sibling relationships are defined by significant fixed structural differences between the two children. Sibling dyads differ in the children's birth order, gender, and age difference, and

families differ by racial background. How these structural qualities affect relationship quality has long been of interest for parents and researchers alike (Abramovitch, Corter & Pepler, 1980; Bigner, 1974; Bowerman & Dobash, 1974; Bragg, Ostrowski & Finly, 1973; Buhrmester & Furman, 1990; Furman & Buhrmester, 1985; Dunn, 1983; Dunn & Kendrick, 1981; Koch, 1960; Minnett et al., 1983**)**. Indeed, such questions feature prominently in the majority of sibling studies, both observational and self-report (Brody & Stoneman, 1995; Bigner, 1974; Furman & Buhrmester, 1985; Minnett et al., 1983; McElwain & Volling, 2005). These studies indicate significant effects for birth order, sibling gender and age difference. Fewer studies have examined sibling effects for race, but there is some indication that this may also be associated with some features of sibling interaction (McGuire & Shanahan, 2010). In the current study we examine positive sibling interactions in relation to these structural variables, extending prior work to a low-income and racially diverse sample.

2.2.1 Birth Order

A wider literature that explores sibling relationship quality, primarily via self-report, suggests that children's perceived quality of their sibling relationship varies with birth order. For example, it has been found that during middle childhood older siblings are more influential than younger siblings on overall relationship quality and older siblings are perceived as more domineering as well as more nurturing than younger siblings (Brody & Stoneman, 1995; Bigner, 1974; Bragg, Ostrowski & Finly, 1973; Buhrmester & Furman, 1990; Furman & Buhrmester, 1985; Minnett, et al., 1983; Tucker, Updegraff, McHale & Crouter, 1999). Older siblings may exert influence over their younger siblings' relationships outside the family as well, with studies indicating more similarity between second-born adolescents' sibling relationships and friendship intimacy than

that of first-borns (Dunn, 2007; McHale, Updegraff, Helms-Erickson & Crouter, 2001; Tucker et al., 1999). However, contributions of second-born children appear to increase with age, not surprisingly, as siblings become more equal in status and power over the course of childhood (Dunn, 1988; Vandell et al., 1987). Thus the self-report findings on birth order suggest that older sibling may be more nurturing, domineering and influential than younger siblings, but little work has examined the issue of birth order using observations of real-time sibling interaction.

2.2.2 Gender and Gender x Birth Order

Same-sex dyads report more closeness than opposite-sex dyads, and there is evidence that sisters perceive their relationships to be closer than brothers or sister-brother dyads. (Bowerman & Dobash, 1974; Dunn, 1983; Dunn & Kendrick, 1981; Furman & Buhrmester, 1985). Studies have shown that girls perceive their relationships with a same-sex sibling as close, but boys are increasingly unlikely to report intimate relations with siblings by middle childhood (Burhmester & Furman, 1990; Dunn, Slomkowski & Beardsall, 1994). However, gender effects also seem to interact with birth order. Overall, children are more likely to report intimacy, prosocial behavior and affection for older sisters than for older brothers or younger siblings of either gender (Buhrmester & Furman, 1990).

When it comes to observations of sibling play (rather than perceptions of relationships) gender and gender by birth order effects are still found. Indeed, observational studies indicate that older female siblings may promote more positive sibling relationships, as dyads with older female siblings are more likely to engage in sophisticated play, girls are more likely to praise their siblings than boys, and older siblings are more likely to initiate prosocial behavior than younger siblings (McElwain & Volling, 2005; Minnett et al. 1983; Volling, Youngblade &

Belsky, 1997). Thus, evidence from studies of both perceived sibling relationship quality and observed sibling interaction suggest effects for gender and gender by birth order interactions such that older female siblings may be more supportive and prosocial than older male or younger female siblings.

2.2.3 Age Difference

Sibling dyads with wide age spacing report less conflict and more admiration and prosocial behavior than those with narrow age spacing (Buhrmester & Furman, 1990; Furman & Buhrmester, 1985; Koch, 1960; Minnett et al., 1983) while older preschoolers may behave more prosocially to infant siblings than do younger preschoolers (Kramer & Gottman, 1992). Early observational studies suggested that dyads spaced more than two years apart were more competitive with each other (Koch, 1960), however later research found that age spacing has little effect on sibling behaviors (Abramovitch et al., 1980), or even that siblings display more positive behaviors towards siblings with wider age difference (more than two years) than they did to siblings who were closer in spacing (Minnett et al., 1983). One study found that siblings with larger age spacing were assessed by mothers to have less positive relations than those with small age spacing whereas observed interactions of the same children actually showed more positivity between pairs with wider age difference (Stocker, Dunn & Plomin, 1989). This study highlights a possible difference between perception of sibling relationship and observational assessment. Thus the findings regarding effects of age difference on sibling relationships are somewhat mixed, but the effects seem to lean in the direction of indicating that siblings with greater age differences show more positive behaviors towards each other than do close-aged siblings, at least in observed interactions.

2.2.4 Race

Structural/demographic factors including age difference, birth order and gender may be systematically related to positive sibling behaviors in complex, interactive ways. However, these findings are almost all from studies of European-American or European children. While differences have been established in African-American and European-American caregiving and parenting styles (Brody & Flor, 1998; Lamborn, Dornbusch, & Steinberg, 1996), there is limited evidence that norms for sibling relations may also vary between these groups (Brody, Stoneman, Smith & Gibson, 1999; Burton, 2007; McHale & Crouter, 1996; McGuire & Shanahan, 2010; Watson, 1998). Likewise, little is known about the effects of structural or demographic variables in African-American siblings as none of the studies cited above employ an African-American or racially diverse sample. One isolated study found that older African-American siblings may positively impact their younger siblings' competence in peer achievement and self-regulation, especially when the sibling relationship was rated as low in conflict (Brody & Murry, 2001). However, no observational study of African-American siblings has clearly or systematically explored sibling relationship quality. The current racially-diverse sample provides an opportunity to explore characteristics of positive play in both African-American and European-American sibling dyads. It is difficult to make specific predictions, however given the likelihood of increased caregiving responsibilities (East, 2010) there is some possibility that older female siblings in African-American dyads will engage in more caretaking activities, and perhaps display greater positivity with their siblings during the play session. Alternately, greater caregiving responsibilities could actually result in lower positive relations between boys and their older sisters in an African-American sample (Baydar et al., 1997; Burton, 2007; East, 2010;

East, Weisner & Reyes, 2006; Maynard, 2002; Zukow, 1989; Zukow-Goldring, 2002). Thus, I will examine Race by Birth Order by Gender interactions in this study.

Taking this work together, a picture begins to emerge that suggests that structural variables including sibling gender, birth order and age difference may systematically influence sibling interactions and relationship quality and perception. However, much of this work has been conducted via self-report rather than observation. Moreover, markedly few of these studies have employed racially diverse samples. Likewise few have examined socioeconomically diverse or underprivileged children, who may have different relationships with their siblings if older siblings are required to provide care for younger siblings. Thus, a second goal of the current study will be to shed light upon these structural variables in a relatively large, racially diverse sample of low-income boys playing with their siblings. Based on prior literature I expect that playing with an older sibling and greater sibling age difference will confer benefits on positive aspects of sibling play. Likewise, I expect that playing with a female sibling, and an older female sibling in particular, will promote positive behaviors in this low-income sample.

2.3 Family and Child Correlates of Positive Sibling Play

The current study will examine positive behaviors in children's play interactions with a close-aged sibling. However, we know that sibling relationships are nested within the larger family context and may be affected both directly and indirectly by aspects of the individual child and family environment (Brody, 1998). Investigators have examined two primary areas of "spillover" from family to sibling relationships: parent-child relationships and marital relationships. The spillover hypothesis suggests that emotional and behavioral qualities transfer from one

relationship to the other, consistent with the family systems model (Cox & Paley, 2003; Minuchin, 1988; Sameroff, 1994). Considerable evidence exists to support the notion of spillover between parent-child and sibling dyads (Erel, Margolin & John, 1998; Pike et al., 2005). Indeed, studies have found links between specific parenting practices and sibling relationships and interactions both cross-sectionally and longitudinally (Brody, Stoneman, McCoy & Forehand, 1992; Brody et al., 1994; Dunn, Deater-Deckard, Pickering, Golding et al., 1999; Furman & Lanthier, 2002). These links appears to exist for both self-report and observed interactions, and for both positive and negative interactions, though the focus of research has often been on relations between harsh parental discipline and sibling conflict (Blakemore, 1990; Felson, 1983; Patterson, 1986; Brody, Stoneman, & MacKinnon, 1986; Brody et al., 1992; Hetherington, 1988; MacKinnon, 1989). Relations between parenting and sibling relationships have been found in early childhood (Dunn & Kendrick, 1982; Kendrick & Dunn, 1983; Vandell & Wilson, 1987; Teti & Ablard, 1989; Volling & Belsky, 1992) as well as middle childhood (Bryant & Crockenberg, 1980; Furman & Giberson, 1995; Volling, 2003). Thus, the current study will examine relations between the concurrent mother-child relationship and positive sibling interaction in early childhood.

A second area of possible spillover involves marital relationships. Marital conflict has repeatedly been shown to influence aspects of children's sibling interactions (Brody et al., 1987 Brody et al., 1992, Brody et al., 1994; Erel et al., 1998; Hetherington, 1998; MacKinnon, 1989; Stocker et al., 1997; Stocker et al., 1999). Indeed, marital conflict has been shown to relate to less warmth and more child-reported sibling conflict and rivalry (Brody et al., 1994; Erel et al., 1998; Stocker & Youngblade, 1999). As with parent-child relationships, the primary area of investigation for this pathway has been from marital conflict to sibling conflict. Little if any

investigation has been conducted on the possibility of spillover from marital satisfaction to positive sibling relationships. Likewise, this work has been conducted largely with self-report measures of sibling relationship, rather than with observed measures of behavior. Thus, in the current study we will examine relations between marital satisfaction and positive sibling behavior during play.

A third area of potential linkage between sibling relationships and children's functioning involves social skills more generally. Few studies have examined specific relationships between children's social skills and their sibling interactions. However, it makes sense that children with good social skills with adults and other children would play well with siblings and vice versa. This link between sibling and peer interactions is bolstered by a handful of studies that indicate that having siblings confers some overall advantage in social skills with peers, with at least one study showing that having one or two siblings (as opposed to none) was associated with enhanced social skills in the peer group setting for 5 year olds (Downey & Condron, 2004) and preschool children without siblings have been found to be more aggressive and less popular in classrooms settings (Kitzman, Cohen & Lockwood, 2002). Thus, a third area of examination in the current study will be relations between children's social skills, more generally, and their positive play behavior with siblings. If such relations are found, then analyses will be conducted to examine whether family variables – marital satisfaction and parent-child relationship – contribute to sibling interactions above and beyond children's broader social skills.

2.4 STUDY 1: SUMMARY AND AIMS

In sum, the current study will seek to replicate and extend prior work, focusing on positive sibling relationship quality and identifying specific behaviors likely to indicate that siblings are friends (i.e., have a high-quality relationship) as well examining how these positive dimensions of behavior may vary with structural characteristics of sibling dyads and be influenced by child and family characteristics. I anticipate that dimensions of positive sibling interaction: play, engagement, affect, communication, and conflict management, will relate to each other, serving as a marker of sibling friendship. In addition, I expect that sibling dyads with an older female sibling will demonstrate more positive behaviors and more cooperative play and communication than dyads with an older male sibling or a younger sibling of either gender. I also expect that dyads in which the target child is playing with an older sibling, regardless of gender, will demonstrate higher-level play, communication and conflict management than dyads with a younger sibling of either gender, because dyads with an older sibling will have a child with greater communication, emotion regulation, and play skills. Sibling age difference and race will also be examined but there are no specific hypotheses about race or age difference as prior literature has not decisively led to any. If significant effects are found for any of the structural variables they will be controlled in subsequent analyses in Study 2. Likewise, if dimensions of positive relations are found to be highly related they will be composited into a single variable for analyses in Study 2. Lastly, child and family correlates of sibling interaction will be examined. If significant associations are found between positive sibling interaction and mothers' marital satisfaction, the mother-child relationship, and child social skills, then these will be followed up with analyses that examine family spillover, controlling for individual children's social skills. I anticipate that social skills, marital satisfaction and positive parent-child relationship will be

associated with positive sibling interaction. Likewise, I expect that parent-child relationship and marital satisfaction will predict sibling interactions even after child social skills are controlled.

3.0 STUDY 2: SIBLING RELATIONSHIPS AS A BUFFER FROM INTERNALIZING: DIRECT EFFECTS AND MODERATION

This study turns to the question of whether positive sibling relationships buffer children from internalizing problems and whether these relations will be mediated or moderated by children's peer functioning. The review begin with a theoretical overview of why interpersonal relationships might be expected to contribute to or buffer against difficulties with internalizing disorders and then review the extant literature supporting this claim, with a focus on sibling relationships.

Internalizing disorders, i.e., depression and anxiety, are characterized by "disordered mood or emotion" (Kovacs & Devlin, 1998). Internalizing disorders in childhood predict concurrent and future problems and pose a significant societal problem: they are associated with impaired social, emotional, and occupational functioning into adulthood as well as attempted and completed suicide (Bardone, Moffitt, Caspi & Dickson, 1996; Rohde, Lewinsohn & Seeley, 1994; Silk, et al., 2009; Weissman et al., 1999). Episodes of depression in particular, are subject to recurrence and evidence shows impaired social functioning even between acute episodes (Puig-Antich, 1985b, Weissman et al., 1999).

One of the leading conceptualizations of the emergence of depression is the interpersonal-behavioral model in which depression has been explained in terms of the individual's experience of negative affect (Cole, Martin & Powers, 1997; Lewinsohn, 1974) as

well as high levels of rejection in the social environment (Coyne, 1976). There is considerable evidence that reduction of positive affect and disruptions in the brain's reward-processing system may also contribute to the development of depression, including in the current sample (Clark & Watson, 1991; Forbes et al., 2007). This connection between absence of positivity and depression is seen in a variety of settings, including interactions with peers and family members (Altmann & Gotlib, 1988; Hammen & Rudolph, 2003; Rubin, Bukowski & Parker, 2006; Sheeber, Hyman & Davis, 2001). While interpersonal factors are not as directly linked to childhood anxiety disorders, there is evidence that childhood anxiety and depression may form a developmental continuum with childhood anxiety evolving into adolescent and adult depression (Albano, Chorpito & Barlow, 2003; Brady & Kendall, 1992). Moreover, rates of co-morbidity between depression and anxiety in childhood have been estimated to be as high as 60%; thus interpersonal functioning may also be relevant in the etiology of childhood anxiety disorders (Albano et al., 2003; Brady & Kendall, 1992). Following is a brief review of the evidence for impairment in social functioning in children with internalizing disorders in the context of peer and parent-child interactions. The subsequent section will review the more limited evidence for links between sibling relationships and internalizing problems.

3.1 INTERNALIZING PROBLEMS AND INTERPERSONAL FUNCTIONING WITH PARENTS AND PEERS

Increased hostile and aversive behaviors in concert with decreased positive behaviors have been linked to children's internalizing symptoms and are emblematic of depressed children's interactions with their parents, even after remission from an episode of depression (Dietz et al.,

2009; Hammen & Rudolph, 2003; Puig-Antich et al., 1985a). Moreover, studies have shown that certain types of parenting increase children's risk for subsequent psychological difficulties. In particular, disengagement, overprotective and overcontrolling parenting, avoidant strategies, and critical behaviors have been identified as associates and predictors of children's internalizing symptoms and diagnoses (Brunk & Henggeler, 1984; Dietz et al., 2009; Hetherington & Martin, 1986; LaFreniere & Dumas, 1992; Messer & Beidel, 1994; Mills & Rubin, 1998; Rubin & Burgess, 2002; Rubin, Hastings, Stewart, Henderson, & Chen, 1997; Sheeber et al., 2001; Silk et al., 2009; Siqueland, Kendall & Steinberg, 1996). On the other hand, a positive, warm relationship with a parent is a known protective factor that can help shield at-risk children from negative outcomes (Emery & Forehand, 1996; Masten, 2001; Vanderbilt-Adriance & Shaw, 2008; Werner & Smith, 1982).

Similarly, competent social behavior with and acceptance by peers in childhood is widely acknowledged to be an important correlate of children's mental health and when peer competence is impaired or lacking, mental health problems may follow (Bierman, 2004; Coie, Dodge & Kupersmidt, 1990; Rubin et al., 2006). In observational studies of the peer interactions of depressed children, depressed probands compared to nondepressed children were found to engage in less social activity and spend more time alone in the playground, as well as more likely to be engaged in aversive or aggressive behaviors (Altmann & Gotlib, 1988; Kazdin et al., 1985). Similarly, anxiety-disordered children demonstrate poor social skills, engage in solitary activities, have fewer reciprocated friends, and are perceived as less socially competent than their peers (Rudolph, Hammen & Burge, 1994). Sadly, these impairments in social functioning with peers may maintain and even extend children's mood problems (Gazelle and Ladd, 2003; Oland & Shaw, 2005).

Links between sociometric status and internalizing disorders suggest that rejection from peers is significantly associated with internalizing problems, and rejection from peers in middle childhood may represent a pathway to later loneliness and depression (Bukowski, Brendgen & Vitaro, 2007; Rubin et al., 1995; Hoza, Molina, Bukowski & Sippola, 1995). Peer rejection is also associated with lack of involvement in dyadic friendships, which may mediate relations between peer rejection and subsequent depression (Nangle, Erdley, Newman, Mason & Carpenter, 2003). In fact, it has been found that the presence of at least one reciprocated friendship can serve as a protective factor in children's functioning (Bukowski, 2001; Parke & Asher, 2003), suggesting that just one friend may be enough to help shield children from the effects of rejection. Study 2 hypothesizes that sibling relationships might be able to play a similar role as friends in buffering at-risk children against the development of adjustment difficulties.

In contrast to peer rejection, popularity or peer acceptance is positively associated with characteristics that may protect children from internalizing outcomes, including prosocial behavior, sense of humor, academic and athletic abilities, attractiveness and wealth (Cillesen & Mayeux, 2004; LaFontana & Cillessen, 2002; Rose, Swenson & Waller, 2004). Additionally, popularity is negatively associated with withdrawal and submissiveness (LaFontana & Cillessen. 2002; Parkhurst & Hopmeyer, 1998). Just as rejection has been robustly associated with withdrawal and internalizing problems, peer acceptance has been identified as a pathway that protects children from these problems (Rubin, Bukowski & Parker, 1998), in part because it provides children with supportive relationships and continued opportunities to play, learn, and interact with others.

In addition to peer acceptance, social play is a known correlate of psychological health as well as positive development more generally and poor play skills in the peer context can

contribute to and predict negative functioning. Play with peers is a normative developmental accomplishment and is known to contribute to children's cognitive and emotional growth (Fromberg & Bergen, 2006; Singer, Golinkoff & Hirsh-Pasek, 2006) and to be a primary context for fostering skills needed for social interaction (Bredekam & Copple, 1997). Social play is a medium for reconstructing and gaining mastery over emotionally arousing experiences and promotes self-regulation (Coplan & Arbeau, 2009). Links have been found between peer pretend play and emotional health (Berk, Mann & Ogan, 2006; Fein, 1989; Galyer & Evans, 2001). A body of work suggests that impaired play in the peer context (such as unoccupied or on-looking behavior) is predictive of later shyness and social fear (Coplan, Prakash, O-Neil & Armor, 2004) and associated with anxiety, loneliness, low-self esteem, poor social competence and peer exclusion, and internalizing symptoms (Coplan & Arbeau, 2009; Coplan, Clossan & Arbeau, 2007; Coplan, Findlay & Nelson, 2004; Coplan, Gavinski-Molina, Lagace-Sequin & Wichmann, 2001). Moreover, so-called "solitary-active" play in which children pretend by themselves instead of with peers, reflects immaturity and impulsiveness, and is associated with peer rejection, impulsivity, poor social problem-solving, academic difficulties, and externalizing problems (Coplan, 2000; Coplan, Wichmann & Lagace-Seguin, 2001; Coplan, Rubin, Fox. Calkins & Stewart, 1994; Coplan, Gavinski-Molina et al, 2001; Rubin, 1982). Thus, examining children's play interactions may provide a window into their interpersonal functioning more generally.

Thus, peer and parent-child interactions have been linked to risk for later internalizing problems. At the same time, we know that positive relationships with parents or peers can protect from such problems. Given the amount of contact that children have with siblings, and the opportunities for play and affect regulation that are provided in the sibling context, it is

reasonable to expect that positive sibling relationships might also serve a buffering role, but little work has explored this possibility. Evidence for this link is reviewed below.

3.2 SIBLING RELATIONSHIPS AND ADJUSTMENT

Sibling conflict and poor sibling relationship quality has been linked to a host of maladaptive outcomes, including internalizing and externalizing difficulties (Bank, Patterson & Reid, 1996; Conger & Conger, 1994; Conger, Conger & Scaramella, 1997; Conger, Simons & Conger, 2001; Criss & Shaw, 2005; Dunn et al., 1994; Garcia et al., 2000; Hetherington & Martin, 1986; Kim, Hetherington & Reiss, 1999; Padilla-Walker et al., 2010; Richmond, Stocker & Rienks, 2005; Slomkowski et al., 2005; Stocker, 1994; Stocker, Burwell & Briggs, 2002; Waldinger et al., 2007; Yeh & Lempers, 2004) and health-risk behaviors such as drug use and sexual risk behavior (East & Khoo, 2005; East & Shi, 1997; Hall, Henggeler, Ferreira & East, 1992). Given known socialization and spillover effects from parent-child to sibling-sibling relationships, variance associated with early critical parenting must be accounted for when examining links between sibling behaviors and later adjustment, because effects of early rejecting and critical parenting on children's internalizing and externalizing problems are well-documented (Belsky, Woodworth & Crnic, 1996; Campbell, Pierce, Moore, Marakovitz & Newby, 1996; Campbell, Shaw & Gilliom, 2000; Pettit, Bates & Dodge, 1997; Zahn-Waxler, Iannotti, Cummings & Denham, 1990). Several studies have found that high conflict sibling relationships contribute independently, over time, to children's externalizing outcomes above and beyond parenting effects (Garcia et al., 2000; Padilla-Walker et al., 2010; Stocker et al., 2002).

However, fewer studies have examined if and how positive sibling relationships may *protect* against negative outcomes in at-risk populations. Research on adult adjustment indicates that concurrent and past sibling relationship quality is a strong predictor of self-reported well-being (Gold, 1989; Milevsky, 2005). Early-childhood relations may set the stage for such support (Kramer, 2010), but less is known about the protective effects of positive sibling relations within childhood. A recent community-based study reported that pre-adolescents with self-reported affectionate sibling relations were likely to demonstrate prosocial behavior, good self-regulation and low externalizing behaviors one year later, whereas sibling conflict predicted self-reported internalizing symptoms at the later time point (Padilla-Walker et al., 2010). A second longitudinal study of a community sample with children between 8 and 14 years of age found that their self-reported sibling relationship quality was negatively associated with depressive symptoms over time (Richmond et al., 2005). After accounting for parent-child relationship quality, Pike and colleagues (2005) found that parent-reported positive aspects of the sibling relationship were concurrently associated with positive adjustment outcomes for older siblings. Child-reported sibling relationship quality also predicted adjustment for older siblings only (Pike et al., 2005). This study is relatively unique in considering positive as well as negative sibling relationship quality in relation to adjustment outcomes in a young sample. Taken together, this small group of studies suggests protective effects for children with positive sibling relations in community samples. However, the risk for adjustment problems in community samples is relatively low. Less is known about protective effects of sibling relationships in the context of risk.

A small literature does exist that suggests that positive sibling relationships may be particularly protective in the context of interpersonal stress (Hetherington, 1988; Jenkins, 1992),

especially in reference to depressive symptomatology (Anderson, Greene, Hetherington & Clingempeel, 1999; Dunn, 1996; Gass, Jenkins & Dunn, 2007; Hetherington, 1999; Jenkins & Smith, 1990). An early study on this topic found that young children experiencing recent stressful life events had fewer adjustment problems if they had an older sibling (Sandler, 1980). A more recent twin study suggests that prosocial twin siblings may provide protection against peer-group victimization (Lamarche et al., 2006), which is a known risk-factor for adjustment problems (Parker & Asher, 1987).

In addition to these direct effects, several studies have examined sibling relationships as a moderator of risk for internalizing outcomes in particular. Jenkins and Smith (1990) found that self-reported sibling relationship quality moderated relations between parents' high marital conflict and depressive symptomology (Jenkins & Smith, 1990), while Gass et al. (2007) found that self-reported sibling relations moderated relations between stressful life events and future internalizing symptoms, even after accounting for mother-child relationship. East and Rook (1992) found evidence that positive sibling relations moderated relations between social isolation and internalizing symptoms: socially isolated sixth graders who perceived their sibling relationships to be affectionate were less anxious and depressed than those without perceived warm sibling relationships. Recently Morgan, Shaw and Olino (in press) found that observed positive sibling relationships moderated the effects of negative emotionality on internalizing symptoms for boys in the low-income sample used in the current study. Thus, evidence suggests both that direct effects exist between self-reported positive sibling relations and protection from internalizing outcomes and that observed and self-reported positive sibling relations may moderate relations between marital conflict, negative emotionality, stressful life events and social isolation and internalizing outcomes.

However, there has been little exploration of what the mechanisms might be for this protection, i.e., what the core aspects of a supportive sibling relationship might be. Moreover, these studies have explored sibling relationships predominately with parent report or self-report in older children, which are subject to reporting bias. Furthermore, the studies cited above have explored symptoms of internalizing disorders via questionnaire checklists with community-based samples and just one has examined a sample where poverty, a chronic stressor, increased the risk for maladjustment. Poverty is known to be a particularly potent chronic stressor that affects multiple aspects of family functioning (Buckner, Mezzacappa & Beardslee, 2003; Kim-Cohen, Moffitt, Caspi, & Taylor, 2004; McLloyd, 1990; 1998), but little work has examined sibling relations in families facing the far-reaching stress of chronic financial impoverishment (Hetherington, 1988; Jenkins, 1992). Nor have previous studies employed a diagnostic measure of internalizing symptoms, which may be a more valid measure of impaired functioning, as sub-clinical internalizing symptoms are relatively normative in a variety of stressed, low-income populations (Chung et al., 2004; McBarnette, 1996). The current study will address some of these limitations by observing sibling interactions in a high-risk sample, employing both symptom and diagnostic outcome measures, and controlling for early critical parenting.

3.3 MECHANISM: MEDIATION AND MODERATION

One potential pathway for sibling relationship effects on children's adjustment is via mediation or moderation of peer functioning, given demonstrated associations between sibling relationships and adjustment as well as peer acceptance and adjustment. The following portion of the paper

will examine evidence for direct and interactive relations between sibling relationships and peer functioning.

There is considerable evidence that children utilize what they have learned in the sibling play context, applying it in their peer interactions and vice versa (Kramer & Gottman, 1992). Similarities across social contexts may occur because children may elicit similar responses from different others (Caspi & Elder, 1988). Both attachment and social learning theory point to the likelihood of children modeling interaction patterns from one social context to another (Parke & Buriel, 1998) and there is evidence to support this. In particular, there is consistency in children's sibling and peer relationships and aggressive, controlling behaviors as well as positive behaviors (Kramer & Gottman, 1992; Slomkowski & Dunn, 1992; Vandell et al., 1987; McCoy et al., 1994; Stocker & Mantz-Simmons, 2006; Vandell & Wilson; 1987). Likewise, aggressive boys with high-conflict and high-warmth relationships with a sibling (which may translate to a highly engaged sibling relationship) are likely to be functioning competently with peers compared to other aggressive boys with less engaged relations with siblings (Stormshak et al., 1996). Given associations between sibling functioning and peer relationships, the current study will examine positive interactions with siblings at age five in relation to peer acceptance at ages 8-10, predicting that peer acceptance will account for some of the variance between sibling interactions and lower internalizing symptoms and disorders.

Alternately, peer functioning may operate interactively with sibling relationships and moderate the effects of sibling interaction in predicting internalizing symptoms and diagnoses. There is empirical evidence, sometimes in the same studies that find evidence for links between sibling and peer relationships, that suggest that children may compensate for weaknesses in one relationship with strengths in the other (East & Rook, 1992; McElwain & Volling, 2005; Stocker

& Dunn, 1990; Volling et al., 1997). Research on social support has suggested that specific aspects of support may be available from more than one social partner, with social compensation or an interplay between the support that is obtained from different social relationships (East & Rook, 1992; Weiss, 1986; Buhrmester & Furman, 1986; Furman & Buhrmester, 1985b). Three studies provide strong evidence for this possibility for sibling and peer relationships. In a study of peer-nominated "isolated", "aggressive", and "average" 6th-grade children, perception of support from their favorite sibling buffered internalizing outcomes for isolated children (East & Rook, 1992). A second study found that high child-reported warmth in sibling relations in middle-childhood moderated the effects of low friendship warmth on behavioral conduct (Stocker, 1994). Yet, both of these studies examined older children, and both employed questionnaire measures that tapped children's perceptions of relationships, rather than coded observations of sibling interactive behavior. In the one study that did employ observations of young children's behavior with peers and siblings McElwain & Volling (2005) found that high quality sibling relationships moderated associations between peer friendship and aggressive and disruptive behaviors in middle-class preschool-aged children, but not internalizing symptoms. In the current study I aim to extend this finding in a high-risk sample, and to internalizing outcomes.

3.4 STUDY 2: SUMMARY AND AIMS

In sum, the current study examines positive sibling interactions in a low-income sample of boys in order to determine whether positive sibling relationships in early childhood might buffer risk for psychiatric diagnoses and symptoms later in childhood. The study employs observational

methodology to examine sibling interactions as a source of possible resilience in the context of poverty, a chronic stressor, and risk factor for later adjustment difficulties. The study builds on strengths of other studies, controlling for early critical parenting, and also broadening the range of outcome variables to examine both symptoms and psychiatric diagnoses. I hypothesize that positive sibling relationships in early childhood will protect children from internalizing symptoms and diagnoses later in childhood.

In addition, the study utilizes a measure of popularity in middle childhood to examine whether peer functioning mediates relations between positive sibling interaction in early childhood and protection from maladjustment in pre-adolescence. I expect that peer acceptance will mediate relations between sibling interaction and internalizing symptoms and diagnoses. Sibling interactions are also be examined as a possible moderator of peer acceptance effects, given the evidence that friendships and peer relationships can operate interactively with sibling relationships. I anticipate that boys with low acceptance and low positive sibling relationships will be at greatest risk for internalizing problems, while boys who are not popular but who do have positive sibling relationships will be somewhat buffered from internalizing outcomes. In this sense, I expect that for boys who are not well-accepted by peers, siblings may act as surrogate friends, protecting them from loneliness and its accompanying worry and sadness.

4.0 STATEMENT OF PURPOSE & HYPOTHESES

Researchers have explored correlates of sibling conflict, rates of conflict, and even *what* siblings fight about (Campione-Barr & Smetana, 2010). However, positive sibling interactions have not been subject to the same scrutiny, even though positive sibling relationships may be important in supporting the acquisition of social skills and promoting psychological adjustment. While many studies have shown that siblings spend abundant time together, the nature of these interactions (beyond fighting) has been only minimally explored (Kramer, 2010). Moreover, most prior work examining sibling interactions has employed community samples rather than children who may be at risk for psychological maladjustment. such as those raised in poverty, for whom sibling interactions may serve unique functions. Low economic status is generally associated with a large number of stressors that increase risk for psychological difficulties (Vanderbilt-Adriance & Shaw, 2008). However, very little descriptive work has been conducted to understand the characteristics of sibling interaction in low-income families (Brody, 1998). The first part of the current study examined positive sibling behaviors during dyadic play in a prospective, longitudinal data set employing observational assessments of sibling relationships in a subsample of the Pitt Mother and Child Project, a longitudinal, prospective study of 310 low-income boys and their families. Positive behavior between 5-year-old siblings was examined in conjunction with structural/demographic factors (birth order, sibling gender, age difference, race) as well as

child and family correlates, including marital satisfaction, parent-child relationship and child social skills.

The second study explored whether and how positive sibling interaction at 5 years of age protect against subsequent development of childhood internalizing problems in this high-risk sample of low-income boys, after controlling for early childhood critical parenting. Internalizing problems were measured with parent and child symptom self-reports and diagnostic interviews. Study 2 additionally examined whether these direct relations were mediated by acceptance from peers in middle childhood. Finally, moderation analyses probed whether positive sibling relations moderated the link between acceptance from peers and lower internalizing problems.

Although girls' rates of depression and anxiety are double those of boys during later adolescence and adulthood, boys and girls are equally susceptible to childhood internalizing disorders (Albano et al., 2003; Angold & Rutter, 1992). There is some evidence to suggest that young boys may be particularly vulnerable to suboptimal rearing environments (Feng et al., 2008; Martin, 1981; Shaw et al., 1994; 1998). Thus, examining sibling interaction in this population contributes both to basic research questions about the development of sibling relationship quality and to preventive and intervention models for children at-risk for internalizing disorders.

However, it should be noted that children who are at high risk for internalizing disorder are also at heightened risk for externalizing disorders, with estimates of co-occurrence as high as 45% in childhood and early adolescence (Capaldi & Stoolmiller, 1999; Cole & Carpentieri, 1990; Loeber & Keenan, 1994). Some argue that there may be non-specific expression of psychopathology in children such that conduct problems may be the expression of "masked depression," or that subtle symptoms of depression and anxiety may be dampened by more overt

expressions of externalizing disorder (Hammen & Compas, 1994; Kovacs, Paulaskas, Gatsonis & Richards, 1988; Kovacs, 1990; Oland & Shaw, 2005; Nottelman & Jensen, 1995). Indeed, prior studies indicate that there are high rates of co-occurrence of externalizing and internalizing symptomatology within the sample used in the current study (Gilliom & Shaw, 2004; Ingolsby, Shaw, Owens & Winslow, 1999; Moilanen, Shaw & Maxwell, 2010). Thus, while the current study focused primarily on internalizing disorders in late childhood and early adolescence, analyses also examined relations of positive sibling relationships with externalizing symptoms and diagnoses and with children's psychological functioning more generally.

4.1 STUDY QUESTIONS & HYPOTHESES

4.1.1 Question 1.a.

How are dimensions of positive sibling relationship related to each other? Do dimensions of positive relationships differ according to birth order, gender, age difference or race?

Based on prior literature I expected that dimensions of sibling play would be related; that dyads with an older female sibling would display more cooperative play and more communication than those with older male or younger siblings of either gender; and that dyads with an older sibling regardless of gender would demonstrate higher-level play and communication and more effective conflict management than dyads with a younger sibling.

4.1.2 Question 1.b.

How do dimensions of sibling positivity relate to conceptually relevant constructs of child and family functioning such as child social skills, marital satisfaction and parent-child relationship? Do family variables predict sibling interaction after controlling for individual child social skills?

Prior literature indicated a strong likelihood that there would be spillover between sibling relationships and other aspects of children's individual and family functioning. I expected that positive aspects of sibling interaction would be related to children's social skills, their parents' marital satisfaction, and their concurrent relations with their parents. I predicted that there would be spillover such that parental marital satisfaction and qualities of the parent-child relationship would contribute to sibling interactions even after child social skills were controlled.

4.1.3 Question 2.a.

Do positive sibling relationships predict lower internalizing symptoms and diagnoses on the CBCL, MASC, CDI or K-SADS? Do they predict global psychological functioning?

Other research has shown that high conflict sibling interactions can increase children's risk for psychopathology, especially externalizing symptoms. Based on this, I hypothesized that positive sibling interactions at age five would predict lower internalizing symptoms and diagnoses at ages 10, 11 and 12, even with early childhood critical parenting controlled.

4.1.4 Question 2.b.

Does peer acceptance mediate relations between sibling positivity and lower internalizing problems?

Given known associations between peer popularity and internalizing symptoms as well as anticipated relations between peer functioning and sibling interaction, I expected that peer acceptance at ages 8-10 would act as a mediator between positive sibling relations at age five and lower internalizing symptoms and diagnoses at ages 10 - 12.

4.1.5 Question 2.c.

Does positive sibling relationship moderate the relationship between peer acceptance and internalizing outcomes?

I expected that positive sibling relationships at age five and peer acceptance at ages 8 – 10 would interact in the prediction of ages 10-12 internalizing disorders such that children with low positive relations with siblings and high peer acceptance would be protected from internalizing outcomes as would children with low peer acceptance and highly positive sibling relationships, while children who were low on both peer acceptance and on positive relations with siblings would be at greatest risk. This hypothesis was based on prior literature that indicated that positive sibling relations can moderate associations between peer rejection and internalizing problems.

5.0 METHOD

5.1 PARTICIPANTS

Participants were part of the Pitt Mother and Child Project (PMCP), an ongoing longitudinal study of child vulnerability and resiliency in low-income families (Shaw et al., 2003). 310 infant boys and their mothers were recruited from Women, Infants, and Children (WIC) Nutrition Supplement Clinics in Allegheny County, PA. At recruitment, mothers were required to have at least two children at home, with the target child approaching 1.5 years old. Average educational level of parents was 12.5 years, and two-thirds of mothers in the sample had 12 years of education or less. Sixty-five percent of mothers were married or living with partners, 28% were never married, and 7% were separated, divorced, or widowed. At the first assessment, mean per capita income was $241 per month, or $2,892 per year ($11,568 for a family of four) while mean Hollingshead (1975) four-factor index of socioeconomic status was 23.35 (*SD* = 9.29). The sample consisted of Caucasian (54%), African-American (40%), and mixed-race or Hispanic families (6%) (Shaw et al., 1998).

To be included in the current study participants needed to have data available for a sibling play interaction conducted at the 60-month visit as well as peer sociometric data available from the study-based summer camp at ages 8-10. In this sub-sample of 133 boys with available data, 46% of the siblings were girls, 87% of siblings were older than the target child, 59% of

siblings were within two years age difference of the target child, and 40% of dyads were African American while 48% were Caucasian. The remaining 12% of families identified themselves as "Other". There were no significant differences found between boys in this subsample and the larger PMCP sample in 60-month reported mother's education (F = 1.54, p = .22) or overall family socioeconomic status (F = .20, p =.66). However, boys in the current study sample came from families with significant lower reported family incomes (M = \$1, 450, SD = \$707) at 60 months (F (1, 276) = 9.80, p <.01) than boys who were not included in the current study (M = 1,836, SD = \$1,247). Thus, the current sample was particularly low-income.

5.2 PROCEDURES

Observational and maternal report data were collected at the lab and/or home when the target child was 1.5, 2**,** 3.5, 5, 5.5, 6, 8, 10, 11, and 12 years old. Parents completed questionnaires regarding sociodemographic characteristics, family factors (e.g., parenting, family members' relationship quality), and child behavior. Children were interviewed regarding their own adjustment starting at age 5.5. In addition, parents, other family members (siblings, alternative caregivers), and friends of the target child were videotaped interacting with each other and/or the target child in age-appropriate tasks, including mother-son clean-up tasks in early childhood and sibling play during preschool and school-age periods. Participants were reimbursed for their time at the end of each assessment.

Retention rates were generally high at each of the 12 time points from age 1.5- to 12-years old, with 90-94% of the initial 310 participants completing assessments at ages 5 and 6, some data available on 89% or 275 participants at ages 10, 11, or 12, and no indication of

selective attrition based on demographic characteristics or child problem behavior at ages 2 and 3.5 (Shaw et al., 2003).

In the current study, data were obtained from Sibling Interaction observed during a home assessment at age 5 (60 months); Critical Parenting was assessed observationally during a parent-child clean-up task at 24 months; Marital Satisfaction was assessed via questionnaire administered to mothers at 42 months; Parent-child Relationship was assessed via questionnaire administered to mothers at 60 months; Child Social Skills was assessed via questionnaire administered to mothers at 60 months; Peer Acceptance was measured using peer -report measures during a study-based summer camp at ages 8-10; and Internalizing Symptoms and Diagnoses and Externalizing Symptoms and Diagnoses were measured via parent and child report at age 10, 11 and/ or 12. Details for all assessments and measures are provided below.

5.3 STUDY MEASURES

5.3.1 Demographic Information

At each visit parents were asked to provide demographic information about their family. In the current study primary caregivers were asked the names and ages of their child's siblings at the 60 month home visit. Parents were also asked to identify their child's race. Race was coded as 1 = European American; 2 = African American; 3 = Hispanic; 4 = Other. There were no Hispanic children in the current study sample. Gender, Birth Order and Age Difference were calculated based on parents' report and corroboration with the videotaped sibling interaction. Gender of Sibling was identified as 1= male; 2 = female. Age Difference was calculated continuously and

then dichotomized as 1= less than or equal to two years; 2 = more than two years. Birth Order was dichotomized as 0 = target child playing with younger sibling; 1= target child playing with older sibling. One set of twins in the sample was coded as 99 (uncodable) for Birth Order.

5.3.2 Sibling Interaction

5.3.2.1 Procedure

Families were visited at home when the target child was 5 years old. The target child and his sibling were videotaped playing with up to three sets of toys for 1 hour, while the examiner and mother completed a Q-sort task in the same room. In the current study minutes 5 to 25 of the play period were coded. During this time children were playing with a castle with a shooting cannon and knights and a Lion King set with moveable animal figures. The mother was told that she should interact with the children as she normally would (Garcia et al., 2000).

5.3.2.2 Observational Coding

Sibling interactions were coded for cooperative play, conflict resolution, positive and negative affect, communication and engagement. The codes were adapted from the peer coding systems developed for the NICHD Study of Early Child Care (NICHD SECC, 2001). Coding began five minutes into the tape to allow parents, children, and examiners to settle in, and other interference to dissipate. Coding was then conducted for the next twenty minutes. Preliminary informal examinations of the tapes indicated that twenty minutes was enough time to capture important aspects of the play interaction and that children displayed positivity in this period. Indeed, coders had the impression that children may have become more negative over the course of the play interactions, as they grew tired of the toys and/or activity. Thus, the first twenty minutes of play

may have represented the most positive period. To capture the desired information, three types of codes were used: interval codes (1 minute intervals), duration codes, and global ratings. Durations were coded using the Noldus Observer 5.0 computer-based software. Prior to coding, coders were trained to 85% or greater reliability (see below for reliability procedure and statistics) on all behavioral categories. All coders were blind to children's outcomes. The specific codes are described below.

5.3.2.3 Cooperative Play

Duration of cooperative play was coded each time it occurred. Cooperative play involved a degree of reciprocity and complementary action and/or mutual gaze and awareness of other. It may or may not have involved pretense. Cooperative play implied that both siblings were working towards a shared play goal. For example, if one sibling put a figure in the castle and said "he's the king" the other child might put his figure next to the other and say "he'll be the prince". Alternately, if one sibling took a cannon and shot the cannonball across the room and the other sibling retrieved it and handed it back for another turn, this would have been considered cooperative play for the duration of the activity. Duration of time spent in cooperative play (in seconds) was derived for each dyad, M = 309.29s, SD = 323.25s.

5.3.2.4 Conflict Resolution Rating

Dyads were given a global score, based on the entire 20 minute episode, for outcomes of conflict using the following scale: 0 = after conflict episodes play was consistently interrupted, and/or negative interactions escalated; repair or reengagement was not seen for extended period of time (3 minutes plus) after conflict episode. 1 = Some conflict may persist or escalate but positive repair (i.e., apology, handing back taken toy, etc.) or reengagement was sometimes seen within

2-3 minutes of conflict episodes. 2 = Dyad has some conflict but repaired or reengaged quickly when it happened, within a minute; escalation of negative affect or conflict was rarely seen. It could be that opportunities for conflict arose (for example, one sibling grabbed a toy from the other) but the situation did not escalate. 99= No conflict or conflict opportunity occurred. Global scores were used, *M* = 1.68, *SD* = .60.

5.3.2.5 Affect

Target child Positive and Negative affect and Sibling Positive and Negative affect were separately coded in 1-minute intervals. Affect was coded on the following scale: 0 = neutral affect; 1 = low/brief, fleeting affect; 2 = moderate affect (multiple instances of low affect or one instance of prolonged affect); 3 = high affect (prolonged strong affect) or multiple instances of mild/moderate affect; 99 = uncodable/not visible. Examples of positive affect included smiles, laughter, positive tone of voice, clear enthusiasm or excitement. Negative affect included whining, expressing discontent, boredom (clear expression of disinterest), anger or hostility. Affect codes were summed over twenty intervals (or number of codable intervals). Target and sibling positive and negative affect were summed to create one dyadic (target + sibling) positive affect composite and one dyadic (target + sibling) negative affect composite score. Thus, each composite score has a total potential of 120, or 60 for each participant. For Dyadic Positive Affect *M* = 20.89, *SD* = 17.06. For Dyadic Negative Affect *M* = 9.64, *SD* = 10.17.

5.3.2.6 Communication

Dyads were coded in 1-minute intervals for the highest level verbal and gestural communication observed using the following scale: 0 = No communication in interval. Children did not speak at all during the interval or someone spoke (or vocalized), but was clearly not addressing sibling.

Sound effects during play session were considered to fall into the this category; 1 = Some gesture or communicative noises, at least one member of dyad gestured or addressed the other communicatively. No clear response was received; 2 = Back-and-forth communicative exchange happened at least once in interval. Child and sibling took at least one turn speaking to each other. Child or sibling may also have communicated at a level deserving a rating of 1 at times, but deserving a rating of 3 at other times; 3 = Concerted efforts at communicating with each other were observed. Child and sibling exchanged dialogue for 30+ seconds of the interval (not necessarily consecutively). Could have taken the form of a discussion of a fantasy scenario. 99 = uncodable. Each dyad had a total communication score that reflected the rating for each interval summed across all intervals. Thus, total possible communication score was 60. *M* = 31.37, *SD* = 13.99.

5.3.2.7 Engagement

Duration of dyadic engagement was coded each time it occurred. This included watching sibling, eye contact with sibling, approaching sibling, playing with sibling, talking to sibling, fighting with sibling or any other behaviors that indicated that the target and/or sibling was paying attention to the partner. This included recruiting, imitating or joining sibling. Dyadic engagement was coded when the target and sibling were simultaneously engaged with each other, and only when both children were clearly attending to each other. If only the target child or only the sibling or neither the target nor sibling were engaged, dyadic engagement was not coded. Total duration of dyadic engagement in seconds was employed for this score, *M* = 574.49s, *SD* = 342.49s.

5.3.2.8 Reliability

The author coded tapes along with four undergraduate assistants in two separate coding teams – two assistants on one team that coded only duration codes (engagement, cooperative play) using Noldus Observer and two assistants on a second team that coded interval (affect, communication) and global codes (conflict resolution) manually using paper and pencil. Both teams watched the same dyads, but training was conducted on separate tapes to minimize bias for the first author (who was leading both teams). Each coding team engaged in a lengthy training period during which all coders watched tapes together, consensus coded tapes together, and discussed and resolved discrepancies. The training tapes were drawn from dyads that were not in the final sample and their codes were not included in reliability calculations. Intercoder reliability was computed between each coder and the lead author (the "gold standard") for a subset (20%- 27%) of the data. Reliability tapes were selected randomly and coded over time to prevent drift. Inter-rater reliability was adequate for all interval codes (ICCs = .91-.99), global codes (ICCs = .90-.91) and duration codes (ICCs = .84 -.90). See Table 1 for details.

5.4 CHILD AND FAMILY CORRELATES

5.4.1 Parent-Child Relationship Quality

Concurrent parent-child relationship quality was measured with the Adult-Child Relationship Scale (ACRS), adapted from Pianta & Steinberg (1991). Primary caregivers completed this 30-item measure at age 60 month home visits describing their relationship with their child on a 5-point scale from 1 (definitely not) to 5 (definitely). A validated Openness score was comprised of

five items that included “If upset, this child seeks comfort from me”; “This child likes telling me about himself”; “It's easy to be in tune with what he is feeling”; “He is open with me about sharing feelings and telling me how things are”; and “Dealing with this child makes me feel good about how I handle things”. Alpha for this factor was .69 with *M* = 22.28 and *SD* = 2.71. Higher scores reflected higher openness.

A validated Conflict score was comprised of ten items that included items such as “He and I always seem to be struggling with each other”; “This child gets angry at me easily”; “This child feels I am unfair to him”; “This child stays angry or resists me after being punished”; and “Dealing with this child drains my energy”. Alpha for this factor was .83 with *M* = 25.18 and *SD* = 7.96. Higher scores reflected higher conflict.

5.4.2 Parent Relationship Satisfaction with Significant Other

Parent relationship satisfaction was measured with the Marital Adjustment Test (Locke & Wallace, 1959). This widely-used measure assesses individuals’ level of satisfaction and adjustment to their relationship with significant others. At the 42 month home visit, primary caregivers rated how each of 15 statements described their relationships with a significant other. Items address degree of happiness in the relationship and agreement on multiple issues (e.g., family finances, matters of recreation). Scores were summed in a Total Score, alpha =.80, *M* = 103.58, *SD* = 29.50. Higher scores reflected better marital adjustment. Marital satisfaction scores at 42 months were chosen because this was the closest available time point to the age 60 month sibling play observation, thus it was believed that this score would reflect the most proximal estimate of the marital climate.

5.4.3 Child Social Skills

Child social competence was measured with Social Skills Rating Scale (SSRS; Gresham & Elliot, 1990), administered to primary caregivers at the age 60-month home visit. This measure was used to assess various aspects of children's social skills, with items like "Follows rules when playing games with others"; "Volunteers to help family members with tasks"; and "Participates in organized group activities." Respondents rated their children's skills on 39 items that described the child's behavior on a 3-point scale in terms of their frequency (0 = never, 1 = sometimes, 2 = very often). The SSRS has four subscales: Cooperation, Assertion, Responsibility and Self Control. These subscales were examined separately and found to correlate highly with each other (*r*'s ranged from .40 to .63). Each individual subscale was strongly associated with the Total Score, which was used for final analyses (*r*'s for subscales to total score ranged from .72 to .83). In the Total Score higher scores indicate greater social skills. For this Total Score, alpha = .88, *M* = 43.27 and *SD* = 9.72.

5.5 PEER ACCEPTANCE: CAMP POPULARITY

5.5.1 Procedures

In the ninth year of the PMCP children participated in a two-week summer day camp to examine their behavioral and social competencies in a naturalistic setting (Shaw et al., 2003). Children were assigned to one of three camp sessions, each of which was held for ten days across a two-week period. At each session, there were four to five separate groups, each comprised of 10-12

children and guided by two counselors who were college students and had received training in behavioral management strategies. Activities were typical of YMCA-administered camps, including arts and crafts, small and large group games, skits, field trips, free play, and swimming. Because of the concern about anti-social behavior contagion effects (Dishion, McCord, & Poulin, 1999), no more than two children were placed in the same group who demonstrated a history of clinically-meaningful externalizing scores, based on mother and teacher reports at ages 5, 6, and 8 years. In addition, children of different ages were assigned evenly among the different groups to ensure heterogeneity in child age. Every effort was made to ensure that children in each group had not previously met. Based on counselor impressions, 3-4 children were assigned to other groups due to previous contact with another group member (Criss et al, 2009). No selective attrition effects were found between children who attended the camp and those who did not attend based on initial demographic characteristics and child problem behavior at ages 1.5, 2, and 3.5 (Criss et al., 2009; Trentacosta & Shaw, 2009).

Children completed individual sociometric ratings (Coie, Dodge & Coppotelli , 1982) at the end of each week. During the sociometric interview, children were presented with a roster of children in their group and were asked to rate the extent to which they liked each peer on a 3-point scale (0 = "doesn't like," 1 = "like OK," 2 = "like a lot"), and to nominate up to three peers from their group who best characterized 14 attributes (e.g., "threaten to beat others up," "are usually shy"). The nomination procedure was not mutually exclusive. Sociometric ratings are often used in conjunction with nomination procedures to identify accepted and rejected children (e.g., Asher & Dodge, 1986).

Mean peer ratings were the average rating each child received from peers in his group for weeks one (M = 1.31, SD = .37) and two (M = 1.18, SD = .44) and were averaged over weeks (r

= .71, $p < .001$). Ratings from both weeks were employed in order to maximize sample size. *Social preference* reflects the standardized difference between the "like most" and "like least" nominations scores based on the mean ($r = .64$, $p < .001$) of scores from weeks one ($M = .00$, $SD = 1.66$) and two ($M = .00$, $SD = 1.68$). Mean peer ratings and social preference scores were standardized and composited to create a Camp Popularity score. When scores from multiple weeks were available, they were summed and averaged. If only one week was available, then only that score was used. The scores were then centered before using. These scores have been used to examine children's peer functioning in several other published papers from this sample (Criss et al., 2009; Trentacosta & Shaw, 2009). For the current sample, $M = 0$, $SD = .31$.

5.6 CONTROL VARIABLE: EARLY CHILDHOOD CRITICAL PARENTING

Maternal critical parenting was measured at age 2 using the Early Parenting Coding System (EPCS), which was designed to measure a range of parenting behaviors typically exhibited in interactions with young children (Shaw, Winslow, Owens, Vondra, Cohn, & Bell, 1998). The EPCS is an observational coding system consisting of 9 categories of parenting strategies coded molecularly, per behavior, as well as six global ratings (Winslow, 1995; Winslow, Shaw, Bruns, & Kiebler, 1995). Molecular and global ratings were made from videotaped mother-child interactions during a five minute structured clean-up task at the 24-month lab assessment. These codes included molecular ratings of verbal and physical approval and critical statements. Physical approval was defined as the use of physical gestures such as head nods or laughter to show acceptance of the child, and verbal approval was defined as the use of praise or verbal affirmations such as "Way to go!" Critical statements were verbal statements that criticized the

child's behavior or character such as "You're bad" or verbal statements to prohibit behavior such as "Stop it." A composite score "Critical Parenting" was created by first summing the inverted frequency score for approval and the frequency of all critical statements. Thus, the score could be negative if there were frequent approving statements, that were then inverted. This variable was then standardized before using. Thus this variable reflects absence of parental approval and presence of parental criticism at age two, during a clean-up task. The composite score was created based on *a priori* evidence of parenting approaches that have been shown to relate to later internalizing symptoms (Dietz et al., 2008; Sheeber et al., 2001). For the current sample, $M = 0$, $SD = 1.0$.

5.7 OUTCOMES: INTERNALIZING AND EXTERNALIZING DIAGNOSES AND SYMPTOMS

Youth internalizing behavior was measured at ages 10, 11 and 12 via a combination of youth self-report of depression and anxiety symptomatology, and parent- and youth-reported psychiatric diagnoses. Diagnosed psychiatric disorders were examined separately from internalizing and externalizing symptoms. Symptoms were assessed with 1) mother-reported symptom checklist scores (CBCL); 2) youth-reported depressive symptomatology (CDI); 3) youth-reported anxiety symptomatology (MASC). Diagnostic outcomes were assessed with the Schedule for Affective Disorders and Schizophrenia for School Aged Children (K-SADS).

5.7.1 Parent-Report of Internalizing and Externalizing Symptomatology

Primary caregiver reports of boys' internalizing and externalizing problems were obtained from the widely-used Child Behavior Checklist (CBCL/4–18; Achenbach, 1991). The CBCL contains a broad-band internalizing and externalizing factors derived of symptoms that load onto each factor. These broadband factors were averaged across ages 10, 11 and 12 to create a more robust and generalizable measure of internalizing and externalizing symptomatology, Composite CBCL Internalizing and Composite CBCL Externalizing. For this sample Composite CBCL Internalizing M = 5.83, SD = 5.21. Composite CBCL Externalizing M = 10.47, SD = 8.16.

5.7.2 Youth-Reported Depressive Symptomatology.

Youth self-report of depressive symptoms at ages 10, 11 and 12 were measured with a 10-item short form of the Child Depression Inventory (CDI, Kovacs, 1992). For the items on the CDI, youths were presented with a group of three statements and asked to choose the sentence that best describes their feelings in the past two weeks. The CDI has been shown to have adequate reliability and validity (Kazdin, French, Unis, Esveldt-Dawson, & Sherick, 1983). The scores from age 10, 11 and 12 were averaged to create a more robust and generalizable measure of depressive symptomatology, called Composite CDI, M = 1.22, SD = 1.27. Higher scores represent greater depressive symptoms.

5.7.3 Youth-Reported Anxiety Symptomatology

Youths' anxiety symptoms were measured with a 10-item short form of the Multidimensional Anxiety Scale for Children (MASC, March, Parker, Sullivan, Stallings, & Conners, 1997). For the items on the MASC, youths were presented with a series of statements indicating anxiety-arousing situations (e.g., "I'm afraid that other kids will make fun of me") and asked to rate how true each statement was for him "recently" on a 4-point scale. The MASC has been shown to have adequate reliability and validity (March et al., 1997). The scores from age 10, 11 and 12 were averaged to create a more generalizable measure of anxiety symptomatology, called Composite MASC, $M = 10.52$, $SD = 3.94$. Higher scores indicate greater recent anxiety.

5.7.4 Internalizing and Externalizing Diagnoses

During the age 10, 11 and 12 visits primary caregivers and their sons were administered the K-SADS (Kaufman et al., 1997) by a trained examiner. The K-SADS is a semi-structured interview that assesses *DSM-IV* child psychiatric symptoms over the previous year via parent and child report. Diagnoses for disorders were based on *DSM–IV* criteria, considering the severity of children's symptoms and level of clinical impairment. Youth reported their own internalizing symptoms while mothers reported externalizing symptoms. For the current study, youths who did not meet criteria for any internalizing disorders (i.e., Major Depressive Disorder, Dysthymic Disorder, Generalized Anxiety Disorder, Panic Disorder, Specific Phobia, Social Phobia, Post-Traumatic Stress Disorder, Separation Anxiety Disorder, Obsessive-Compulsive Disorder) at any age (10, 11 or 12) were grouped as "internalizing diagnosis absent" while youths who meet criteria for any of the disorders at any age of the three ages were dichotomized as "internalizing

disorder present." The same approach was employed for externalizing present and absent scores with externalizing diagnoses including Attention Deficit/Hyperactivity Disorder, Oppositional Defiant Disorder and Conduct Disorder. 50 children in this sample were in the K-SADS Externalizing Diagnosis present group. 35 children were in the K-SADS Internalizing Diagnosis present group.

5.7.5 Global Psychological Functioning Score

Because symptoms of depression may manifest as acting-out behaviors in young children, overall functional impairment was explored as a second possible marker of childhood psychological functioning. A K-SADS symptom count was created to form a psychological impairment score for each child, where symptoms for each disorder were either absent (0 = no clinical symptoms) or present (1= symptoms present). All symptoms were included in this measure, both those from internalizing disorders and externalizing disorders. Symptom counts were composited over ages 10, 11 and 12, thus each child was assigned a continuous "Global Psychological Functioning" score. M = 24.36, SD = 23.92. Higher scores indicates a greater number of psychological symptoms, which may index worse functioning.

6.0 RESULTS

6.1 DATA ANALYTIC OVERVIEW

The primary goals of the proposed research were to identify and characterize dimensions of positive sibling interaction in early childhood among children from low-income families, and to investigate relations between positive sibling relationship dimensions in early childhood and internalizing behavior at ages 10, 11 and 12 in children at high risk for internalizing disorders.

Bivariate correlations were first conducted to examine relations between aspects of positive sibling interaction. Factor analysis was then employed to reduce the core dimensions of sibling positive interaction for subsequent Study 1 and Study 2 analyses.

To address Study 1 questions the original, conceptually-driven dimensions of positive sibling interaction and the empirically-driven factors were examined in relation to the demographic variables in order to explore group differences in positive sibling interaction. The factors and their component behaviors were then examined for relations to child, family and sibling dyad structural variables. Additionally, multiple linear regressions were used to examine whether family relationships predict sibling interaction above and beyond children's social skills.

Study 2 analyses employed multiple linear regression and logistic regression to examine whether positive sibling interaction helps protect children from internalizing and externalizing outcomes after controlling for demographic variables and early critical parenting. Finally, peer

acceptance at summer camp at ages 8-10 was examined as a potential mediator and moderator of relations between positive sibling interaction at age 5 and the emergence of psychopathology later in childhood at ages 10-12.

Multiple measures of adjustment across multiple informants were analyzed as outcomes. Because symptoms of depression and anxiety are by their very nature internal, they can be difficult to identify in children, who are not always accurate reporters. Thus, the rule of thumb for identifying such disorders is to employ multiple informants and methods (Hammen & Rudolph, 2003). Consistency between informants on symptom questionnaires is often modest (Achenbach et al., 1987), thus child and parent symptom reports were examined separately in the current study. Dichotomous K-SADS scores were additionally used to predict actual diagnosed cases, which is a conceptually distinct outcome from that of a continuous measure of symptom counts. All outcome measures were composited and/or averages across the three ages (10, 11 and 12) to increase robustness and generalizability.

Sample size varied across analyses as not all measures were available for each subject at every time point. To maximize power and to form more generalizable constructs, efforts were made to aggregate across periods close in time and/or informants whenever possible (Patterson, Reid, & Dishion, 1992). When data for a composited measure were missing at one of two time points or for one of two informants, data from the one data point or informant were used to minimize missing data. When data was missing for a variable, a list-wise method of deletion was used to ensure that only subjects with complete data on the analysis variables were entered into that specific analysis.

6.2 DESCRIPTIVE STATISTICS

Descriptive statistics for the sample characteristics, independent variables and dependent variables are displayed in Tables 2 - 4. Given the significant discrepancy in group size (t = 29.53, $p < .001$) between dyads with a target playing with an older sibling and dyads with a target playing with a younger sibling, the question of whether to examine only a subsample with targets and older siblings was considered (see below).

In terms of study outcomes, 37.9% of boys qualified for one or more externalizing disorder diagnoses (Attention Deficit Hyperactivity Disorder, Oppositional Defiant Disorder or Conduct Disorder) at age 10, 11 and/or 12 based on parents' report on the K-SADS. Rates of internalizing were somewhat lower, but 26.5% of boys qualified for one or more internalizing disorders diagnoses (Major Depressive Disorder, Dysthymia, Generalized Anxiety Disorder, Obsessive Compulsive Disorder, Panic Disorder, Seperation Anxiety, Specific Phobia, Post Traumatic Stress Disorder) at age 10, 11 and/or 12 based on their own report of symptoms on the K-SADS. Thus this sample of boys was at very elevated risk for both internalizing and externalizing disorders compared to the general population. Indeed, 48.5% of the sample met criteria for an internalizing or externalizing diagnosis at age 10, 11 or 12, and 15.9% met criteria for an internalizing *and* an externalizing diagnosis at some point between age 10 and 12. In addition, study outcomes were highly correlated (as shown in Table 11). Presence of Internalizing Diagnoses at ages 10, 11 or 12 was significantly correlated with presence of Externalizing Diagnoses at ages 10, 11 or 12 as well as Composite CBCL Internalizing and Composite Externalizing broadband factors, Global Psychological Functioning and Composite CDI and Composite MASC self-reports of symptoms. Despite these significant inter-correlations, multiple outcomes were included due to the conceptual interest in examining parent

and child reports and clinical interview outcomes and clinical symptoms versus psychiatric diagnoses. Analyses did yield different results, as demonstrated below.

6.3 QUESTION 1.A. ANALYSIS

How are dimensions of positive sibling relationship related to each other? Do dimensions of positive relationships differ according to birth order, gender, age difference or race?

Initial examination of bivariate correlations between dimensions of sibling interaction revealed that Cooperative Play, Positive Affect, Dyadic Communication and Dyadic Engagement were significantly positively related to each other, with correlations ranging from .24 to .80; see Table 5. In addition, Conflict Resolution and Negative Affect were strongly inversely associated with each other (r = -.72) but not with the other aspects of interaction.

Due to moderate to high correlations among the *a priori* dimensions of sibling interaction, the six variables were submitted to principal components factor analysis with Varimax rotation. This resulted in a two-factor solution accounting for 74.43% of the variance (Table 6). Factors were determined based on eigenvalues, with a cut off of .5. Factor loadings for the first factor ranged from .52 to .93 and for factor two were .92 and -.93. The first factor included Dyadic Engagement, Cooperative Play, Dyadic Communication and Positive Affect. The second factor included Conflict Resolution and the negative loading of Negative Affect. Thus, the factors translate approximately into Sibling Positivity and Resolution of Negativity. The factors were not correlated with each other.

These analyses were also completed on a subsample (N = 114) that included only dyads where the target child (age 5) interacted with an older sibling, and results were substantively

unchanged. In particular, the sibling interaction factors remained identical though factor loadings changed slightly. Specifically, the two-factor solution for this subsample accounted for 75.31% of the variance. Factors were again determined based on eigenvalues of greater than .5. The first factor again included Dyadic Engagement, Cooperative Play, Dyadic Communication and Positive Affect. The second factor again included Conflict Resolution and Negative Affect. Factor loadings are shown in Table 7. Given that factors and loadings were very similar in the full sample and the smaller sample with older-sibling playmates only, all dyads were included in subsequent analyses to preserve power. Thus the first set of factor scores, including both older and younger sibling dyads, were utilized in all subsequent analyses. Variance associated with birth order was examined for significance and controlled for in individual analyses, if necessary, rather than reducing the overall sample size.

6.3.1 Tests of Differences between Demographic Groups

In order to examine effects of Race, Sibling Gender and Age Difference on sibling interaction, three-way ANOVAs were conducted on a subsample that was European-American (N = 62) or African-American (N = 53) with Race (European-American or African-American), Sibling Gender (male; female), and Age Difference (dichotomized as two years or less versus more than two years difference in age) as the fixed factors and the Sibling Positivity and Resolution of Negativity factors as the dependent variables. Only European-American and African-American siblings were considered because the third category of "Other" was too unspecified to be able to meaningfully interpret findings. Birth Order (older versus younger sibling playmate) was not included in these analyses as this resulted in extremely small cell sizes (n < 10). Instead, Birth Order was examined together with Sibling Gender in a second set of analyses.

Findings showed that Sibling Positivity differed significantly as a function of Age Difference F (1, 107) = 6.37, $p < .05$ and Race F (1, 107) = 4.11, $p < .05$ such that sibling dyads with more than two years age difference, or who were European-American were found to display more positivity than those dyads whose age difference was less than two years, or in which the children were African-American. See Table 8 for means and standard errors. Sibling Gender was not significantly associated with differences in either sibling interaction factor. There were no significant differences for Resolution of Negativity and there were no significant interactions. These differences were followed up with a MANOVA exploring the component behaviors that comprised the two sibling interaction factors.

A three-way MANOVA was conducted with Race (European-American; African-American), Sibling Gender (male; female) and Age Difference (< 2 years; > 2 years) as the fixed factors and the six positive sibling behaviors (Cooperative Play, Conflict Resolution, Negative Affect, Positive Affect, Dyadic Communication, and Dyadic Engagement) as the dependent measures. When behaviors were considered all together, the MANOVA showed no significant main effects for Race, Gender or Age Difference. In addition, there were no significant interactions.

As an exploratory follow-up to the finding of lower Sibling Positivity for Race and to establish whether other family variables also varied by Race, one-way ANOVAs were run with Race as the fixed factor and mother-report of mother-child Conflict and Openness (ACRS) as the dependent measures. There was a trend F (1, 115) = 3.05, p = .08, such that African-American mothers reported marginally higher levels of mother-child Conflict (M = 27.92, SD = 9.07) with their boys than European-American mothers (M = 25.30, SD = 7.20). Effects were not significant for mother-child Openness.

Birth Order (older sibling play partner; younger sibling play partner) and Sibling Gender were examined in separate ANOVAs with Sibling Positivity and Resolution of Negativity as dependent measures. This was conducted in order to examine specific Sibling Gender x Birth Order hypotheses, given that cell sizes were very small for the younger sibling group (n = 17 total; 8 younger males and 9 younger females) so that Birth Order could not be considered in the primary analyses. Significant effects were found for Birth Order, with dyads with a target child and an older sibling demonstrating higher overall Sibling Positivity F (1, 124) = 12.22, $p < .001$. No significant effects were found for Sibling Gender. There were also no significant interactions.

A follow-up MANOVA was conducted with Birth Order and Sibling Gender as the fixed factors and Cooperative Play, Conflict Resolution, Negative Affect, Positive Affect, Dyadic Communication, and Dyadic Engagement as the dependent measures. The overall MANOVA was significant F (6, 119) = 2.23, $p < .05$ for Birth Order. Specifically, effects were significant for Dyadic Communication (F (1, 124) = 10.44, $p <.01$) and Dyadic Engagement (F (1, 124) = 11.74, $p <.001$) such that dyads with a target child and an older sibling playmate showed higher Dyadic Communication and Dyadic Engagement than dyads where the sibling playmate was younger than the target child. There were no significant main effects for Gender or significant Birth Order x Gender interactions. These results should be interpreted with caution as cell sizes were small in the group with younger siblings.

In sum, dimensions of positive sibling interaction were found to be related to each other and to organize into two factors: 1) Sibling Positivity, which included positive affect, cooperative play, communication and engagement; and 2) Resolution of Negativity, which included conflict resolution and low negative affect. Sibling Positivity was found to vary according to sibling birth order, age difference, and race with greater observed positivity in

dyads where the target child was playing with an older sibling, with more than two years age difference between siblings, and that were European-American rather than African-American. Based on these differences, Birth Order, Age Difference and Race were controlled in subsequent Study 1 and 2 analyses. Gender was not controlled as it was not found to differ significantly for any of the sibling interaction variables or factors.

6.4 QUESTION 1.B. ANALYSIS

How do dimensions of sibling positivity relate to conceptually associated constructs of child and family functioning such as child social skills, marital satisfaction and parent-child relationship? Do family variables predict sibling interaction after controlling for individual child social skills?

6.4.1 Correlations between Sibling Interaction and Child and Family Variables

The two sibling interaction factor scores were first examined in relation to child and family variables using bivariate correlations (See Table 5). In particular Sibling Positivity and Resolution of Negativity were examined in relation to concurrent mother-reported parent-child Openness and Conflict scales (ACRS) at 60 months, mother-reported Marital Satisfaction (Locke & Wallace total score) at 42 months, concurrent mother-reported target child Social Skills (Total Score of the SSRS) at 60 months, observed Critical Parenting at 24 months and peer-rated popularity (Camp Popularity) at ages 8-10. Sibling Positivity was not found to relate to any of the child and family variables. Resolution of Negativity was significantly inversely related to mother-reported Conflict with child and positively associated with mother reports of child Social

Skills. These findings were followed up with a more detailed examination of relations between the *a priori* dimensions of sibling interaction and the child and family variables.

Cooperative Play, Conflict Resolution, Negative Affect, Positive Affect, Dyadic Communication, and Dyadic Engagement were examined in relation to mother-child Openness and Conflict, mother-reported Marital Satisfaction, child Social Skills, observed Critical Parenting and Camp Popularity (see Table 5). Results show that observed sibling Conflict Resolution was related inversely to mother-child Conflict as well as positively to mother-reported child Social Skills. Observed sibling Negative Affect was positively related to mother-report of mother-child Conflict, as well as negatively related to Marital Satisfaction. Observed sibling Dyadic Engagement and Cooperative Play were negatively related to observed Critical Parenting at 24 months.

Partial correlations were then conducted for the same measures, controlling Race (including all races), Age Difference (in years, as a continuous measure) and Birth Order (older sib partner or younger sib partner). See Table 9. Patterns of findings were similar to those found in uncontrolled analyses above with some associations becoming only marginally significant and others strengthening mildly. With Race, Age Difference and Birth Order controlled, sibling Resolution of Negativity was still significantly inversely related to mother-child Conflict, and also positively related to child Social Skills. Among the *a priori* dimensions of sibling interaction, Conflict Resolution was still significantly associated with mother-child Conflict as well as with child Social Skills. Dyadic Negative Affect was still significantly associated with mother-child Conflict, but the association with Marital Satisfaction was reduced to a marginal trend. There was an additional inverse trend between Dyadic Negative Affect and child Social Skills. Inverse relations between Critical Parenting and sibling Cooperative Play remained, while

Cooperative Play also became positively associated with Camp Popularity. Thus, with sibling dyad structural variables controlled, there was still a consistent pattern of associations between child and family variables and observed sibling interaction suggesting some possible spillover from one interpersonal domain to another.

6.4.2 Predicting Sibling Interaction from Family Environment

In order to examine the spillover hypothesis in greater detail, or that sibling interaction might partly be a function of general family affective relations, a series of linear multiple regressions were conducted to evaluate whether Marital Satisfaction and Parent-Child Conflict or Openness contributed independently to aspects of sibling interaction above and beyond children's mother-rated Social Skills and sibling dyad structural variables. Thus, in these analyses Race, Age Difference, Birth Order, and child Social Skills were entered at the first step of the equation. In the second step Marital Satisfaction and mother-rated mother-child Openness and mother-child Conflict were entered. These analyses were conducted first with the two factors of sibling interaction (Sibling Positivity and Resolution of Negative Affect) and then with each of the six *a priori* dimensions of sibling interaction (Cooperative Play, Engagement, Communication, Positive Affect, Negative Affect, Conflict Resolution) in order to determine if there were particular behavioral aspects of sibling interaction that were influenced by child and family spillover.

The overall equation was significant for predicting the two sibling interaction factors, Resolution of Negativity and Sibling Positivity (see Table 10a-h for test statistics). For Sibling Positivity it was only the first step (adjusted R^2 = .11), with demographic variables and Social Skills, that resulted in significant *F* change; and only Birth Order (B = .29 p < .05) was an

independent predictor, with dyads in which the sibling playmate was older exhibiting greater Sibling Positivity. In contrast, for Resolution of Negativity *F* change was significant for the second step (adjusted R^2 = .07) indicating that adding mother-child Openness, Conflict and Marital Satisfaction to the model significantly added to explained variance, with mother-child Conflict (*B* = -.30 *p* < .01) operating as a significant independent predictor and mother-child Openness (*B* = -.18 *p* < .10) as a marginal predictor of the Resolution of Negativity.

The individual dimensions followed a similar pattern to the factor scores. The overall equation was significant for predicting the dimensions of Cooperative Play, Dyadic Communication, and Conflict Resolution. The overall equations were marginal for predicting the dimensions of Dyadic Engagement and Negative Affect and not significant for predicting the dimension of Positive Affect. However, the second step of the model added significantly to *F* change only for the dimensions of Conflict Resolution and Negative Affect. Thus, for positive interaction outcomes – Cooperative Play, Dyadic Communication, and Dyadic Engagement, it was only the first step, with demographic variables and Social Skills, that resulted in significant *F* change. In particular, for Cooperative Play (adjusted R^2 = .09 for the final equation), Birth Order (*B* = .21 *p* < .10) and Race (*B* = -.16 *p* < .10) were marginal independent predictors. For Dyadic Engagement (adjusted R^2 = .06 for the final equation), only Birth Order (*B* = .27 *p* < .05) was an independent predictor. For Dyadic Communication (adjusted R^2 = .08 for the final equation) only Birth Order (*B* = .31 *p* < .05) was a significant independent predictor, with child Social Skills (*B* = .19 *p* < .10) as a marginal predictor.

In contrast, for Negative Affect and Conflict Resolution, *F* change was significant for the second step. In particular, for predicting dyadic Negative Affect (adjusted R^2 = .06), mother-child Conflict (*B* = .26 *p* < .05) was an independent predictor and mother-child Openness (*B* =

.21 $p < .10$) was a marginal predictor. For Conflict Resolution (adjusted $R^2 = .08$) mother-child Conflict was a significant independent predictor ($B = -.30$ $p < .01$).

In sum, partial support was found for the spillover hypothesis in that parent-child Conflict appeared to influence expression of Negative Affect and Conflict Resolution in sibling interaction, while there was no indication that Marital Satisfaction independently "spilled over" into aspects of sibling positivity or resolution of negativity. There was also no evidence that parent-child relationship or marital satisfaction contributed independently to Sibling Positivity, including positive features of sibling interaction such as positive affect, communication, engagement or cooperative play.

6.5 QUESTION 2.A. ANALYSIS

Do positive sibling relationships predict lower internalizing symptoms and diagnoses? Do they predict global psychological functioning?

To examine this question preliminary bivariate correlations were conducted, then followed by multiple linear and logistic regressions. The independent variables were the two sibling interaction factors -- Sibling Positivity and Resolution of Negativity. Control variables included sibling Age Difference, Race, Birth Order and Critical Parenting at 24 months. The five continuous dependent variables included Composite CBCL Internalizing symptoms; Composite CBCL Externalizing symptoms ; Composite MASC scores; Composite CDI scores; and Global Psychological Functioning at ages 10, 11 and 12, as indexed by a total symptom count on the K-SADS. In addition, there were two dichotomous outcome variables: presence or

absence of K-SADS Internalizing Diagnosis; and presence or absence of K-SADS Externalizing Diagnosis.

Bivariate correlations between Sibling Positivity and Resolution of Negativity and the dependent variables indicated significant negative relations between Resolution of Negativity and CBCL Externalizing scores, Global Psychological Functioning, and presence of Externalizing diagnosis over ages 10, 11 and 12. See Table 11. These significant preliminary correlations were followed up with a series of linear multiple and logistic regressions examining the seven primary outcomes of interest (Composite CBCL Internalizing, Composite CBCL Externalizing, Global Psychological Functioning, Composite CDI, Composite MASC, K-SADS Internalizing Diagnosis, K-SADS Externalizing Diagnosis). In all equations continuous predictor variables were centered to eliminate non-essential multicollinearity.

6.5.1 Continuous Outcomes: Linear Multiple Regression Analyses

A series of five linear multiple regression analyses was conducted with children's internalizing and externalizing symptoms as the dependent variables. In each of the five equations sibling Age Difference, Birth Order and Race were entered in Step 1, followed by observed Critical Parenting at 24 months in Step 2, followed by the sibling interaction factors -- Sibling Positivity and Resolution of Negativity -- in Step 3. Results are shown in Table 12 a through e. The overall equation was significant for Global Psychological Functioning, adjusted R^2 = .07; Resolution of Negativity between siblings (B = -.24 p < .01) and early childhood Critical Parenting (B = .21 p < .05) were significant independent predictors in the final equation. The overall equation was not significant for Composite CBCL Internalizing, Composite CBCL Externalizing, Composite CDI or Composite MASC.

6.5.2 Dichotomous Outcomes: Logistic Multiple Regressions

A logistic regression was conducted to examine effects of sibling interaction on the two dichotomous dependent measures: K-SADS Internalizing Diagnosis and K-SADS Externalizing Diagnosis. Again, in each regression equation, sibling Age Difference, Birth Order and Race were entered in Step 1, followed by observed Critical Parenting at 24 months in Step 2, followed by the sibling interaction factors (Sibling Positivity and Resolution of Negativity) in Step 3. See Table 13a and b. Results indicate that the overall equation was significant for presence of internalizing diagnoses (χ^2 = 19.51, $p < .01$) with Critical Parenting (B = -.64, OR = .53, $p < .05$) and Resolution of Negativity (B = .42, OR = 1.52, $p < .05$) as significant independent predictors. Sibling Positivity was a marginal independent predictor (B = .48, OR = 1.62, $p < .10$). The final equation was also significant for presence of externalizing diagnoses (χ^2 = 18.03, $p < .01$) with Resolution of Negativity (B = .70, OR = 2.01, $p < .001$) again as a significant independent predictor and Critical Parenting as a marginal independent predictor (B = -.41, OR = .66, $p < .10$).

Thus, siblings' ability in early childhood to resolve their conflicts effectively and to resume play following conflict, and to regulate negative affect with their sibling during play, appears to protect high-risk boys against poor psychological functioning in later childhood, above and beyond the known influence of harsh or critical parenting.

6.6 QUESTION 2.B. ANALYSIS

Does peer acceptance mediate relations between sibling positivity and lower internalizing problems?

Hypothesized mediation of links between sibling interaction and psychiatric outcomes by peer acceptance could not be evaluated because there were no significant relations between either of the sibling factors and camp sociometric status, this study's measure of peer acceptance (see Table 5). Thus, the criteria were not met for testing a mediation model (Baron & Kenny, 1986). It is the case that Camp Popularity acted as an independent, strong negative correlate of both internalizing and externalizing outcomes at ages 10, 11 and/or 12 (see Table 11). Indeed, correlations between Camp Popularity and outcome measures of psychological functioning reveal robust negative associations with many of the dependent measures including K-SADS Externalizing Diagnosis, K-SADS Internalizing Diagnosis, Composite CBCL Internalizing, Composite CBCL Externalizing, Global Psychological Functioning and Composite CDI scores. Thus, sibling interaction was assessed in interaction with Camp Popularity in subsequent analyses predicting adjustment outcomes.

6.7 QUESTION 2.C. ANALYSIS

Does positive sibling relationship moderate the relationship between peer acceptance and internalizing outcomes?

In order to assess whether a positive sibling relationship moderates relations between peer acceptance and psychopathology outcomes a series of seven regression models (5 linear and

2 logistic) were conducted for the seven dependent variables. In each equation the significant structural control variables (Age Difference, Birth Order, Race) were entered at the first step. The second step of the equation consisted of early Critical Parenting. The third step included the centered peer acceptance variable (Camp Popularity) as well as the centered sibling interaction variable (Resolution of Negativity). Resolution of Negativity was selected as a potential moderator because it contributed independently to psychopathology outcomes including KSADS Internalizing Disorders, KSADS Externalizing Disorders and Global Psychological Functioning (see above and Tables 12-13) whereas Sibling Positivity did not. The fourth step included the interaction term between Camp Popularity and Resolution of Negativity. All continuous predictor variables were centered to eliminate non-essential multicollinearity.

6.7.1 Continuous Outcomes: Linear Multiple Regression Analyses

The overall equation was significant for Composite CBCL Internalizing, R^2 = .12. See Table 14a through e. However, the last step of the equation, where the interaction term was entered, did not add significantly to the model (F Δ = 2.00, p = .16). This suggests that the variation in CBCL Internalizing was carried by the additive effects of Critical Parenting, Camp Popularity, and Resolution of Negativity. Indeed, only Camp Popularity was a significant independent predictor of presence of CBCL Internalizing symptoms in the final equation (B = -.29, p < .001). Likewise, the overall equation was significant for Composite CBCL Externalizing, R^2 = .14, but again, the interaction did not improve the model (F Δ = .29, p = .59). In the final equation Resolution of Negativity (B = -.18, p < .05) and Camp Popularity (B = -.34, p < .001) were significant independent main effects predictors of Composite CBCL Externalizing symptoms but their interaction was not. This pattern held for Global Psychological Functioning where the overall

equation was significant, adjusted R^2 = .20, but the interaction term did not add significantly to the model (F Δ = 2.13, p = .15). Again, Resolution of Negativity (B = -.23, p < .01) and Camp Popularity (B = -.35, p < .001) were significant independent predictors of Global Psychological Functioning in the final equation while the interaction between them was not. The overall equation was not significant for MASC or CDI score outcomes.

In sum, evidence was found that Resolution of Negativity with a sibling contributed independently to CBCL Externalizing and Global Psychological Functioning scores at ages 10, 11 and 12, and also that Camp Popularity contributed independently to CBCL Internalizing, CBCL Externalizing and Global Psychological Functioning at 10, 11 and 12, when both Camp Popularity and Resolution of Negativity were considered together. No evidence was found for moderation of peer acceptance by sibling interaction for any of the five continuous outcomes (Composite CBCL Internalizing, Composite CBCL Externalizing, Composite MASC, Composite CDI, Global Psychological Functioning).

6.7.2 Dichotomous Outcomes: Logistic Multiple Regressions

For the dichotomous outcomes, results indicated that the overall model was significant for presence of K-SADS Internalizing Diagnoses (χ^2 = 22.61, p < .01) with Resolution of Negativity (B = .45, OR = 1.57, p < .05), Camp Popularity (B = 1.83, OR = 6.28, p < .05) and Critical Parenting (B = -.59, OR = .55, p < .05) as significant independent predictors. See Table 15a and b. The interaction term between Camp Popularity and Resolution of Negativity was not significant. The final equation was also significant for presence of K-SADS Externalizing Diagnoses (χ^2 = 22.88, p < .01) with Resolution of Negativity (B = .67, OR = 1.95, p < .01) and Camp Popularity (B = 1.51, OR = 4 .51, p < .05) as significant independent predictors. Again the

interaction term was not significant. Thus, evidence was found that when both Resolution of Negativity in sibling interaction and Camp Popularity are considered and Critical Parenting is controlled, both factors contributed independently to the presence of Externalizing Diagnoses at age 10, 11 or 12 and Resolution of Negativity, Camp Popularity and Critical Parenting contributed significantly to presence of an Internalizing Diagnosis at age 10, 11 or 12. However there was no evidence for moderation of peer acceptance by sibling interaction on presence of internalizing or externalizing diagnoses.

7.0 DISCUSSION

When young children interact with another child or group of children, their social partner is very likely to be a sibling. Young children spend abundant time in the company of their siblings and much of this time is spent in play. These play interactions may include conflict, aggression, sharing, pretense, gestures, vocalization, smiles, laughter, tears and wide host of other behaviors. Sibling play interactions are also likely an important testing ground and learning arena for the development of self- and emotion-regulation, social skills, memory and language, among other skills. Despite interest in the social development of young children as it relates to their concurrent and future well-being, little is known about the qualities of young children's play interactions with siblings. Especially little is known in children from low-income households and stressful family environments, who are known to be at risk for psychological and behavioral difficulties. Likewise, we know little about the positive qualities of sibling interaction, which may have the potential to buffer children against some of the stresses in their lives and to mitigate risk for poor adjustment later in childhood or adolescence.

The current study examines the play interactions of five-year-old boys from low-income, urban families with a close-in-age sibling, probing specifically for aspects of positive interaction: resolution of conflict, positive and negative affect, engagement, communication and cooperative play. The study makes four primary contributions to the field: 1) Identifying child and family associates of positive sibling interaction in a high-risk sample of young children observed during

regular play; 2) Finding differences in positive sibling interactions between siblings with small and large age differences, older versus younger siblings, and African-American and European-American sibling dyads; 3) Demonstrating a relationship between positive sibling interaction at five years of age and absence of psychiatric diagnoses and fewer symptoms up to seven years later in boys at risk for psychopathology; and 4) Identifying the unique contributions of positive sibling relationships, independent of family functioning and peer relationships, in protecting against the development of psychopathology in this high-risk sample. These contributions and the findings related to them will be discussed below.

7.1 STUDY 1: CORRELATES OF CHILDREN'S POSITIVE PLAY WITH SIBLINGS

It is well known that children fight with their siblings (and they do!) but they also exhibit a host of prosocial behaviors when playing with each other. Indeed, this study finds evidence that sibling play interactions of low-income boys include ample communicative, cooperative, engaged play. In a growing literature that examines children's sibling relationships (Kramer, 2010), notably few studies have examined young children's behavioral interactions rather than older children's perceptions of their sibling relationship, and even fewer have identified or examined specific behaviors that might index positive relationships (McElwain & Volling, 2005; Morgan, Shaw & Olino, in press). Thus, the first goal of this study was simply to characterize these positive interactions between young siblings at the level of interactive behavior. In a twenty minute play episode in their homes, children in this study spent 25% of the time, on average, engaged in cooperative play with their sibling. They spent an average of almost ten minutes, 50% of the time, actively engaged with their sibling – in positive or negative activities.

Surprisingly, ratings that included both intensity and frequency of affect indicated that children are more than twice as positive as they are negative when playing with novel toys together with their sibling. Parents and observers may *notice* conflict and aggression (which may demand intervention from adults), yet this study finds evidence that positive behavior is occurring regularly, even in a high-risk sample of five year old boys and their siblings – children young enough to have difficulty regulating conflict and independently initiating complex play. It is also evident that the domains of resolution of conflict and regulation of negative affect, in particular, are most influenced by other family variables and are also most protective for later psychiatric outcomes. This suggests the need to focus not just on whether children have conflict with siblings (because we know that they do), but rather how they resolve this conflict constructively and move on from negative affective interactions (Recchia & Howe, 2009). Indeed, others have recognized this, and treatment protocols for intervening in sibling conflict are already underway (Kramer, 2004; Kramer, 2010).

This study represents a first effort to identify and quantify positive sibling interactive behaviors in a low-income sample. Even though the play session that generated the data was initiated for the purposes of this study, we can use it to extrapolate, if cautiously, to children's lives more generally. The implication is that when young children play with siblings, a substantial part of the play involves active social and emotional engagement, and that a high proportion is likely to include cooperative play, with all of its attendant benefits. Interesting questions for future research include how representative this sort of semi-structured play is of everyday interactions, which could potentially be addressed with EMA or related procedures; and whether the amount and quality of sibling social engagement differs in children from different ecological contexts.

7.1.1 Structural Variables: Birth Order, Age Difference, Gender and Ethnicity

A second goal of the current study was to examine the positive dimensions of sibling play interaction in relation to demographic and dyadic structural variables such as birth order, age difference, gender and race of sibling dyads. While some of these constructs – notably birth order, age difference and gender, have been established as important contributors to sibling relationship (Brody, 1998), many findings have been obtained from questionnaire measures administered to older children. We know very little about the specific influence of factors like age difference, birth order, sibling gender or racial background on the play interactions of young children with their siblings. The strongest findings in the current study indicate that older siblings and siblings with a larger age difference support more positive play interactions with 5-year-olds, especially in communication, engagement, positive affect and cooperative play. This finding is consistent with those from other observational studies of sibling play and highlights the way in which sibling interaction may be different from peer interaction: the age difference between siblings may promote more hierarchical interactions, and may also heighten the potential for scaffolding of play (McElwain & Volling, 2005; Stocker et al., 1989; Volling et al., 1997).

Indeed, this finding is consistent with the work of Vygotsky (1978), and also with a handful of studies that indicate that older siblings can support learning in their younger counterparts (Abromavitch, Corter, Pepler & Stanhope, 1986; Azmitia & Hesser, 1993; Brody et al., 1982; 1985; Dunn & Kendrick, 1982; Dunn & Shatz, 1989). A five year old playing with a seven year old stands a far greater chance of engaging in an interesting conversation or contributing to an elaborate pretend play scenario than the same child would when playing with a three-year-old sibling. Some researchers may have characterized this effect as "controlling"

behavior – a more negative interpretation of the way in which an older child can control, but also constructively lead a play interaction (McElwain & Volling, 2005). Older siblings may both control and support and scaffold their younger siblings' play.

Sibling age difference and birth order effects may be heightened by the low-income nature of this sample, because older siblings may be engaged in more caretaking of younger siblings than they would in higher-income families (Brody & Murry, 2001; Brody et al., 1999; Burton, 2007; McHale & Crouter, 1996; Watson, 1998). It is also likely that because these children are growing up in impoverished homes their language development and play sophistication will lag behind that of a higher income sample (McLoyd, 1998). The communicative input from older siblings may be especially important for language and cognitive development of low-income children, thus the scaffolding effect of older siblings on play may be more pronounced in this sample than in some others. The question of older siblings' contributions to younger siblings' cognitive, language or academic achievement via scaffolding of play is not one that the current study addresses, but it will be important for follow-up examination. Indeed, we know that play with peers is an important contributor to children's emotional and cognitive growth, and especially for young children sibling play may be another important venue for positive play practice and development of social skills (Berk et al., 2006; ; Coplan & Arbeau, 2009; Fein, 1989; Fromberg & Bergen, 2006; Galyer & Evans, 2001; Singer et al., 2006; Bredekam & Copple, 1997).

A secondary goal in examining group differences was to replicate and extend the finding from other studies that sisters, and older sisters in particular, might contribute to more positive sibling interactions (McElwain & Volling, 2005; Minnett et al. 1983; Volling et al., 1997). However, in this sample there was no evidence of a main effect for gender on sibling interaction

nor an interaction between gender and birth order. Thus, sisters did not contribute to markedly more positive interactions than brothers. It is possible that the sister effect would have been found if the study had been able to evaluate sister-sister dyads, but the sample's exclusively male target children constrained approaches to this question. However, it may be that this null finding is not a function of the sample, but rather one of methodology. Studies that have found gender effects for sibling relationships have examined relationships primarily via questionnaires in older children (Bowerman & Dobash, 1974; Burhmester & Furman, 1990; Dunn, 1983; Dunn & Kendrick, 1981; Dunn et al., 1994; Furman & Buhrmester, 1985). In this study we observed what children did with each other – not how they said they felt. That is, the current study finds no gender effect in *observed* positive sibling *behaviors* while others have found gender differences in children's *reports* of their *perception* of positive aspects of their relationship. In addition, some aspects of sibling relationship that have been shown to differ with gender, such as perceived intimacy and support, are more developmentally appropriate to older children's relationships than they are for five-year-olds (Hartup & Stevens, 1997). Thus, it is likely that if gender differences exist in sibling relationships that these effects would emerge with age.

A final demographic variable that this study explored was race. The finding that emerged, that African-American sibling dyads display less overall positivity in their play than European-American siblings, as indexed by positive affect, communication, engagement and cooperative play, is an important first step for understanding children's sibling relationships in their macro-level ecological context (McGuire & Shanahan, 2010). The finding that African-American sibling dyads are engaging less positively with each other than European-American siblings is in keeping with known race differences in parenting style, where research shows lower rates of warmth and more "no nonsense" parenting approaches in African-American parents than

European-American parents (Bradley, Corwyn, McAdoo & Coll, 2001; Ispa et al., 2004; McLlyod & Smith, 2002). Indeed, one recent study that employed the same parent-child relationship measure as the current study found that parent-child openness is actually associated with higher levels of anxiety for African-American children, but not for European-American children (Vendlinski, Silk, Shaw & Lane, 2006). Conversely, harsher styles of parenting and discipline have been found to relate to higher rates of externalizing and gang activity in European-American children, but not in African-American children (Bradley, Corwyn, Burchinal, McAdoo, & Coll, 2001; Deater-Deckard, Dodge, Bates & Pettit, 1996; Gunnoe & Mariner, 1997; Hill & Bush, 2001; Lansford, Deater-Deckard, Dodge, Bates, & Pettit, 2004; Lindahl & Malik, 1999; Walker-Barnes & Mason, 2001). Taken together, these findings suggest either that it may be normative or even protective in African-American families to display less positive affect than in European-American families, or that positive affect in African-American families is expressed in ways or in contexts not captured by most observational systems developed with European-American samples. In the current study African-American mothers also reported marginally higher levels of parent-child conflict with their boys than did European-American mothers, suggesting the possibility of spillover from the parent-child relationship into the sibling relationship, but also suggesting the possibility of differing cultural norms regarding conflict that cut across relationships. The current study did not explore potential associates or mechanisms of these differences in sibling positivity; however, the role of racial identity and discrimination needs to be taken into consideration when we examine factors that influence children's socialization, including sibling and family relationships (Garcia-Coll et al., 1996; McGuire & Shanahan, 2010).

7.1.2 Correlates and Contributors to Sibling Interaction

In addition to examining birth order, age difference, gender and race differences in sibling play, this study also provides evidence that children's behavior with their siblings is related to longitudinal and concurrent individual and family characteristics. When mothers are critical, rate their relationships with their children as higher in conflict, or their marital satisfaction as low, children appear to display more negativity with siblings, resolve conflict with siblings less well, and/or spend less time engaging and playing cooperatively with siblings. Specifically, children whose mothers see their relationships with their son as high in conflict are also likely to concurrently demonstrate negative affect with their siblings, and less likely to be resolving conflict effectively with siblings. These findings hold even when race, sibling age difference and birth order of siblings are accounted for. Likewise mothers' criticism and lack of approval of their children observed at two years of age is related inversely to the children's cooperative play and engagement with siblings at five years of age, suggesting a spillover pathway where negativity in one relationship within the family spills over into others. In this case, highly critical and low-approving mothers may promote less positive engagement, even among siblings. Similarly, children's negative affect with a sibling is inversely related to their mother's report of marital satisfaction one year earlier. Thus, in families where mothers are not satisfied in their relationships with their spouse, partner, or significant other, more negative affect is also observed between the siblings.

In predictive models where demographic variables and children's concurrent social skills are controlled and earlier marital satisfaction, concurrent parent-child conflict and concurrent parent-child openness are included in the model, only concurrent mother-reported parent-child conflict emerges as a significant independent predictor of children's negative affect with siblings

and failure to resolve conflict with siblings. This provides evidence that maternal perceptions of conflict with their children are independently contributing to children's negative affect and conflict resolution with their sibling. These findings could also be driven by untested factors such as maternal depression, stress, or even personality (Brody et al., 1994; Brody, 1998; Brody et al., 1999). Thus this study provides evidence that negative emotional tone in the family relates to negative tone and disengagement with siblings, although the cause or direction of effects cannot be inferred from correlations. In any case, these children appear to be growing up in a climate of higher conflict and negativity across multiple relationships, not just the sibling relationship; conversely, some children are growing up in a family climate of positive, engaged, low conflict relationships, including the sibling relationship.

It is no surprise that negative emotional tone in one family relationship may spillover into another relationship, and it has been demonstrated in many other studies (Blakemore, 1990; Brody et al., 1986; Brody et al., 1992; Bryant & Crockenberg, 1980; Dunn & Kendrick, 1982; Erel et al., 1998; Felson, 1983; Furman & Giberson, 1995; MacKinnon, 1989; Hetherington, 1988; Kendrick & Dunn, 1983; Patterson, 1986; Pike et al., 2005; Teti & Ablard, 1989; Vandell & Wilson, 1987; Volling & Belsky, 1992; Volling, 2003). It is notable, though, that the more positive dimensions of the parent-child relationship or marital satisfaction did not appear to impact behavior during sibling interaction. Although it was hypothesized that parent-child openness would be related to positive aspects of sibling interaction, these relations were found only at a marginally significant level, and in an unexpected direction to conflict resolution; openness did not significantly contribute to sibling behaviors like cooperative play or engagement. The fact that the spillover is found only in relation to conflict resolution and negative affect is in keeping with many findings in psychology, where negativity is often found

to be more predictive than positive affect for both adults and children (Dunn, 1988; Vaish, Grossmann & Woodward, 2008). For better or worse there may be a "negativity bias," where conflict, negative affect, and their resolution and regulation are the domains with the most predictive power when it comes to interpersonal functioning and children's outcomes. Indeed, some argue that this powerful effect is early-emerging, hard-wired, and driven by evolution (Cacioppo & Berntson, 1999; Vaish et al., 2008).

With respect to individual child characteristics, the only dimension of sibling interaction found to relate to mothers' concurrent ratings of children's social skills was children's ability to resolve conflict with their sibling. When race, sibling age difference and birth order were controlled, this association between children's social skills and sibling conflict resolution remained significant. It stands to reason that conflict resolution – which could be initiated by the target child or the sibling – might extend more broadly from one context (sibling play) to another (social skills more generally). Either children may be learning how to resolve conflict from their sibling interactions or children with good social skills may be more adept at applying these skills to sibling conflict. For example, when conflicts emerge during sibling pretend play, effective conflict resolution will allow children to maintain play relations after a conflict (Howe et al., 2002). Sibling play may be a practice ground for these conflict resolutions, or it may be an environment in which children bring social skills from other settings to bear in resolving their conflicts. It is also possible that observed resolution of conflict between siblings may index some of the same underlying social competencies that mothers are rating in their estimation of their children's social skills, i.e., that conflict resolution is actually a proxy for social skills. Furthering that hypothesis, in the current study the measurement of sibling conflict resolution was defined primarily in terms of children's ability to reengage quickly with their sibling and to deescalate

conflict. In dyads where conflict never arose, conflict resolution scores were also high. Thus the conflict resolution outcome in this sample captured both those sibling dyads who engage in conflict but deescalated quickly and reengaged with each other and those dyads who never engaged in conflict. It could well be that children's underlying social competence might drive both reengagement after conflict and/or the absence of conflict in the first place. In any case, it appears that conflict resolution with siblings may be an important dimension in children's broader social competence and skills. Indeed, reengagement after conflict and conflict resolution have been found to be correlates of strong friendships, and the same appears to be true of strong sibling friendships (Bukowski et al., 2009; Hartup, et al., 1988, Howe, et al., 2002, Recchia & Howe, 2009; Rinaldi & Howe, 1998).

Thus, in Study 1 a series of findings emerged that help elucidate the characteristics and correlates of observed positive behaviors during sibling play interactions among low-income five-year-old boys. Most notably, there was evidence for birth order, age difference and race effects on positive sibling play behaviors. Additionally, there was evidence for concurrent spillover, with mother-child conflict predicting less effective sibling conflict resolution and greater negativity. Consistent with family systems models (Cox, 2010), these findings suggest that demographic, child and family characteristics contribute to the interactions that siblings have with each other, including their positive behaviors. These findings extend the current literature by examining a diverse, low-income sample and examining their positive behaviors in particular. Study 1 shows that sibling relationships are impacted by other factors in children's domestic lives. In Study 2 this information is used to evaluate whether sibling relationships can provide unique protective effects, with family factors controlled, when peer relationships are also considered.

7.2 STUDY 2: PROTECTIVE EFFECTS OF POSITIVE SIBLING RELATIONSHIPS

The driving conceptual hypothesis of the second study is that sibling play interactions may provide a testing ground for social skills and the development of friendships that can help protect children at risk for later psychiatric difficulties. The study found support for this hypothesis. Based on the established connections between social rejection and family hostility and internalizing problems (Bukowski et al., 2007; Dietz et al., 2008; Rubin et al., 1995; Hoza et al., 1995; Siqueland et al., 1996), the expectation was that positive sibling interaction would especially help protect boys at risk for later internalizing problems. Further, it was expected that this would hold even after controlling for early rejection from parents, a known contributor to development of internalizing problems (Bayer, Sanson & Hemphill, 2006; Feng, Shaw & Moilanen, 2011; Rapee, 1997). As predicted, effects were found for internalizing diagnoses; they were also found for externalizing diagnoses, indicating that protective sibling effects were not specific to one type of disorder or symptom profile. While no "buffering" effects were found in the form of moderation, protective effects were seen in the sense that the children in the current sample were from high-risk, stressed families.

In particular, a combination of low negative affect and effective conflict resolution with a sibling at age 5 was found to be an independent longitudinal predictor of the absence of internalizing and externalizing diagnoses, and better global psychological functioning in terms of psychiatric symptoms at ages 10 – 12. Because sibling interaction was considered with significant demographic variables (age difference, birth order and race) and early critical parenting controlled, these effects are due to the qualities of the sibling relationship, and not to specific structural characteristics of sibling dyads or the larger effects of family negativity. Although other studies have examined sibling effects on psychopathology with parenting effects

controlled, they have explored aspects of sibling *conflict* (Garcia et al., 2000; Padilla-Walker et al., 2010; Stocker, et al., 2002). Studies that have found effects for sibling positivity on adjustment (e.g., Gass, et al, 2007; Kim, et al, 2007; Pike, et al, 2005; Richmond, et al, 2005) have largely used parent-report or self-report measures of sibling relationship. In contrast, the current study is unique in examining *positive* aspects of sibling interaction, utilizing observational methodology while also controlling for earlier parenting behavior, and examining effects over such a lengthy period of time. The findings are also in keeping with theoretical and empirical work that indicates that conflict itself is not a problematic aspect of sibling interaction. Rather, "constructive" conflict, involving negotiation, reasoning, and perspective-taking has been shown to result in stronger sibling relationships and better problem-solving skills (Perlman, Garfinkel & Turrell, 2007; Vandell & Bailey, 1992).

The fact that effects were found for both internalizing and externalizing disorders serves as a reminder of the role of affect regulation and the importance of social skills across psychiatric diagnoses (Berndt, 2002; Bierman, 2004, Bukowski et al., 2007). Indeed, rates of co-occurrence of psychiatric diagnoses in childhood are very high (Capaldi & Stoolmiller, 1999; Cole & Carpentieri, 1990; Loeber & Keenan, 1994) and distinguishing on conceptual grounds between internalizing and externalizing symptoms may not be very meaningful, perhaps especially for a high-risk sample such as this. In this moderate-sized sample of 133 boys 15.9% met criteria for an internalizing *and* an externalizing diagnosis at some point between age 10 and 12. While the study hypothesized effects for internalizing disorders on conceptual grounds, it is notable that there were no significant effects for internalizing symptoms or diagnoses that were not also seen for externalizing symptoms and diagnoses. In addition, there were no significant effects for boys' self-report measures of depression and anxiety symptoms (CDI and MASC). These results

may partly be a function of the current sample; boys with externalizing disorders may underreport internalizing symptoms due to inflated or idealized self-concept (Oland & Shaw, 2005). It is also possible that a third variable, such as irritability, negative affectivity, or social competence may drive effects for both internalizing and externalizing disorders (Keiley, Lofthouse, Bates, Dodge & Petit, 2003; Lahey, Loeber, Burke, Rathouse, & McBurnett, 2002; Lilienfeld, 2003). However, it is notable that in the current study effects emerged for the contribution of sibling interactions to psychiatric disorders even after accounting for children's peer acceptance. Thus, this study contributes to evidence that risk for psychopathology in childhood may be non-specific, especially when it comes to interpersonal functioning. Sibling interactions, and resolution of conflict and regulation of negative affect in particular, help protect children over time from psychiatric problems and diagnoses whether they are internal or external.

7.2.1 Peer Acceptance as a Mechanism

It was hypothesized that peer acceptance in middle childhood would account in part for the longitudinal relationship between early sibling interaction and absence of psychiatric problems. Specifically, it was expected that peer acceptance would act as a mediator between sibling interaction and internalizing problems and also that sibling relationships would moderate relations between peer acceptance and psychopathology: that children with highly positive sibling interactions and high peer acceptance would be at lowest risk for later psychiatric difficulties, and highly positive sibling relationships would help protect children who were rejected by peers from developing later psychiatric problems. These hypotheses were not supported in the current study. No associations were found between peer acceptance and aspects

of sibling interaction, so the mediation hypothesis could not be tested. So far as moderation was concerned, there was no evidence that the interaction between peer acceptance and sibling interaction contributed to children's psychiatric outcomes. These analyses did reveal that peer acceptance independently contributed to absence of psychiatric outcomes and lower internalizing and externalizing symptoms, a finding that is consistent with work that suggests that peer rejection (rather than acceptance) is associated with psychopathology (Bukowski et al, 2007; Rubin et al., 1995; Hoza et al., 1995). Findings also revealed striking longitudinal prediction between critical parenting during a clean-up task at age two and internalizing and externalizing diagnoses and symptoms five to seven years later, indicating the importance of considering critical parenting as a control.

This study also showed that when peer acceptance and sibling interaction are considered together, both significantly predict over time fewer psychiatric symptoms, lower CBCL externalizing scores, and absence of externalizing and internalizing diagnoses. This suggests that sibling interaction makes an independent contribution to children's longitudinal psychiatric well-being, beyond what can be accounted for by critical parenting, and separate from the effects of peer acceptance. Positive features of sibling interaction, particularly regulation of negative affect and effective resolution of conflict, have an independent longitudinal protective effect that does not interact with children's sociometric standing with peers. We know sibling interactions to be emotional (Dunn, 1983), and thus a potential practice ground for skills related to coping with negative affect. It may be that sibling interactions provide a unique social context for affectively-laden interactions in which children can hone their regulatory skills. This finding supports the notion that research on children's well-being should begin to incorporate sibling interaction, and especially the resolution of conflict, into interventions to protect high-risk children.

The absence of significant association between peer acceptance and sibling interaction in the current study is consistent with some other studies that have found few or no associations between children's behavior with peers and siblings (Abramovitch et al., 1986; Berndt & Bulleit, 1985; DeHart, 1999; McElwain & Volling, 2005). While others have found evidence for moderation of peer friendship by sibling relationships in predicting internalizing or externalizing symptoms, no prior study has examined this question in early childhood, among high-risk children, using observational approaches (East & Rook, 1992; Stocker, 1994). In the one study that employed observations of young children's behavior with peers and siblings, McElwain & Volling (2005) found that high quality sibling relationships moderated associations between peer friendship and aggressive and disruptive behaviors in middle-class preschool-aged children, but not internalizing symptoms. In the current study this question was extended to examine buffering effects over time in a high risk sample of young children. Unlike McElwain & Volling (2005), however, it was not friendships that were assessed in the current study, but peer acceptance among previously unacquainted boys. The social and emotional processes that exist within the two types of relationship are very different (Gifford-Smith & Brownell, 2003), perhaps accounting for the fact that a similar interaction did not appear in the current study. Future studies with high-risk samples should consider assessing children's behavior with established peer relationships or with friends in order to examine how relationships with peers and with siblings may interact to buffer against the development of psychopathology.

7.3 IMPLICATIONS AND FUTURE DIRECTIONS

Several findings that emerged in this study suggest directions for future research and/or intervention. In particular, the confirmation that there is concurrent spillover from the parent-child to the sibling relationship attests to the importance of parenting and family-level interventions for at-risk children. However, the study also shows that aspects of sibling interaction, specifically resolution of conflict with siblings and regulation of negative affect with siblings, contribute independently over time, above and beyond disapproving and critical parenting and separately from peer acceptance, to protection from psychiatric outcomes. This suggests that sibling interaction in and of itself may be an important arena for intervention. Indeed, conflict resolution with siblings is shown to relate to children's social skills more generally. Interventions that focus on the resolution of conflict with siblings have the potential to promote children's social skills, protect children from psychiatric difficulties *and* alleviate stress for parents.

The current study extends the literature in several important ways. However, as with any study there are limitations. The sample consists entirely of boys from low-income families, perhaps limiting its generalizability. In addition, while the sample was more diverse than many, it consisted of children from primarily European-American and African-American backgrounds, with few or no families representing children from Latino, Asian or other backgrounds. Given that socialization norms and family interactions are known to vary with culture (McGuire & Shanahan, 2010), future studies should include examination of sibling relationships in families from diverse backgrounds as well as sister-sister dyads in order to generate knowledge about positive sibling relationships informed by specific cultural and ecological contexts. We had hoped to identify pathways to internalizing diagnoses and symptoms, but co-occurrence of

internalizing and externalizing behaviors and diagnoses was quite high in this sample (16%). At the same time, a large portion of the boys had neither an internalizing nor an externalizing diagnosis, which may have decreased the ability to detect effects. Either a more distressed sample, perhaps one with parental history of depression or other psychiatric disorder, or a less-distressed, but larger community sample would allow for greater power to examine protective effects of sibling relations.

Although one of the study's strengths was being able to collect observational data on sibling interaction, observations were available in only one context, with only one sibling, and at only one point in time. While these sibling interactions are assumed to be representative, it is possible that this one time point was not an accurate representation of siblings' usual interactions. The presence of videotaping researchers bearing toys might have biased children to behave differently than they normally would, either by exhibiting "best behavior" in front of the cameras, or behaving worse than usual because of the regulatory task of sharing brand new toys. In addition, many of the children in the current study have more than one sibling with whom they play and interact. Relationships might vary significantly from sibling to sibling. Future studies could address these limitations by examining multiple play episodes over several weeks or even months, or by examining children's interactions with all close-aged siblings. Because sibling interactions were conceptualized as a unique form of child-child relationships, it was expected that they would contribute both additively and interactively with other child-child relationships to adjustment. However, this hypothesis could be only partially tested, using a measure of peer acceptance in middle childhood. Not only was this short-term, camp-based measure perhaps idiosyncratic and not necessarily a good reflection of children's everyday peer relationships in schools and neighborhoods, but it was also collected at a time point that was several years

removed from the sibling interaction observations. Future studies might examine sibling interactions in conjunction with peer acceptance in the classroom setting at a closer time point, in order to produce a stronger measure of children's functioning across peer settings. Moreover, other relationships, such as friendships, may interface with sibling relationships in still different ways, and have been shown in past research to operate together with them to buffer the development of behavior problems (McElwain & Volling, 2005; Stocker, 1994). Future studies might remedy these shortcomings by examining peer friendships more specifically.

8.0 CONCLUSIONS

While we know that children's sibling relationships are important, little work has examined the protective role of positive interaction with siblings, especially in at-risk youth. In the current study we examine aspects of five-year-old boys' positive interactions with siblings and find that children spend a great deal of time engaged in positive play with each other, and that having older siblings and siblings with large age differences to play with may help support children's play and positive sibling engagement. In addition, aspects of positive sibling play are related concurrently and longitudinally to children's relations with their parents, social skills with others, and even to their parents' satisfaction with their marital relationships. Thus the sibling play context has associates with other important aspects of children's lives and functioning and should be accorded more consideration. In particular, it appears that regulation of negative affect and conflict with siblings may relate to other domains of children's lives. It is these regulatory aspects of behavior with siblings that also predict later psychiatric functioning. Children who are regulating negative affect and resolving conflict with siblings effectively are at less risk for developing later psychiatric disorders even after accounting for their parents' rejection and their popularity among peers. The mechanisms for this relationship remain unknown, but the finding indicates the need to continue to probe children's interactions with their siblings in the hopes of better understanding the role of siblings in children's positive development, as well as protection from psychiatric problems.

APPENDIX A

TABLES

Table 1: Intra Class Correlations (ICCs) for Observational Coding

	N	ICC
Interval & Global Codes		
Target Positive Affect	27, 36	.97, .99
Sibling Positive Affect	27, 36	.96, 98
Target Negative Affect	27, 36	.91, 97
Sibling Negative Affect	27, 36	.95, .98
Dyadic Communication	27, 36	.93, .99
Conflict Resolution	27, 32	.90, .91
Duration Codes		
Cooperative Play	25, 33	.84, .87
Dyadic Engagement	25, 33	.89, .90

Note: First number represents *N* and reliability between coder 1 and lead author, second number represent N and reliability for coder 2 and lead author

Table 2: Demographic Descriptive Statistics for Sample

	N	Percentage
Demographic		
African American	53	39.8
Caucasian	64	48.1
Other	16	12.0
Male Sibling	72	54.1
Female Sibling	60	45.1
Older Sibling	114	85.7
Younger sibling	17	12.8
Age difference >2 years	54	40.6
Age difference < or equal 2 years	79	59.4
Diagnostic		
Externalizing K-SADS diagnosis at age 10, 11 or 12	50	37.9
Internalizing K-SADS diagnosis at age 10, 11 or 12	35	26.5
Internalizing *or* Externalizing diagnosis at age 10, 11 or 12	64	48.5
Internalizing *and* Externalizing diagnosis at age 10, 11 or 12	21	15.9

Table 3: Descriptive Statistics for Predictor Variable

	N	Mean	*SD*	Range
Observed Sibling Dimensions				
Cooperative Play	133	309.29	323.25	0 – 1177.5
Conflict Resolution	133	1.68	.60	0 - 2
Dyadic Negative Affect	131	9.64	10.17	0 - 40
Dyadic Positive Affect	131	20.89	17.06	0 - 98
Dyadic Communication	131	31.37	13.99	0 - 57
Dyadic Engagement	133	574.49	342.49	0 - 1194
Sibling Positivity Factor	131	.00	1.0	-1.89 - 2.78
Resolution of Negativity	131	.00	1.0	-3.16 - .95
Child and Family Variables				
ACRS Openness	133	21.76	3.22	8-25
ACRS Conflict	133	26.16	8.17	11 - 49
SSRS Total	132	42.71	10.00	9 - 65
Marital Satisfaction	126	99.62	29.30	17 - 155
Camp Popularity	133	0	.31	-1.00 - .69
Critical Parenting	128	0	1.00	-2.80 - 1.99

Table 4: Descriptive Statistics for Outcome Variables

	N	Mean	*SD*	Range
K-SADS[1] internalizing diagnoses	132	.27	.44	0 - 1
K-SADS[1] externalizing diagnoses	132	.38	.48	0 - 1
CBCL Internalizing Broadband	132	5.83	5.21	0 - 23.33
CBCL Externalizing Broadband	132	10.47	8.16	0 - 36.33
CDI[2] (short)	132	1.22	1.27	0 – 5.67
MASC[3] (short)	132	10.52	3.94	1.67 - 20.33
Global Psychological Functioning[4]	132	24.36	23.92	0 - 122

[1] Schedule for Affective Disorders and Schizophrenia compiled over ages 10, 11 and 12. K-SADS diagnoses are dichotomized into any diagnosis over the three ages. CBCL, CDI and MASC measures are composited and averaged across the number of ages that were reported for each individual (i.e., one, two or three ages). CBCL K-SADs externalizing symptoms are parent report. CDI, MASC and K-SADs internalizing symptoms are child-report.

[2] Child Depression Inventory

[3] Multidimensional Anxiety Scale for Children

[4] K-SADS symptom count

Table 5: Correlations Among Sibling Factors and Behaviors and Family and Child Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Cooperative Play	--	19*	-.10	24**	70***	80**	87***	.14	05	.05	.07	.11	.13	-.24**
2. Conflict Resolution		--	-.72***	13	.03	.12	.10	.92***	.08	-.30***	.14	.22**	.10	-.10
3. Dyadic Negative Affect			--	.04	.03	-.06	02	-.93***	.01	.21*	-.18*	-.12	-.09	.08
4. Dyadic Positive Affect				---	.41***	.33***	.52***	.00	.12	-.10	.08	.12	.14	.03
5. Dyadic Communication					---	.81***	.92***	-.06	-.03	-.01	.01	.12	.03	-.04
6. Dyadic Engagement						---	.93***	.07	.00	-.02	.03	.07	.07	-.18*
7. Sibling Positivity							---	.00	.03	-.03	.04	.11	.09	-.13
8. Resolution of Negativ.								---	.04	-.27**	.17	.18*	.10	-.11
9. Parent-Child Openness									---	-.46**	.15	.42**	.35**	-.15
10. Parent-Child Conflict										---	-.33**	-.48**	-.16	.17
11. Marital Satisfaction											---	.20*	.08	.00
12. Child Social Skills												---	.19*	-.04
13. Camp Popularity													---	-.20*
14. Critical Parenting														---

* = $p < .05$; ** = $p < .01$; *** = $p < .001$

Table 6: Factor Loadings for Principal Components Factor Analysis with Varimax Rotation

Variable	1 Sibling Positivity	2 Resolution of Negativity
1. Cooperative Play	.87	.14
2. Conflict Resolution	.10	.92
3. Dyadic Negative Affect	.02	-.93
4. Dyadic Positive Affect	.52	.01
5. Dyadic Communication	.92	-.06
6. Dyadic Engagement	.93	.07

Table 7: Factor Loadings for Principal Components Factor Analysis with Varimax Rotation for subsample with older siblings only (N=114)

Variable	1 Sibling Positivity	2 Resolution of Negativity
1. Cooperative Play	.85	.19
2. Conflict Resolution	.16	.91
3. Dyadic Negative Affect	.05	-.94
4. Dyadic Positive Affect	.56	-.06
5. Dyadic Communication	.91	.01
6. Dyadic Engagement	.93	.13

Table 8: Means and Standard Deviations for Sibling Variables Based on Age, Birth Order, Gender and Race

Variable	TC & Younger Sibling *M (SE)*	TC & Older Sibling *M (SE)*	African-American *M (SE)*	European-American *M (SE)*	Age diff < 2 years *M (SE)*	Age diff > 2 years *M (SE)*	Sib Male *M (SE)*	Sib Female *M (SE)*
1. Cooperative Play	72.41***	344.71	281.69	380.79	254.92**	407.56	374.01	288.47
	(76.09)	(29.87)	(45.88)	(42.64)	(40.94)	(47.41)	(42.94)	(45.61)
2. Conflict Resolution	1.58	1.67	1.59	1.78	1.65	1.72	1.75	1.62
	(.15)	(.06)	(.08)	(.08)	(.07)	(.08)	(.08)	(.08)
3. Dyadic Negative Affect	11.44	9.43	10.42	8.60	10.53	8.48	9.08	9.93
	(2.50)	(.98)	(1.49)	(1.38)	(1.33)	(1.54)	(1.39)	(1.48)
4. Dyadic Positive Affect	16.47	21.14	17.01*	24.60	20.35	21.26	23.73	17.88
	(4.15)	(1.63)	(2.41)	(2.24)	(2.15)	(2.49)	(2.26)	(2.40)
5. Dyadic Communicat.	21.57**	32.93	29.48	34.07	28.90	34.65	33.88	29.67
	(3.27)	(1.29)	(1.90)	(1.76)	(1.69)	(1.96)	(1.78)	(1.89)
6. Dyadic Engagement	324.19***	619.79	537.0	638.59	491.70**	683.93	599.45	576.18
	(80.31)	(31.53)	(47.28)	(43.90)	(42.15)	(48.81)	(44.21)	(46.96)
7. Sibling Positivity	-.76***	.12	-.15*	.23	-.20*	.28	.17	-.09
	(.23)	(.09)	(.14)	(.13)	(.12)	(.14)	(.13)	(.14)
8. Resolution of Negativ.	-.15	.01	-.11	.14	-.06	.10	.09	-.05
	(.25)	(.10)	(.14)	(.13)	(.13)	(.15)	(.13)	(.14)

* = $p < .05$; ** = $p <. 01$ *** = $p < .001$

Table 9: Partial Correlations Among Sibling, Family and Child Variables with Age Difference, Birth Order and Race partialled out

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Cooperative Play	---	.19†	-.11	.23*	.66***	.78***	.85***	.15	.02	-.06	.08	.09	.20*	-.19*
2. Conflict Resolution		---	-.76***	.12	.01	.15	.10	.93***	.09	-.32**	.11	.26**	.13	-.10
3. Dyadic Negative Affect			---	.02	.04	-.07	.01	-.94***	.01	.28**	-.16†	-.18†	-.16	.06
4. Dyadic Positive Affect				---	.40***	.33**	.53***	.01	.13	-.08	.05	.14	.11	.04
5. Dyadic Communication					---	.80***	.91***	-.07	-.07	.02	.02	.10	.05	.02
6. Dyadic Engagement						---	.92***	.08	-.05	-.01	.06	.04	.12	-.12
7. Sibling Positivity							---	.00	-.01	-.02	.06	.10	.13	-.09
8. Resolution of Negativ.								---	.05	-.32***	.14	.22*	.15	-.10
9. Parent-Child Openness									---	-.49***	.17†	.43***	.35***	-.16†
10. Parent-Child Conflict										---	-.39***	-.50***	-.13	.15
11. Marital Satisfaction											---	.28**	.09	.00
12. Child Social Skills												---	.16†	-.04
13. Camp Popularity													---	-.26**
14. Critical Parenting														---

† = p <.10; * = p < .05; ** = p <.01; *** = p <.00

Table 10a: Hierarchical Regression Analyses Predicting Sibling Positivity from Family and Child Variables

	Overall Model			Change statistics			
	df	*Adj.* R^2	F	*df*	ΔR^2	ΔF	β
Sibling Positivity							
Step 1: Controls	4, 116	.11	4.57**				
Social Skills							.12
Age difference							.03
Birth order							.28*
Race							-.13
Step 2: Predictors	7, 113	.09	2.61*	3,113	.00	.13	
Social Skills							.15
Age difference							.03
Birth order							.29*
Race							-.14
Marital Satisfaction							.00
P-C Conflict							.04
P-C Openness							-.04

*= p <.05; **= p <.01

Table 10b: Hierarchical Regression Analyses Predicting Resolution of Negativity from Family and Child Variables

	Overall Model			Change statistics			
	df	*Adj. R^2*	F	*df*	ΔR^2	ΔF	*β*
Resolution of Negativity							
Step 1: Controls	4, 116	.02	1.60				
Social Skills							.21*
Age difference							.05
Birth order							.00
Race							-.07
Step 2: Predictors	7,113	.07	2.31*	3,113	.07	3.14*	
Social Skills							.14
Age difference							13
Birth order							-.06
Race							-.06
Marital Satisfaction							.00
P-C Conflict							-.30**
P-C Openness							-.18†

† = p <.10; *= p <.05; **= p <.01

Table 10c: Hierarchical Regression Analyses Predicting Cooperative Play from Family and Child Variables

	Overall Model			Change statistics			
	df	*Adj. R^2*	F	*df*	ΔR^2	ΔF	β
Cooperative Play							
Step 1: Controls	4, 118	.11	4.89***				
Social Skills							.13
Age difference							.10
Birth order							.21
Race							-.16
Step 2: Predictors	7, 115	.09	2.74*	3,115	.00	.04	
Social Skills							.14
Age difference							.10
Birth order							.21
Race							-.16
Marital Satisfaction							.02
P-C Conflict							.02
P-C Openness							-.02

* = p <.05; **= p <.01

Table 10d: Hierarchical Regression Analyses Predicting Conflict Resolution from Family and Child Variables

	Overall Model			Change statistics			
	df	*Adj. R^2*	F	*df*	ΔR^2	ΔF	β
Conflict Resolution							
Step 1: Controls	4, 118	.04	2.20†				
Social Skills							.25**
Age difference							.02
Birth order							.02
Race							-.09
Step 2: Predictors	7, 115	.08	2.44*	3,115	.06	2.64†	
Social Skills							.18†
Age difference							.10
Birth order							-.05
Race							-.09
Marital Satisfaction							.00
P-C Conflict							-.30**
P-C Openness							-.15

† = p <.10 ; *= p <.05; **= p <.01

Table 10e: Hierarchical Regression Analyses Predicting Dyadic Negative Affect from Family and Child Variables

	Overall Model			Change statistics			
	df	*Adj. R^2*	F	*df*	ΔR^2	ΔF	β
Dyadic Negative Affect							
Step 1: Controls	4, 116	.00	1.21				
Social Skills							-.17†
Age difference							-.07
Birth order							-.01
Race							.05
Step 2: Predictors	7, 113	.06	2.03†	3,113	.08	3.18*	
Social Skills							-.11
Age difference							-.14
Birth order							.04
Race							.03
Marital Satisfaction							-.10
P-C Conflict							.26*
P-C Openness							.21†

† = p <.10 ; *= p <.05

Table 10f: Hierarchical Regression Analyses Predicting Dyadic Positive Affect from Family and Child Variables

	Overall Model			Change statistics			
	df	*Adj. R^2*	F	*df*	ΔR^2	ΔF	β
Dyadic Positive Affect							
Step 1: Controls	4, 116	.01	1.41				
Social Skills							.12
Age difference							-.09
Birth order							-.0.14
Race							-.15
Step 2: Predictors	7, 113	.00	.94	3,113	.01	.34	
Social Skills							.08
Age difference							-.11
Birth order							.15
Race							-.14
Marital Satisfaction							.03
P-C Conflict							.01
P-C Openness							.10

† = p <.10 ; *= p <.05; **= p <.01

Table 10g: Hierarchical Regression Analyses Predicting Dyadic Communication from Family and Child Variables

	Overall Model			Change statistics			
	df	*Adj. R^2*	F	*df*	ΔR^2	ΔF	β
Dyadic Communication							
Step 1: Controls	4, 116	.09	3.83**				
Social Skills							.12
Age difference							-.06
Birth order							.31**
Race							-.12
Step 2: Predictors	7, 113	.08	2.42*	3,113	.01	.60	
Social Skills							.19†
Age difference							-.05
Birth order							.31*
Race							-.13
Marital Satisfaction							-.02
P-C Conflict							-.10
P-C Openness							.05

† = p <.10 ; *= p <.05; **= p <.01

Table 10h: Hierarchical Regression Analyses Predicting Dyadic Engagement from Family and Child Variables

	Overall Model			Change statistics			
	df	*Adj. R^2*	F	*df*	ΔR^2	ΔF	β
Dyadic Engagement							
Step 1: Controls	4, 118	.08	3.58**				
Social Skills							.07
Age difference							.06
Birth order							.27*
Race							-.03
Step 2: Predictors	7, 115	.06	2.05†	3,115	.00	.12	
Social Skills							.09
Age difference							.07
Birth order							.27*
Race							-.03
Marital Satisfaction							.03
P-C Conflict							.02
P-C Openness							-.05

† = p <.10 ; *= p <.05; **= p <.01

Table 11: Correlations Between Sibling Factors and Outcome Variables at age 10, 11 and 12

Variable	1	2	3	4	5	6	7	8	9	10	11
1. K-SADs Internalizing Dx	---	.27***	.35***	.31***	.24**	.25**	.53***	-.12	-.15†	-.26**	.21*
2. K-SADS Externalizing Dx		---	.30***	.55***	.20*	.11	.71***	-.01	-.29**	-.26**	.20*
3. CBCL Internalizing			---	.71***	.18*	.17*	.56***	-.07	-.12	-.33***	.23*
4. CBCL Externalizing				---	.16†	.12	.67***	-.03	-.19*	-.38**	.16†
5. CDI Average					---	.33***	.37***	.01	-.07	-.23**	.13
6. MASC Average						---	.22*	-.01	-.06	-.12	.08
7. Global Psychological Funct							---	-.06	-.21*	-.39***	.24**
8. Sibling Positivity								---	.00	.09	-.13
9. Resolution of Negativity									---	.10	-.11
10. Camp Popularity										---	-.20*
11. Critical Parenting											---

† = p <.10 * p <.05; ** p <.01; *** p <.001;

Table 12a: Hierarchical Regression Analyses Predicting Composite CBCL Internalizing from Sibling Interaction Factors

	Overall Model			Change statistics			
	df	*Adj. R^2*	F	*df*	ΔR^2	ΔF	β
CBCL Internalizing							
Step 1: Controls	3, 119	-.02	.07				
Age difference							.04
Birth order							.00
Race							-.01
Step 2: Critical Parenting	4, 118	.03	1.92	1,118	.06	7.48**	
Age difference							.05
Birth order							.03
Race							.00
Critical Parenting							.25**
Step 3: Sibling Interaction	6, 116	.03	1.67	2, 116	.02	1.17	
Age difference							.06
Birth order							.04
Race							-.02
Critical Parenting							.23*
Sibling Positivity							-.06
Resolution of Negativity							-.13

† = p <.10; *= p <.05; **= p <.01

Table 12b: Hierarchical Regression Analyses Predicting Composite CBCL Externalizing from Sibling Interaction Factors

	Overall Model			Change statistics			
	df	*Adj. R^2*	F	*df*	ΔR^2	ΔF	β
Composite CBCL Externalizing							
Step 1: Controls	3, 119	-.02	.40				
Age difference							-.05
Birth order							.10
Race							-.06
Step 2: Critical Parenting	4, 118	.01	1.14	1,118	.03	3.35†	
Age difference							-.05
Birth order							.12
Race							-.05
Critical Parenting							.17†
Step 3: Sibling Interaction	6, 116	.04	1.76	2, 116	.05	2.92†	
Age difference							-.03
Birth order							.13
Race							-.07
Critical Parenting							.14
Sibling Positivity							-.05
Resolution of Negativity							-.21*

† = p <.10; *= p <.05; **= p <.01

Table 12c: Hierarchical Regression Analyses Predicting Composite CDI from Sibling Interaction Factors

	Overall Model			Change statistics			
	df	*Adj. R^2*	F	*df*	ΔR^2	ΔF	β
Composite CDI							
Step 1: Controls	3, 119	-.01	.75				
Age difference							-.12
Birth order							.18
Race							.01
Step 2: Critical Parenting	4, 118	.00	1.08	1,118	.02	2.02	
Age difference							-.11
Birth order							.19
Race							.02
Critical Parenting							.13
Step 3: Sibling Interaction	6, 116	-.01	.82	2, 116	.01	.34	
Age difference							-.11
Birth order							.18
Race							.01
Critical Parenting							.13
Sibling Positivity							.03
Resolution of Negativity							-.07

† = p <.10; *= p <.05; **= p <.01

Table 12d: Hierarchical Regression Analyses Predicting Composite MASC from Sibling Interaction Factors

	Overall Model			Change statistics			
	df	*Adj. R^2*	F	*df*	ΔR^2	ΔF	β
Composite MASC							
Step 1: Controls	3, 119	.00	1 .04				
Age difference							.18
Birth order							-.09
Race							.10
Step 2: Critical Parenting	4, 118	.00	1.07	1,118	.01	1.17	
Age difference							.18
Birth order							-.08
Race							.10
Critical Parenting							.10
Step 3: Sibling Interaction	6, 116	-.01	.85	2, 116	.01	.42	
Age difference							.19
Birth order							-.08
Race							.10
Critical Parenting							.09
Sibling Positivity							-.02
Resolution of Negativity							-.08

† = p <.10; *= p <.05; **= p <.01

Table 12e: Hierarchical Regression Analyses Predicting Global Psychological Functioning from Sibling Interaction Factors

	Overall Model			Change statistics			
	df	*Adj. R^2*	F	*df*	ΔR^2	ΔF	β
Global Psychological Functioning							
Step 1: Controls	3, 119	-.02	.25				
Age difference							-.06
Birth order							.03
Race							-.07
Step 2: Critical Parenting	4, 118	.03	1.97	1,118	.06	7.10**	
Age difference							-.06
Birth order							.06
Race							-.06
Critical Parenting							.24**
Step 3: Sibling Interaction	6, 116	.07	2.60*	2, 116	.06	3.67*	
Age difference							-.04
Birth order							.07
Race							-.08
Critical Parenting							.21*
Sibling Positivity							-.04
Resolution of Negativity							-.24**

*= p <.05; **= p <.01

Table 13a: Logistic Regression Analyses Predicting K-SADS Internalizing Diagnosis from Sibling Interaction Factors

Independent Variables	*B*	*SE*	Wald	OR
Step 1: Demographics				
Race	.31	.27	1.32	1.37
Age difference	-.15	.12	1.55	.86
Birth order	-1.18	.98	1.46	.31
Step 2: Controls				
Critical Parenting	-.64	.26	6.05*	.53
Step 3: Sibling Interaction				
Sibling Positivity	.48	.25	3.80†	1.62
Resolution of Negativity	.42	.21	4.04*	1.52

No diagnosis dummy code = 1; Diagnosis at 10, 11 or 12 dummy code = 0
† = $p < .10$; *= $p < .05$

Table 13b: Logistic Regression Analyses Predicting Externalizing Diagnosis from Sibling Interaction Factors

Independent Variables	B	*SE*	Wald	OR
Step 1: Demographics				
Race	.04	.22	.04	1.05
Age difference	.07	.13	.31	1.07
Birth order	-.59	.80	.54	.56
Step 2: Controls				
Critical Parenting	-.41	.22	3.45†	.66
Step 3: Sibling Interaction				
Sibling Positivity	-.04	.22	.03	.96
Resolution of Negativity	.70	.21	11.32***	2.01

No diagnosis dummy code = 1; Diagnosis at 10, 11 or 12 dummy code = 0
† = p <.10; * = p <.05, ** = p <.01, *** = p <.001

Table 14a: Hierarchical Linear Regression Analyses Predicting Composite CBCL Internalizing from Sibling Interaction and Camp Popularity

	Overall Model			Change statistics			
	df	*Adj. R^2*	F	*df*	ΔR^2	ΔF	β
Composite CBCL Internalizing							
Step 1: Controls	3, 119	-.02	.07				
Age difference							.04
Birth order							.00
Race							-.01
Step 2: Critical Parenting	4, 118	.03	1.92	1,118	.06	7.48**	
Age difference							.05
Birth order							.03
Race							.00
Critical Parenting							.25**
Step 3: Main Effects	6, 116	.11	3.52**	2, 116	.09	6.35**	
Age difference							.04
Birth order							.01
Race							-.01
Critical Parenting							.17*
Resolution of Negativity							-.09
Camp Popularity							.29***
Step 4: Sibling x Camp	6, 116	.12	3.32**	1, 115	.02	2.00	
Age difference							.04
Birth order							.01
Race							-.01
Critical Parenting							.16
Resolution of Negativity							-.12
Camp Popularity							-.29***
Resolution of Negativity x Camp Popularity							-.12

† = p <.10; *= p <.05; **= p <.01; *** = p <.001

Table 14b: Hierarchical Linear Regression Analyses Predicting Composite CBCL Externalizing from Sibling Interaction and Camp Popularity

	Overall Model			Change statistics			
	df	*Adj. R^2*	F	*df*	ΔR^2	ΔF	β
Composite CBCL Externalizing							
Step 1: Controls	3, 119	-.02	.40				
Age difference							-.05
Birth order							.10
Race							-.06
Step 2: Critical Parenting	4, 118	.01	1.14	1,118	.03	3.35†	
Age difference							-.05
Birth order							.12
Race							-.05
Critical Parenting							.17
Step 3: Main Effects	6, 116	.15	4.53***	2, 116	.15	10.93***	
Age difference							-.05
Birth order							.10
Race							-.06
Critical Parenting							.08
Resolution of Negativity							-.17*
Camp Popularity							-.34***
Step 4: Sibling x Camp	7, 115	.14	3.91***	1, 115	.00	.29	
Age difference							.05
Birth order							.10
Race							-.06
Critical Parenting							.07
Resolution of Negativity							-.18*
Camp Popularity							-.34***
Resolution of Negativity x Camp Popularity							-.05

† = p <.10; *= p <.05; **= p <.01; *** = p <.001

Table 14c: Hierarchical Linear Regression Analyses Predicting Composite CDI from Sibling Interaction and Camp Popularity

	Overall Model			Change statistics			
	df	*Adj. R^2*	F	*df*	ΔR^2	ΔF	β
Composite CDI							
Step 1: Controls	3, 119	-.01	.75				
Age difference							-.12
Birth order							.18
Race							.01
Step 2: Critical Parenting	4, 118	.00	1.08	1,118	.02	2.02†	
Age difference							-.11
Birth order							.19
Race							.02
Critical Parenting							.13
Step 3: Main Effects	6, 116	.03	1.55	2, 116	.04	2.43†	
Age difference							-.12
Birth order							.18
Race							.02
Critical Parenting							.08
Resolution of Negativity							-.05
Camp Popularity							-.19*
Step 4: Sibling x Camp	7, 115	.04	1.68	1, 115	.02	2.37	
Age difference							-.11
Birth order							.18
Race							.02
Critical Parenting							.07
Resolution of Negativity							-.08
Camp Popularity							-.19*
Resolution of Negativity x Camp Popularity							-.14

† = p <.10; *= p <.05; **= p <.01; *** = p <.001

Table 14d: Hierarchical Linear Regression Analyses Predicting Composite MASC from Sibling Interaction and Camp Popularity

	Overall Model			Change statistics			
	df	*Adj. R^2*	F	*df*	ΔR^2	ΔF	β
Composite MASC							
Step 1: Controls	3, 119	.00	1.04				
Age difference							.18
Birth order							-.09
Race							.10
Step 2: Critical Parenting	4, 118	.00	1.87	1,118	.01	1.17	
Age difference							.18
Birth order							-.08
Race							.10
Critical Parenting							.10
Step 3: Main Effects	6, 116	.00	.98	2, 116	.01	.80	
Age difference							.18
Birth order							-.08
Race							.09
Critical Parenting							.07
Resolution of Negativity							-.07
Camp Popularity							-.08
Step 4: Sibling x Camp	7, 115	-.01	.89	1, 115	.00	.42	
Age difference							.18
Birth order							-.08
Race							.09
Critical Parenting							.07
Resolution of Negativity							-.09
Camp Popularity							-.08
Resolution of Negativity x Camp Popularity							-.06

† = p <.10; *= p <.05; **= p <.01; *** = p <.001

Table 14e: Hierarchical Linear Regression Analyses Predicting Global Psychological Functioning from Sibling Interaction and Camp Popularity

	Overall Model			Change statistics			
	df	*Adj. R^2*	F	*df*	ΔR^2	ΔF	β
Global Psychological Functioning							
Step 1: Controls	3, 119	-.02	.25				
Age difference							-.06
Birth order							.03
Race							-.07
Step 2: Critical Parenting	4, 118	.03	1.97	1,118	.06	7.10**	
Age difference							-.06
Birth order							.06
Race							-.06
Critical Parenting							.24**
Step 3: Main Effects	6, 116	.19	5.80***	2, 116	.17	12.67***	
Age difference							-.06
Birth order							.04
Race							-.07
Critical Parenting							.14†
Resolution of Negativity							-.20*
Camp Popularity							-.35***
Step 4: Sibling x Camp	7, 115	.20	5.32***	1, 115	.01	2.13	
Age difference							-.05
Birth order							.04
Race							-.07
Critical Parenting							.13
Resolution of Negativity							-.23**
Camp Popularity							-.35***
Resolution of Negativity x Camp Popularity							-.12

† = p <.10; *= p <.05; **= p <.01; *** = p <.001

Table 15a: Logistic Regression Analyses Predicting Internalizing Diagnosis from Sibling Interaction and Camp Popularity

Independent Variables	*B*	*SE*	Wald	OR
Step 1: Controls				
Race	.27	.28	.96	1.31
Age difference	-.14	.13	1.16	.87
Birth order	-.75	.99	.58	.47
Step 2				
Critical Parenting	-.59	.27	4.78*	.55
Step3				
Camp Popularity	1.83	.77	5.70*	6.28
Resolution of Negativity	.45	.22	4.16*	1.57
Step 4: Moderation				
Resolution of Negativity X Camp Popularity	.86	.69	1.55	2.36

No diagnosis dummy code = 1; Diagnosis at 10, 11 or 12 dummy code = 0
* = $p < .05$

Table 15b: Logistic Regression Analyses Predicting Externalizing Diagnosis from Sibling Interaction and Camp Popularity

Independent Variables	*B*	*SE*	Wald	OR
Step 1: Demographics				
Race	.03	.22	.02	1.03
Age difference	.08	.13	.36	1.08
Birth order	-.49	.81	.37	.61
Step 2				
Critical Parenting	-.34	.23	2.18	.72
Step3				
Camp Popularity	1.51	.70	4.61*	4.51
Resolution of Negativity	.67	.21	9.70**	1.95
Step 4: Moderation				
Resolution of Negativity X Camp Popularity	-.11	.72	.02	.90

No diagnosis dummy code = 1; Diagnosis at 10, 11 or 12 dummy code = 0
* = p <.05; ** = p <.01

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