Fearful Temperament Moderates the Effect of Harsh Parenting on Early Childhood Problem Behaviors within Dangerous Neighborhoods: A Multilevel Analysis

Brenna Sapotichne

University of New Orleans, bfsapot@uno.edu

Follow this and additional works at: http://scholarworks.uno.edu/td

Part of the Developmental Psychology Commons

Recommended Citation


http://scholarworks.uno.edu/td/2106

This Dissertation is brought to you for free and open access by the Dissertations and Theses at ScholarWorks@UNO. It has been accepted for inclusion in University of New Orleans Theses and Dissertations by an authorized administrator of ScholarWorks@UNO. The author is solely responsible for ensuring compliance with copyright. For more information, please contact scholarworks@uno.edu.
Fearful Temperament Moderates the Effect of Harsh Parenting on Early Childhood Problem Behaviors within Dangerous Neighborhoods: A Multilevel Analysis

A Dissertation

Submitted to the Graduate Faculty of the University of New Orleans
In partial fulfillment of the requirement for the degree of

Doctor of Philosophy
in
Applied Developmental Psychology

by

Brenna Sapotichne
B.S. University of Pittsburgh, 2008
M.S. University of New Orleans, 2012

December, 2015
# Table of Contents

List of Tables and Figures ........................................................................................................ iii
Abstract ........................................................................................................................................ iv
Introduction ................................................................................................................................. 1
Method .......................................................................................................................................... 17
Results .......................................................................................................................................... 26
Discussion ..................................................................................................................................... 43
References ...................................................................................................................................... 52
Vita .................................................................................................................................................. 62
List of Tables and Figures

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1</td>
<td>28</td>
</tr>
<tr>
<td>Table 2</td>
<td>28</td>
</tr>
<tr>
<td>Table 3</td>
<td>31</td>
</tr>
<tr>
<td>Table 4</td>
<td>35</td>
</tr>
<tr>
<td>Table 5</td>
<td>39</td>
</tr>
<tr>
<td>Table 6</td>
<td>40</td>
</tr>
<tr>
<td>Table 7</td>
<td>42</td>
</tr>
<tr>
<td>Figure 1</td>
<td>43</td>
</tr>
</tbody>
</table>
Abstract

Repeatedly, harsher and more intrusive parenting has been linked to higher levels of problem behaviors during the early childhood period (e.g., Bayer, Sanson, & Hemphill, 2006; Shaw, Giliom, Ingoldsby, & Nagin, 2003). Additionally, neighborhood characteristics have been found to condition the impact of harsh parenting on problem behaviors. That is, harsher parenting has been found to be more strongly associated with problem behaviors as levels of neighborhood danger increased (e.g., Callahan, Scaramella, Laird, & Sohr-Preston, 2011). The differential susceptibility hypothesis proposes that some children are more susceptible to the influences of their environment (e.g., Belsky, 1997). The present study considers fearful temperament as a marker of differential susceptibility such that temperamentally fearful children may be more vulnerable to the negative effects of harsh parenting and neighborhood danger.

The current study examines: a) whether observations of harsh and intrusive parenting influence change in children’s levels of problem behaviors, b) whether neighborhood danger moderates the association between harsh parenting and problem behaviors, and c) whether temperamentally fearful children are more sensitive to the effects of harsh parenting and neighborhood danger as evidenced through higher levels of problem behaviors. The sample consists of 167 predominantly African American, low-income families with two siblings who were approximately 2 and 4-years-old at the first assessment wave. Results from multilevel within-family models did not support study hypotheses. However, for older siblings, fearful temperament moderated the influence of harsh parenting on change in problem behaviors only within the most dangerous neighborhoods. Specifically, temperamentally fearful preschool-aged children who were exposed to harsher parenting and dangerous neighborhoods experienced higher levels of problem behaviors from ages 4 to 6.

Keywords: early childhood; problem behaviors; fearful temperament; harsh parenting; neighborhood danger
Fearful Temperament Moderates the Effect of Harsh Parenting on Early Childhood Problem Behaviors within Dangerous Neighborhoods: A Multilevel Analysis

Children with elevated problem behaviors during early childhood seem to be at increased risk for experiencing clinically significant levels of psychopathology during middle childhood and adolescence (e.g., Campbell, Shaw, & Gilliom, 2000; Keenan, Shaw, Delliquadri, Giovannelli, & Walsh, 1998). Socioeconomic disadvantage has been found to increase children’s risk for experiencing problem behaviors in part because stressors associated with poverty have been linked to poorer parenting quality and an increased likelihood of residing in dangerous neighborhoods. Combined with the lack of positive parenting, harsher and more intrusive parenting has been linked to higher levels of problem behaviors during the early childhood period (e.g., Bayer, Sanson, & Hemphill, 2006; Shaw, Gilliom, Ingoldsby, & Nagin, 2003). Additionally, neighborhood characteristics have been found to condition the impact of harsh parenting on problem behaviors. That is, harsher parenting has been found to be more strongly associated with problem behaviors as levels of neighborhood danger increased (e.g., Callahan, Scaramella, Laird, & Sohr-Preston, 2011).

While neighborhood characteristics may intensify the impact of harsh parenting on children’s development of problem behaviors, not all children who reside in dangerous neighborhoods and who receive less than optimal parenting develop problem behaviors. Differential susceptibility perspectives (e.g., Belsky & Pluess, 2009) suggest that children vary in their sensitivity or susceptibility to environmental effects. Stated differently, children who are more sensitive to the environment may be more affected by the quality of parenting received and the conditions of their neighborhoods. Dangerous neighborhoods and harsh/intrusive parenting may be most distressing for children who are observed to be more temperamentally fearful, or
rated higher in negative affect and avoidance. In contrast, the negative impact of neighborhood
danger and harsh parenting on levels of problem behavior may be attenuated for less fearful
children.

The present study is designed to evaluate the direct and interactive effects of exposure to
harsh parenting and neighborhood danger as well as level of observed temperamental fearfulness
on change in internalizing and externalizing behavior problems during early childhood. As will
be described in the following sections, children are expected to vary in their susceptibility to
neighborhood effects and in their sensitivity to harsh/intrusive parenting depending on their level
of observed fearfulness. Children who are observed to exhibit more distress and avoidance
during a structured fear task are expected to be at increased risk for internalizing and
externalizing problems when they receive harsher parenting and reside in dangerous
neighborhoods. In other words, the combination of both a scary neighborhood environment and
emotionally negative and controlling parent will be more distressing for temperamentally fearful
children than children rated as low in temperamental fearfulness.

The following sections will first describe the developmental significance of elevated
levels of problem behaviors during early childhood, followed by a discussion of the impact of
harsh parenting on early childhood problem behaviors, the direct, indirect, and interactive effects
of neighborhood danger, and fearful temperament as a marker of differential susceptibility to the
influence of neighborhood danger and harsh parenting. Finally, the specific hypotheses for the
current investigation will be described.

The Consequences of Elevated Levels of Problem Behaviors during Early Childhood

Early childhood, which typically encompasses ages 2 to 6 years, is marked by significant
physical, cognitive, social, and emotional changes. The transition from infancy to toddlerhood
and from toddlerhood to school-age is marked by dramatic increases in independence and autonomy. By age 2, motor advances allow for greater mobility and the desire for autonomous exploration. However, toddlers are not always strong walkers and lack the cognitive and psychosocial abilities to function without adult supervision (Berk & Meyers, 2015). Parents’ often limit toddlers’ independence in an effort to protect their toddlers, much to the dismay of the toddler-aged children (Shaw et al., 1998). Unfortunately, toddler-aged children lack the requisite language abilities to express wants or feelings, as a result frustration often gives way to temper tantrums, sad affect, and aggression (Gilliom & Shaw, 2004). Children’s desire for autonomy often results in deliberate defiance when caregivers’ goals do not match children’s goals (Shaw, Lacourse, & Nagin, 2004). Consistent with the notion of the “terrible twos,” elevated levels of problem behaviors are quite common during this period (e.g., Fanti & Henrich, 2010).

Behavioral difficulties that occur during early childhood are often grouped into two major domains: externalizing behaviors, consisting of overt disruptive behavior like aggression, tantrums, destruction, and deliberate defiance, or internalizing behaviors, including more emotional, internal states such as withdrawal, sad affect, and anxiety (Achenbach, 1992). As just described, externalizing behaviors are common during toddlerhood because toddler-aged children lack the cognitive abilities and coping strategies to regulate negative emotions. Increases in language abilities (Byrnes & Wasik, 2009) and strategies for independently regulating emotions and behaviors (Zimmer-Gembeck & Skinner, 2011) coincide with declines in externalizing behaviors during early childhood (e.g., Fanti & Henrich, 2010). Children who do not evidence declines in problem behaviors are at greater risk of experiencing chronically elevated levels of externalizing problems which becomes increasingly more serious and often persists into adulthood (Moffitt & Caspi, 2001).
Internalizing problems, such as the presence of persistently sad affect or anxiety, seem to increase after early childhood as young children’s cognitive abilities become more sophisticated. Theoretically, with language advances, children are able to verbally express feelings rather than act out feelings of sadness or worry (Keenan & Shaw, 1997). Furthermore, cognitive maturation allows children to self-reflect, remember negative events, and anticipate undesirable experiences, which may lead to higher levels of depression and/or anxiety (Kovacs & Devlin, 1998). Fanti and Henrich (2010) examined trajectories of problem behaviors from age 2 to age 12; children with elevated levels of internalizing problems at age 2, as compared to other children, demonstrated increases in internalizing problem behaviors over time. However, for children with low to moderate levels of internalizing problems at age 2, internalizing behavior levels remained quite consistent throughout childhood (Fanti & Henrich, 2010). Taken together, elevated levels of internalizing problem behaviors during the early childhood period may be a marker of risk for later internalizing problems as well as problems regulating feelings of sadness or worry.

Repeatedly, internalizing and externalizing problems co-vary across development (Fanti & Henrich, 2010; Gilliom & Shaw, 2004; Youngstrom, Findling, & Calabrese, 2003). This covariation may occur for a number of reasons. First, both internalizing and externalizing problems are typically measured using questionnaires that are often completed by the same person (e.g., mothers), shared method variance may inflate any naturally occurring covariation across constructs. Second, emotional expression during early childhood is not well organized. Parents’ and outside observers’ may have difficulty discriminating negative affect that reflects variations in children’s emotional states. That is, young children may react to both separations from parents and parental limit setting with crying. Moreover, toddler-aged children often cannot
clearly articulate the reasons for their emotional responses and may experience the same emotion (e.g., crying) to separations from parents or parental limit setting. This behavioral co-occurrence of internalizing and externalizing problems may decrease with maturation as children become better able to differentiate and communicate feelings of anger, anxiety, or sadness. In the current study, a total problem behavior score was computed to capture both internalizing and externalizing problems. Follow up analyses estimated hypotheses separately for internalizing and externalizing by controlling for the covariance of problem behaviors.

Children evidencing extreme levels of problem behaviors during early childhood are at substantially greater risk for developing problems in school, delinquency, and later psychopathology (Campbell et al., 2000; Fanti & Henrich, 2010; Oland & Shaw, 2005). Experiencing externalizing problems during early childhood has been linked to increased risk of disruptive disorders such as attention deficit hyperactivity disorder (ADHD), conduct disorder (CD), and antisocial behavior later in life (Campbell et al, 2000). Similarly, elevated levels of internalizing problems during early childhood have been linked to serious problems such as depression, anxiety, and suicide during adolescence and early adulthood (Keenan et al., 1998). Notably, when compared to children with pure internalizing or externalizing problems, co-occurring internalizing and externalizing behavior problems have been associated with increased severity of psychopathology, such as a chronic history of mental illness, more physical health problems, greater interference in daily life, and more problems in school (Newman, Moffitt, Caspi, & Silva, 1998). Furthermore, the combination of internalizing and externalizing problems is associated with more problems with peers, such as rejection and antisocial behavior, which may exacerbate existing symptoms of both internalizing and externalizing problems (Fanti & Henrich, 2010; Oland & Shaw, 2005).
Given the frequency with which internalizing and externalizing behaviors co-occur, it is possible that similar risk factors predict both types of behaviors, particularly for young children (Keiley, Lofthouse, Bates, Dodge, & Pettit 2003; Lilienfeld, 2003). Specifically, the parent-child relationship is often identified as an important influence on young children’s social and emotional adjustment (e.g., Bayer et al., 2006; Kochanska, Aksan, & Nichols, 2003; Kochanska, Barry, Aksan, & Boldt, 2008; Shaw et al., 2003). The following section will further discuss the influence of parenting on young children’s social and emotional development.

**Harsh Parenting May Increase Children’s Risk for Developing Problem Behaviors**

Early childhood represents the first period in which parents must actively discipline and set limits on their children’s activities (e.g., Shaw & Bell, 1997). During infancy, parents vigilantly respond to babies’ emotional displays because infants are dependent on their caregivers to meet their feeding, soothing, diapering, and social needs. Parents’ responses that are well timed, appropriate, and contingent on infants’ actions teach infants that they can evoke predictable responses from their environment (Kochanska, 2001). When parents consistently respond to infants’ distress, older infants eventually learn to self-soothe, which is the start of the development of children’s emotion regulation strategies. By toddlerhood, parents have the difficult task of balancing children’s autonomy seeking behavior and their own parenting objectives, such as keeping children safe and teaching children to behave in ways that are consistent with parental expectations even when parents are not present (Grusec & Hastings, 2014). Ideally, parents socialize children’s behavior by using elevated levels of support, positive reinforcement, and clear communication of parents’ expectations and rules; such parenting has been found to promote children’s autonomy and appropriate self-regulation (Kochanska, Coy, & Murray, 2001).
While parents may not rely solely on positive parenting strategies, an over-reliance on harsh and intrusive parenting practices seems to increase children’s risk for problem behaviors. Harsh and intrusive parenting consists of emotional negativity and intrusiveness. Harsh parents rely on emotionally negative, angry, and hostile responses in the absence of warmth or sensitivity. Furthermore, harsh parents use verbal and/or physical intrusiveness, such as spanking or grabbing a child to restrict their activities (Scaramella & Leve, 2004). This type of parenting constrains children’s autonomy and does not teach effective emotional and behavioral regulation strategies; instead, such parenting models emotionally negative and aggressive behavior (Scaramella & Leve, 2004). When children do not learn adaptive strategies to regulate negative emotions, risk for externalizing behavior problems increases (e.g., Denham, Workman, Cole, Weissbrod, Kendziora, & Zahn-Waxler, C., 2000). Moreover, harsh parenting often is distressing for young children. Harsh and rejecting parent responses to children’s transgressions decreases children’s feelings of safety and security and may lead to increases in children’s feelings of sadness and anxiety (e.g., Graham & Easterbrooks, 2000; Warren, Huston, Egeland, & Sourfe, 1997). Not surprisingly, harsh parenting also is related to more internalizing behavior problems (e.g., Bayer, Hiscock, Ukomunne, Price, & Wake, 2008; Rapee, Schniering, & Hudson, 2009). Quite possibly, the effect of harsh parenting depends on the distal environmental stressors that families’ experience.

The Impact of Neighborhood Danger on Problem Behaviors during Early Childhood

The parent-child relationship exists within a broader social context, which influences parents, children, and parent-child relationships (Bronfenbrenner & Morris, 2006). The neighborhoods in which families reside are an influential aspect of their socio-contextual environment. Indeed, neighborhoods provide the resources and opportunities (e.g., schools,
relationships with neighbors) and risks and boundaries (e.g., dangerousness, insufficient public transportation) for families (Conger & Donnellan, 2007). Low socioeconomic status (SES), social disorganization, high levels of crime, and low levels of social cohesion characterize disadvantaged neighborhoods (e.g., Ingoldsby & Shaw, 2002). Most notably, socially disadvantaged neighborhoods may be frightening for children because of the omnipresent levels of danger. Not surprisingly, living in a dangerous neighborhood is associated with an increased risk for problem behaviors, particularly for children from low-income families (e.g., Beyers, Bates, Pettit, & Dodge, 2003; Callahan et al., 2011; Colder, Mott, Levy, & Flay, 2000).

Compared to research during middle childhood and adolescence, little research has considered the influence of neighborhood danger on problem behaviors during early childhood. As compared to older children, very young children are not expected to be directly exposed to the dangers in disadvantaged neighborhoods because parents monitor young children closely; young children should have little unsupervised time to wander their neighborhood (e.g., Winslow & Shaw, 2007). Accordingly, Winslow and Shaw (2007) found that neighborhood disadvantage did not influence problem behaviors until age 6. Practically, insulating young children from the dangers associated with disadvantaged neighborhoods may be virtually impossible. Consider, for instance, the quality of impoverished families’ physical residences. These homes tend to be poorly maintained and insulated, to lack central air and heat, to be placed in close proximity to other residences, and to be positioned close to the street (Evans, 2006). The lack of central air conditions (as well as the expense associated with using it) may mean that doors and windows stay open to increase airflow and promote cooling. With open doors and windows the noise and activities of the street can filter into the home and provides ample opportunities for even the youngest family member to witness and hear activities in their neighborhood.
Quite possibly, young children who are regularly exposed to dangerous events in their neighborhood become desensitized to the dangers associated with these events. That is, for most young children loud noises, like gunshots, destruction of property, and aggressive behavior, may seem atypical and not a part of everyday life, unless the children reside in dangerous neighborhoods. When acts of aggression are typical, parents may not try to shelter their children from witnessing aggression. That is, some parents may actually encourage children to behave aggressively as a way of protecting them from victimization (e.g., Barnett & Scaramella, in press).

Theoretically, neighborhood danger may affect children’s development of problem behaviors in three different ways. First, neighborhood danger may independently and directly influence children’s problem behaviors. According to social interactional theory (e.g., Patterson, Reid, & Dishion, 1992), witnessing others model aggressive behavior may increase aggression because children mimic such methods of managing conflict (e.g., Ingoldsby & Shaw, 2002). Furthermore, witnessing unpredictable and potentially dangerous events in the neighborhood may be distressing to children, leading to increased levels of anxiety and/or sad affect.

Second, neighborhood danger may indirectly effect children’s adjustment through parenting. The environmental context of neighborhood danger may directly affect the quality of parenting, parenting that directly shapes problem behaviors. That is, residing in a dangerous neighborhood may be stressful for parents and felt contextual stressors may increase parents’ reliance on harsh parenting, or parenting which has been found to result in increased levels of problem behaviors in children (Scaramella, Sohr-Preston, Callahan & Mirabile, 2008). The logic of this model is similar to the logic of the Family Stress Model (Conger, Conger, Elder, Lorenz, Simons, & Whitbeck, 1992), which argues that felt economic stress and strain negatively impacts
parents’ psychological health and the quality of family relationships, including parenting. Elevated levels of felt stress then indirectly influences children’s adjustment by way of increased depressed mood, family conflict, and harsh parenting (Conger & Donnellan, 2007). Consistent with this model, Linares and colleagues (2001) found that neighborhood violence was indirectly associated with children’s internalizing and externalizing behavior problems during the preschool years by way of mothers’ psychological distress.

Third, neighborhood danger may interact with harsh parenting to predict young children’s problem behaviors. Exposure to harsh parenting and danger within the neighborhood may compound children’s exposure to models of negative, hostile, and potentially antisocial behavior. Parents with an over-reliance on harsh parenting may fail to adequately protect their children from the psychological consequences of exposure to neighborhood danger. Parents who fail to comfort or protect children from exposure to the dangers in their neighborhood may actually increase children’s feelings of anxiety and/or sadness. Consistent with this interpretation, Callahan and colleagues (2011) found that the positive association between harsh parenting and levels of internalizing and externalizing problems was moderated by neighborhood danger. Specifically, among mothers and 2-year-old children, exposure to harsher parenting predicted more internalizing problems only in the most dangerous neighborhoods (Callahan et al., 2011).

While harsh parenting may fail to protect children from neighborhood dangers thereby increasing children’s risk for developing problem behaviors, it is possible that positive parenting might reduce children’s risk of problem behaviors by protecting them from the negative influences of a dangerous neighborhood. Alternatively, some evidence suggests that intrusive and controlling parenting is associated with lower levels of problem behaviors and higher levels of academic achievement for African American children, particularly those in low-income
families (Dearing, 2004; Ispa et al., 2004; Lamborn, Dornbusch, & Steinberg, 1996).

Furthermore, even physical punishment has been associated with lower levels of problem behaviors for African American youths (Deater-Deckard, Dodge, Bates, & Pettit, 1996; Lansford, Deater-Deckard, Dodge, Bates, & Pettit, 2004). One possible explanation for this is that parents within dangerous neighborhoods may use more controlling behaviors to keep their children safe and the normality of these parenting practices may be less detrimental for children in such environments. That is, highly controlling parenting or even punitive parenting in the absence of parental rejection and emotional negativity, may offer greater protection from the dangers of residing in a disadvantaged neighborhood.

According to the differential susceptibility hypothesis (Belsky & Pluess, 2009), individual differences exist in the extent to which environmental characteristics influence individual adjustment. In other words, not all children are equally affected by qualitative characteristics of parenting or neighborhood conditions. Not all children residing in dangerous neighborhoods develop internalizing or externalizing problems, for instance. The following section will discuss how individual characteristics of the child may moderate the association between environmental factors and problem behaviors.

**Fearful Temperament as a Marker of Differential Susceptibility to the Environment**

Temperament has been defined as biologically based individual differences in emotional reactivity and self-regulation (Rothbart & Bates, 2006). Emotional reactivity refers to the latency, duration, and intensity of emotional, orienting, and motor reactions to changes in the environment, such as positivity, negative affect, fear, anger, and sadness (Posner & Rothbart, 2000; Rothbart, Sheese, Rueda, & Posner, 2011). Self-regulation refers to internal processes that modulate reactivity, specifically processes of executive attention and effortful control (Rothbart
et al., 2011) and may include approach and avoidance behaviors (Posner & Rothbart, 2000). Temperamentally fearful children tend to experience strongly negative emotions when exposed to novel events and often attempt to regulate this distress through avoidance (Kagan, 1989). In the present study, fearful temperament is operationalized as children’s distress and avoidance in response to a novel and fear-inducing stimulus.

Individual differences in fear reactivity are associated with variations in levels of internalizing and externalizing problem behaviors. For instance, the propensity to react to novelty with negative emotional reactivity has been associated with co-occurring internalizing and externalizing behaviors (e.g., Nigg, 2006). Traditionally, fearful temperament has been identified as a precursor of internalizing problems (e.g., Degnan, Almas, & Fox, 2010), but emerging research suggests that fearful temperament also is related to increased risk of externalizing behavior problems (e.g., Vitaro, Brengden, & Tremblay, 2002). Mechanisms by which levels of fearful temperament affect risk for problem behaviors are less well understood. While direct relationships between fearful temperament and problem behaviors have been found, these associations are typically modest at best (Nigg, 2006). Quite possibly, fearful temperament influences children’s susceptibility to environmental influences (e.g., Belsky & Pluess, 2009).

The differential susceptibility hypothesis proposes that children vary in their susceptibility to environmental influences (e.g., Belsky, 1997). That is, some children are more susceptible to both positive and negative influences of their environment (Belsky & Pluess, 2009). Theoretically, then, temperamental characteristics may reflect individual variability in awareness of or sensitivity to changes in daily structure or environmental characteristics. Consistent with the differential susceptibility hypothesis, temperamentally fearful children may be more susceptible to positive and negative events within their environment (e.g., Obradovic,
That is, temperamentally fearful children may benefit more from exposure to positive parenting and may be more vulnerable to the negative effects of harsh parenting and neighborhood danger than less fearful children.

While harsh parenting can be emotionally distressing for most children, such parenting may be particularly distressing for temperamentally fearful children (e.g., Kochanska, 1995). That is, fearful temperament has been found to moderate the association between harsh parenting and internalizing problems. For temperamentally fearful children, harsher parenting has been linked to increases in internalizing problems (e.g., Oldehinkel, Veenstra, Ormel, De Winter, & Verhulst, 2006). Less research has considered how fearful temperament may moderate the association between harsh parenting and externalizing behavior problems. Quite possibly, harsh parenting also is associated with increased risk for externalizing behavior problems for temperamentally fearful children. Given temperamentally fearful children’s propensity to react to novelty or uncertainty with distress and avoidance (Kagan, 1989), fearful children also may be more likely to interpret ambiguous cues as threatening. When avoidance is not an option, fearful children may react with aggression or antisocial behavior during instances of perceived threat or danger, especially when exposed to harsh parenting as a model of hostile and aggressive behavior. Additional research, which clarifies the process by which fearful temperament and harsh parenting may amplify risk for problem behavior, is clearly needed.

While exposure to harsh parenting may be one mechanism by which risk for developing problem behaviors increases for temperamentally fearful children, temperamentally fearful children also may be particularly vulnerable to neighborhood characteristics. In a sample of 8 to 12 year old children, Bush and colleagues (2010) found that temperamental fearfulness moderated the association between neighborhood disadvantage and adjustment. Specifically,
more neighborhood problems were associated with less social competence for highly temperamentally fearful children. Similarly, Colder and colleagues (2006) found that poor neighborhood quality was more strongly and positively associated with antisocial behavior for children with high levels of fearful temperament and low levels of positive affect compared to non-fearful children and fearful children with high levels of positive affect. Virtually no research has explored the interactive effects of neighborhood danger and fearful temperament on co-occurring problem behaviors beginning in the toddler period.

Although there is evidence that the combination of exposure to harsh parenting and residing in a dangerous neighborhood is associated with increases in problem behaviors (Callahan et al., 2011; Linares et al., 2001), investigators have not yet considered the extent to which temperamentally fearful children may be more vulnerable to the negative effects of these environmental factors. For fearful children, the combination of harsh parenting and neighborhood danger may be overwhelming emotionally, leading to increases in behaviors associated with poor emotional and behavioral regulation. The unpredictability of residing in a dangerous neighborhood and sporadic nature of harsh parenting may be emotionally distressing for fearful children, leading to more depression and anxiety. However, fearful children also may be hyperaware of the threatening nature of harsh parenting and neighborhood danger and model hostility and aggression in other social interactions, leading to increases in externalizing behaviors. The present study examines the interactive effects of harsh parenting and neighborhood danger on problem behaviors and how such interactive influences may be strengthened for temperamentally fearful children as compared to less fearful children.

The Strength of Within Family Sibling Designs
Differential susceptibility hypotheses propose that multifinality and equifinality are partially explained by variations in children’s responses to environmental stimulation (Belsky & Pluess, 2009). Within family sibling designs are ideal for evaluating differential susceptibility hypotheses because these designs can distinguish the impact of parenting and neighborhood characteristics on children’s adjustment by considering within family variation in child temperamental proclivities. Unobservable family characteristics, like exposure to stressors related to socioeconomic disadvantage, have the potential to influence mothers’ harsh parenting and evaluations of children’s behavior. A within family design controls for these unmeasured factors and reduces the bias in estimations of parenting on children’s behavior problems (e.g., Barnett & Scaramella, in press). Including same and mixed sex sibling dyads also provides a powerful test of potential, yet not hypothesized, sex differences.

A within family sibling design also considers age differences. Little research considers the role of developmental timing on environmental influences and children’s adjustment. Although not hypothesized, environmental influences such as neighborhood danger and harsh parenting may differentially affect children based on age. Specifically, mothers may adapt their parenting strategies to children’s age (e.g., Calkins, 2002; Kochanska, Coy, & Murray, 2001), so that differences in parenting across siblings may be associated with age. Furthermore, neighborhood danger may only influence older children as they are likely allowed more independence within the neighborhood as they travel to and from school, play with friends, etcetera (Winslow & Shaw, 2007). Age at the first assessment will be statistically controlled because of the variability in the older sibling’s ages. There is little variability in younger siblings’ ages.
The present study includes longitudinal data of siblings at 3 annual time points when younger siblings were 2, 3 and 4 years of age. Older siblings averaged about 4, 5 and 6 years of age at each assessment point. As compared to the younger siblings who completed all assessments within 2 weeks of their birthdays, older siblings’ ages at the assessments varied more.

**Goals of the Present Study**

The present study evaluated the interactive effects of harsh parenting, neighborhood danger, and fearful temperament on increases in problem behaviors during early childhood. While harsh parenting was expected to predict increases in children’s problem behaviors, this association was expected to be stronger for families living within a dangerous neighborhood, particularly for temperamentally fearful children. Specifically, the current study tested the following hypotheses:

**Hypothesis 1:** Harsh parenting predicts increases in children’s problem behavior during early childhood.

On average, problem behaviors were expected to remain quite stable across early childhood. However, exposure to harsher parenting was expected to predict increases in problem behaviors over the 2-year period of early childhood, controlling for child age and sex. Specifically, harsher parenting measured when siblings were either 2 or 4 years of age was expected to predict increases in problem behaviors from age 2 to age 4 or age 4 to age 6, respectively. Conversely, no change in problem behaviors over the same time period was expected for children experiencing low levels of harsh parenting.

**Hypothesis 2:** Level of neighborhood danger moderates the effect of harsh parenting on change in children’s problem behaviors.
The slope associated with harsh parenting and problem behavior was expected to vary by level of neighborhood danger. Specifically, as neighborhood danger increased, the magnitude of the association between harsh parenting and increases in problem behavior was expected to strengthen. For families living in the most dangerous neighborhoods, the relationship between harsh parenting and increases in problem behaviors was expected to be stronger in magnitude than for children living in less dangerous neighborhoods.

**Hypothesis 3: Temperamentally fearful children will be more sensitive to variations in harsh parenting and neighborhood danger as manifested in increases in problem behaviors.**

Not all children were expected to be equally affected by variations in harsh parenting and neighborhood danger. The greatest increase in problem behavior was expected for temperamentally fearful children, residing in the most dangerous neighborhoods and who experienced the harshest parenting.

**Method**

**Participants**

Participants included 167 low-income families and 334 children (2 children per family) who participated in three annual assessments. Families were recruited from Head Start centers located in the New Orleans metropolitan area and could participate if they had a child eligible for Head Start enrollment, a younger child who would turn 2 years of age during the next year of the study, and a mother who was willing to participate. The present study used data collected from mothers, Head Start eligible children (referred to as older siblings), and their younger siblings. Data were predominately collected in families’ homes and all three family members participated.
Mothers averaged 25.31 years of age (SD = 3.57 years), older siblings averaged 49 months (SD = 7.63 months), and younger siblings averaged 24.16 months of age (SD = 1.77 months). Participants were African-American (90.2%), White (4.9%), or Middle Eastern (1.2%). Of the older siblings assessed, 55.1% were female. Of the younger siblings assessed, 57.5% were female. On average, mothers had 3.19 children (SD = 1.46) and each household supported 4.35 people on average (SD = 1.55). Regarding mothers level of education, 52.7% of mothers graduated from high school and 33.9% of mothers were either married or living with a romantic partner at the time of the interview. Family SES was generally very poor, with an average income to needs ratio of 1.06 (SD = .70) and an average per capita income of $2,801.

Participant retention was excellent. Of the 167 study families, 153 participated in the second assessment, and 154 participated in the third assessment. Complete data was available for 152 (91%) families and these data were used in the present report.

**Procedures**

Recruitment for the study took place at Head Start orientation meetings and when parents registered their children for Head Start. All interested mothers completed a brief recruitment screener in order to determine eligibility and their willingness to participate. A total of 1855 primary caregivers completed the eligibility screener. Of those who completed the screener, 314 (17%) met eligibility requirements. Of the 314 eligible participants, 104 could not be contacted, primarily because their contact information was no longer valid when project staff attempted to contact them. An additional 35 eligible families were not interested in participating once we contacted them. Eight families were interested in participating, but could not participate because they did not speak English sufficiently to participate. Thus, of the eligible participants, 55 percent actually participated in the study.
After project staff explained the study to interested mothers, interviews were scheduled. Interviews primarily occurred in families’ homes, but a few interviews were conducted at Head Start centers at mothers’ requests. This only occurred at the first assessment, by the time the second and third assessments occurred, all participating families were comfortable with project staff visiting their homes. Interviews lasted approximately 2.5 hours and consisted of three parts: a videotaped structured interview, a questionnaire completed by mothers, and a language assessment of the older sibling. Mothers received $100 for participating and each child received a small toy worth about $5. There were 3 annual assessment waves of data collection, when younger siblings were 2, 3, and 4 years of age and older siblings were about 4, 5, and 6 years of age and the interview procedures were identical across the assessment waves.

Informed consent occurred during the first (wave 1) in-home assessment. Before setting up any equipment, interviewers first read and reviewed the consent form with mothers and answered any questions mothers had. The interview did not proceed until the informed consent had been signed and all questions had been answered. Mothers were given a copy of the consent form. At each consecutive assessment, consent forms were reviewed with mothers, but mothers did not have to re-sign the form. Next, the interviewing team set up the camera and equipment for the assessment while the interviewer reviewed a list of interview activities with mothers. Mothers were given an activity list that included brief descriptions of each activity that family members would complete so that they could follow along with the interview.

The interview began with the families participating in a set of structured interactional tasks. Relevant to the present study, mothers completed a matching task for 3 minutes with the younger sibling and then for an additional 3 minutes with both siblings. Both children also
completed an observational temperament assessment at wave 1. Procedures used for each of the observational assessments will be described in turn.

At the initial assessment (wave 1), mothers played a cookie matching game with both of their children. First, the interviewer taught the mother how to play the game. There were 12 cookie pairs; each half of a pair had the same shape in the middle (or “cream” part of the cookie) and the two halves fit together making an Oreo-like cookie. Each person receives 6 cookie halves and the other halves are in a cookie jar. Players are supposed to take turns reaching in the cookie jar without looking to find matches for their cookies. Whoever matches all of their cookies first wins the game. Mothers are instructed to teach their younger child first, which lasts 3-minutes. This segment was used as a measure of parenting towards the younger sibling. Next, the interviewer returns with the older sibling and sets up the game so the siblings can play together. Mothers are instructed to offer any help they think is necessary and to make sure the children follow the rules (3 additional minutes). Mothers’ behavior directed towards the older sibling during this segment was used to measure parenting.

At the wave 1 (children aged 2 and 4) fearful temperament assessment, children sat by themselves on a 54-inch square mat. The mat had markings denoting where children were to sit and where the stimuli were placed. This procedure was used to ensure consistency in the placement of the stimuli. Interviewers placed a robot 18 inches in front of the children, a distance just out of the children’s reach. First, interviewers made the robot turn in a circle and ended with the robot facing the child (about 15 seconds in duration). Then, the robot was still for 15 seconds. Next, the robot raised its arms and roared 4 times (about 15 seconds in duration). The robot was then still for 15 seconds. In the last segment, the robot moved 6 inches toward the child, then back to the far corner of the mat, and then returned to the spot 12 inches away from
the child (approximately 15 seconds). Once the robot reached the final destination, the interviewer turned off the robot and informed the child that the robot would not move anymore and asked the child to touch the robot. If the child did not touch the robot within 5 seconds, the interviewer repeated the request and waited 10 seconds. After 10 seconds, the interviewer removed the robot.

After completing all of the observational tasks, mothers completed questionnaires. Interviewers began the questionnaire portion of the assessment reading the questionnaires to mothers. If mothers requested to complete the questionnaires on their own, they were allowed to do so. Relevant to the present study, mothers answered questions about their children’s problem behaviors and about neighborhood disadvantage.

Later, trained observational coders rated mothers’ behaviors during the matching task and fearful temperament assessments. Prior to coding, each coder received a minimum of 20 hours of training and achieved an average inner-rater reliability estimate of .80 on training interactions. Twenty-five percent of all tasks were double coded to ensure adequate inner-rater reliability. To monitor ongoing adherence to coding procedures, coders attended weekly reliability meetings and coding disagreements were resolved. If reliability dropped below .75 on any single code, additional training on that code occurred. All coders were blind to the identity of families and to study hypotheses.

**Measures**

**Harsh parenting: Wave 1.** Harsh parenting was measured using observational ratings of mothers’ parenting behaviors during the matching game. Based on the NICHD Early Child Care Study (Adi-Japha & Klein, 2009) observational coding procedures, two different observational codes were used to measure harsh parenting: intrusiveness and negative regard. The
*intrusiveness* code measured mothers’ behaviors that were over controlling and parent-centered rather than autonomy promoting and child-centered. The *negative regard* code measured mothers’ expression of negative feelings towards their children, including finding fault in the child, coercive statements, and negative physical behaviors toward the child (e.g., pulling the child by their arm). Each code was rated on a 7-point Likert scale ranging from 1 (not at all characteristic) to 7 (very highly characteristic). Inter-class correlation coefficients indicated strong correspondence across the two raters for intrusiveness [ICC = .84 (younger child) and .83 (older child)] and negative regard [ICC = .88 (younger child) and .86 (older child)]. Notably, different groups of coders rated parenting scores for the younger and older siblings.

**Fearful Temperament: Wave 1.** Children’s fearful temperament was measured using observational ratings of children’s avoidance and distress in response to a robot at the wave 1 assessment. Four trials, each lasting 30 seconds were administered. Each trial was split up into three 10-second epochs. Observational coders scored children’s avoidance and distress on a 4-point scale, ranging from 0 (no avoidance/distress) to 3 (moderate/high avoidance/distress). Avoidance was measured by the amount of distance between the children and the robot. For example, standing in place and not moving was coded as 0, while leaving the room was coded as 3. Distress was measured based on children’s vocalizations of anger, sadness, or distress. For example, no vocalizations or vocalizations in a conversational tone were coded as 0 for no distress, while screams or cries were coded as 3 for high distress. Scores were created by using the peak avoidance and distress score within each trial and averaging across the 4 trials. Inter-class correlation coefficients were computed to estimate the reliability of observational coders (younger siblings: average ICC = .91 for distress and average ICC = .75 for avoidance; older siblings: average ICC = .76 for distress and average ICC = .60 for avoidance).
The robot task has been used in existing research as an observational measure of fearful temperament during early childhood (e.g., Kochanska, Aksan, & Joy, 2007; Rubin, Burgess, Hastings, 2002). However, the majority of samples include middle to high income, White families. Very few studies have used this task as a measure of fearful temperament with low-income and racially diverse families. Very little is known regarding the efficacy of such tasks for evoking fearful emotional reactivity.

**Neighborhood danger: Wave 1.** Mothers’ reports on the Me & My Neighborhood Questionnaire (Pittsburgh Youth Study, 1991) were used to create the neighborhood danger measure. Mothers rated 20 items regarding the frequency with which events occurred during the past year on a 4-point Likert scale (0=never, 1=once, 2=a few times, and 3=a lot). Because less severe events (e.g., “neighbors arguing loudly”) may occur more frequently than more severe events (e.g., “A family member was stabbed or shot”), all items were recoded as 0 (never occurred) or 1 (occurred at least once) during the past year. In addition, some of the items included dangerous events that happened to family members or friends, which may or may not have occurred within families’ neighborhoods. Thus only items that clearly occurred within the neighborhood were included in the final index of neighborhood danger. The **neighborhood danger** index included the following 9 events: “You hear neighbors complaining about crimes in your neighborhood,” “You carry a gun or knife for safety,” “You see or hear about a shooting near your home,” “You see strangers drunk or high near your home,” “A gang fight occurs near your home,” “People in your neighborhood complain about being harassed by the police,” “You see cars speeding or driving dangerously on your street,” “You see people dealing drugs near your home,” “You hear adults arguing loudly on your street.” Items were summed so that higher scores reflect more dangerous events occurring within the neighborhood during the past year.
Total problem behaviors: Waves 1 and 3. Mothers’ completed the Child Behavior Checklist for ages 1½ to 5 (CBCL; Achenbach & Rescorla, 2000). All items were rated on a 3-point Likert scale (0 = not true, 1 = sometimes true, and 2 = very true). Mothers rated 51 items regarding the level of children’s internalizing and externalizing behaviors. Forty-six items were averaged to create a total problem behavior score. Five of the original 51 items were deleted from the internalizing and total problems score because they closely matched measures of fearful temperament, which is a main predictor in the hypothesized model. Consistent with previous research, internalizing and externalizing scores were statistically and significantly correlated for younger siblings ($r = .64, p < .01$ at wave 1; $r = .74, p < .01$ at wave 3) and older siblings ($r = .76, p < .01$ at wave 1; $r = .79, p < .01$ at wave 3), providing support for using an overall problem behavior score (e.g., Achenbach, 1992; McCartney, Owen, Booth, Clarke-Stewart, & Vandell, 2004).

Data Analytic Plan

Prior to testing any study hypotheses, the means, standard deviations, skewness, and kurtosis were examined for all study constructs. Constructs with unacceptable skew were transformed using logarithmic or square root transformation as necessary. Correlations were computed to evaluate the patterns of the associations among study constructs. Although study constructs were not expected to vary by child sex, child sex will be included in these correlations. If child sex is significantly correlated with any study constructs, then it will be statistically controlled in the tests of study hypotheses. Fearful temperament, harsh parenting, and neighborhood danger were expected to be correlated with problem behaviors.

First, an unconditional means model was computed to examine variance in problem behaviors across time, within families, and between families. More variance between families
compared to within families is expected and supports the use of multilevel modeling techniques, which account for the non-independence of within family data. Then, a multilevel model was computed to test study hypotheses. Multilevel linear modeling is a rigorous technique for studying family processes and the development of problem behaviors as it accounts for the intra-class correlation in the data providing more efficient estimates, particularly in a data structure that includes multiple individuals within families. The model included 3 levels with time (i.e., wave) at level 1, individual-level variables at level 2, including fearful temperament, harsh parenting, and problem behaviors, and family-level variables at level 3, including neighborhood danger. With the exception of child age, child sex, and wave, all study constructs were grand mean centered and any interaction term was computed using centered constructs. Child age was centered at 24 months (the average age of the youngest children at the first assessment), sex was centered at girls (girls = 0 and boys = 1), and assessment wave was centered at wave 1 (i.e., wave 1 = 0; wave 2 = 1; wave 3 = 2). Study hypotheses were estimated with a single model which included the main effects (i.e., fearful temperament, harsh parenting, neighborhood danger, and wave), two-way interaction terms between fearful temperament x harsh parenting, fearful temperament x neighborhood danger, harsh parenting x neighborhood danger, fearful temperament x wave, harsh parenting x wave, and neighborhood danger x wave, three-way interaction terms for fearful temperament x harsh parenting x neighborhood danger, fearful temperament x harsh parenting x wave, fearful temperament x neighborhood danger x wave, and harsh parenting x neighborhood danger x wave, and one four-way interaction term for fearful temperament x harsh parenting x neighborhood danger x wave.

Planned Alternative Analyses
While the co-occurrence of problem behaviors was the focus of study, alternative analyses also were estimated to ensure that the pattern of associations were similar across internalizing and externalizing problems. Models were re-estimated in two different ways. First, models were estimated separately for internalizing and externalizing problems. This set of analyses was expected to produce results similar to the total problem behavior analyses because internalizing and externalizing problems demonstrate strong covariation. In other words, using internalizing or externalizing scores in isolation was expected to produce results comparable to the total problem behavior score.

Second, the model was estimated statistically controlling for the covariation between internalizing and externalizing behaviors. By removing the covariation observed in internalizing and externalizing problems, the effects of neighborhood, parenting, and child fearful temperament on the variance unique to externalizing or internalizing problems were estimated. Since these models maximize the difference across externalizing and internalizing problems, these models may not replicate the model estimating the variance associated with total problem behaviors.

**Results**

Before testing study hypotheses, the distributional properties of the study constructs were examined to ensure the constructs met normality assumptions. All study constructs were normally distributed as noted in skewness and kurtosis scores in acceptable ranges (e.g., all scores less than 3.00). As shown in Table 1, the means and standard deviations indicated good variability for the majority of the study constructs. Most families reported experiencing just over 3 dangerous events in their neighborhood, although scores varied considerably (M = 3.26, SD = 2.24). Regarding harsh parenting, older siblings experienced less harsh parenting (M = 2.65, SD
than younger siblings (M = 3.36, SD = 1.06). Paired sample t-tests indicated significant differences in harsh parenting towards younger children (age 2) compared to older siblings (age 4; \( t = 6.23, p < .01 \)). Levels of fearful temperament were slightly higher for younger siblings (M = 1.91, SD = .87) than for older siblings (M = 1.39, SD = .76). Fearful temperament also was significantly different between siblings (\( t = 6.16, p < .01 \)). Finally, problem behavior scores were generally low. Younger siblings had mean problem behavior scores of .59 (SD = .29) at age 2 and .53 (SD = .29) at age 4. Older siblings had mean problem behavior scores of .50 (SD = .30) at age 4 and .43 (SD = .43) at age 6. Mothers’ ratings of younger siblings and older siblings’ problem behaviors were significantly different at wave 1 (younger child age 2 and older sibling age 4; \( t = 6.01, p < .01 \)) and wave 3 (younger child age 4 and sibling age 6; \( t = 6.31, p < .01 \)). Furthermore, problem behaviors significantly decreased for younger siblings from age 2 to age 4 (\( t = 2.75, p < .01 \)) and older siblings from age 4 to age 6 (\( t = 3.21, p < .01 \)). Due to the significant differences in problem behaviors by age, age at wave 1 was controlled statistically in the evaluation of study hypotheses.

Boys are often reported as having higher levels of externalizing problems than girls during early childhood (Keenan & Shaw, 1997). Study constructs were correlated with younger and older siblings’ sex. Only one statistically significant correlation emerged. For older siblings, sex was significantly correlated with harsh parenting at age 4 (\( r = -.26, p < .01 \); see Table 2), indicating that mothers were harsher with boys than girls. Consequently, child sex was controlled statistically in the evaluation of study hypotheses.
### Table 1. Descriptive Statistics of Study Constructs

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Younger Sibling:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harsh Parenting (wave 1)</td>
<td>162</td>
<td>1.50</td>
<td>7.00</td>
<td>3.358</td>
<td>1.058</td>
</tr>
<tr>
<td>Fearful Temperament (wave 1)</td>
<td>158</td>
<td>.000</td>
<td>3.00</td>
<td>1.905</td>
<td>.873</td>
</tr>
<tr>
<td>Problem Behaviors (wave 1)</td>
<td>166</td>
<td>.020</td>
<td>1.540</td>
<td>.593</td>
<td>.288</td>
</tr>
<tr>
<td>Problem Behaviors (wave 2)</td>
<td>152</td>
<td>.040</td>
<td>1.340</td>
<td>.573</td>
<td>.288</td>
</tr>
<tr>
<td>Problem Behaviors (wave 3)</td>
<td>154</td>
<td>.020</td>
<td>1.460</td>
<td>.533</td>
<td>.288</td>
</tr>
<tr>
<td><strong>Older Sibling:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harsh Parenting (wave 1)</td>
<td>162</td>
<td>1.00</td>
<td>7.00</td>
<td>2.645</td>
<td>1.175</td>
</tr>
<tr>
<td>Fearful Temperament (wave 1)</td>
<td>162</td>
<td>.000</td>
<td>3.00</td>
<td>1.386</td>
<td>.761</td>
</tr>
<tr>
<td>Problem Behaviors (wave 1)</td>
<td>166</td>
<td>.000</td>
<td>1.430</td>
<td>.497</td>
<td>.300</td>
</tr>
<tr>
<td>Problem Behaviors (wave 2)</td>
<td>152</td>
<td>.000</td>
<td>1.450</td>
<td>.438</td>
<td>.295</td>
</tr>
<tr>
<td>Problem Behaviors (wave 3)</td>
<td>154</td>
<td>.000</td>
<td>1.530</td>
<td>.429</td>
<td>.293</td>
</tr>
<tr>
<td>Neighborhood Danger (wave 1)</td>
<td>166</td>
<td>.000</td>
<td>7.000</td>
<td>3.259</td>
<td>2.237</td>
</tr>
</tbody>
</table>

### Table 2. Correlations among Study Constructs

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sex</td>
<td>- .127</td>
<td>-.031</td>
<td>-.126</td>
<td>.003</td>
<td>-.071</td>
<td>-.165</td>
<td>*</td>
<td>-.027</td>
</tr>
<tr>
<td>2. Age</td>
<td>.030</td>
<td>-</td>
<td>-.058</td>
<td>.041</td>
<td>-.123</td>
<td>.022</td>
<td>.096</td>
<td>-.054</td>
</tr>
<tr>
<td>3. Neighborhood Danger (wave 1)</td>
<td>.024</td>
<td>-.049</td>
<td>-</td>
<td>-.092</td>
<td>.001</td>
<td>.073</td>
<td>.155</td>
<td>+</td>
</tr>
<tr>
<td>4. Harsh Parenting</td>
<td>-.255</td>
<td>**</td>
<td>-.099</td>
<td>-.134</td>
<td>-</td>
<td>-.001</td>
<td>.054</td>
<td>.112</td>
</tr>
<tr>
<td>5. Fearful Temperament</td>
<td>.019</td>
<td>-.140</td>
<td>+.142</td>
<td>+.167</td>
<td>*</td>
<td>-.150</td>
<td>-.037</td>
<td>-.024</td>
</tr>
<tr>
<td>6. Problem Behaviors (wave 1)</td>
<td>-.074</td>
<td>-.078</td>
<td>.091</td>
<td>.230</td>
<td>**</td>
<td>.050</td>
<td>-</td>
<td>.583</td>
</tr>
<tr>
<td>7. Problem Behaviors (wave 2)</td>
<td>-.028</td>
<td>-.058</td>
<td>.113</td>
<td>.284</td>
<td>**</td>
<td>.121</td>
<td>.650</td>
<td>**</td>
</tr>
<tr>
<td>8. Problem Behaviors (wave 3)</td>
<td>-.024</td>
<td>-.104</td>
<td>.009</td>
<td>.239</td>
<td>**</td>
<td>.134</td>
<td>.471</td>
<td>**</td>
</tr>
</tbody>
</table>

Note: + p < .10; * p < .05; ** p < .01.
Upper matrix: younger siblings; lower matrix: older siblings
**Evaluation of Study Hypotheses**

Next, a three-level model was estimated to test the hypothesized direct and interactive effects of harsh parenting, neighborhood danger, and fearful temperament on change in problem behaviors from wave 1 (younger sibling: age 2, older sibling: age 4) to wave 3 (younger sibling: age 4, older sibling: age 6). Level 1 estimated the growth trajectory of each sibling’s problem behavior across time. Level 2 estimated individual variations in problem behaviors, including the influences of harsh parenting and fearful temperament. Level 3 considered systematic variations in levels and trajectories of problem behaviors between families and the influence of neighborhood danger.

First, an unconditional means model was computed with total problem behaviors as the dependent variable to estimate the variance of problem behaviors across time, within families, and between families. The average problem behavior score was .51 for the entire sample (possible range 0 – 3). Results indicated statistically significant within individual (i.e., across time; \( e = .04 \)), between family (\( u_{00} = .04, p < .01 \)) and within family (\( r_{0} = .01, p < .01 \)) variance in total problem behaviors. Specifically, 44 percent of the variance in problem behaviors was associated with time, 11 percent attributed to within family differences, and 44 percent associated with between family variance. That is, children in the same family were considerably more similar to each other in terms of problem behaviors than were children from different families. Significant nesting of problem behaviors within families highlights the importance of a multilevel design that accounts for unobserved similarities within families. Following the estimation of an unconditional means model, a conditional growth model with all hypothesized predictor variables was computed.
As shown in Table 3, the main effects of child age, child sex, wave, harsh parenting, neighborhood danger, and fearful temperament were added to the model. All two-way interactions (harsh parenting x neighborhood danger, harsh parenting x fearful temperament, fearful temperament x neighborhood danger, harsh parenting x wave, neighborhood danger x wave, and fearful temperament x wave), three-way interactions (harsh parenting x neighborhood danger x fearful temperament, harsh parenting x neighborhood danger x wave, harsh parenting x fearful temperament x wave, and fearful temperament x neighborhood danger x wave), and the four-way interaction (harsh parenting x neighborhood danger x fearful temperament x time) also were included. The addition of the main and interactive effects significantly improved the model fit ($\chi^2 = 93.46, p < .01$). Although considerable variance in problem behaviors between families ($u_{00} = .04, p < .01$) and within individuals (i.e., across time; $e = .04$) persisted, the within family variance in total problem behaviors became nonsignificant ($r_0 < .01, p > .05$). That is, the main and interactive effects of harsh parenting, neighborhood danger, and fearful temperament explain significant proportions of variance in total problem behaviors within families but not across time or between families.

Results of the multilevel regression model are presented in Table 3. Regarding the statistical controls, child age explained a significant proportion of variance in total problem behaviors ($\beta = -.002, p < .01$) such that older children had fewer problem behaviors than younger children at wave 1 (younger sibling: age 2; older sibling: age 4). Although total problem behaviors were expected to remain stable over time, results indicated that levels of problem behaviors declined each year ($\beta = -.03, p < .01$). The following sections will discuss the results specific to each study hypothesis.
Table 3. *Results of the Multilevel Regression Analyses Estimating Direct and Interactive Effects of Harsh Parenting, Neighborhood Danger, and Fearful Temperament on Change in Total Problem Behaviors for Younger and Older Siblings*

<table>
<thead>
<tr>
<th>Fixed Effects</th>
<th>d.f.</th>
<th>b</th>
<th>S.E.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>161</td>
<td>.568**</td>
<td>.022</td>
</tr>
<tr>
<td>Wave</td>
<td>367</td>
<td>-.034**</td>
<td>.008</td>
</tr>
<tr>
<td>Child Age</td>
<td>137</td>
<td>-.002**</td>
<td>.001</td>
</tr>
<tr>
<td>Child Sex</td>
<td>137</td>
<td>.020</td>
<td>.018</td>
</tr>
<tr>
<td>Harsh Parenting</td>
<td>137</td>
<td>.039**</td>
<td>.012</td>
</tr>
<tr>
<td>Neighborhood Danger</td>
<td>161</td>
<td>.015+</td>
<td>.008</td>
</tr>
<tr>
<td>Fearful Temperament</td>
<td>137</td>
<td>&lt; .001</td>
<td>.016</td>
</tr>
<tr>
<td>Harsh Parenting x Wave</td>
<td>367</td>
<td>-.005</td>
<td>.007</td>
</tr>
<tr>
<td>Neighborhood Danger x Wave</td>
<td>367</td>
<td>-.004</td>
<td>.004</td>
</tr>
<tr>
<td>Fearful Temperament x Wave</td>
<td>367</td>
<td>.018+</td>
<td>.010</td>
</tr>
<tr>
<td>Harsh Parenting x Neighborhood Danger</td>
<td>137</td>
<td>.007</td>
<td>.005</td>
</tr>
<tr>
<td>Harsh Parenting x Fearful Temperament</td>
<td>137</td>
<td>.010</td>
<td>.014</td>
</tr>
<tr>
<td>Neighborhood Danger x Fearful Temperament</td>
<td>137</td>
<td>-.007</td>
<td>.007</td>
</tr>
<tr>
<td>Harsh Parenting x Neighborhood Danger x Wave</td>
<td>367</td>
<td>-.003</td>
<td>.003</td>
</tr>
<tr>
<td>Harsh Parenting x Fearful Temperament x Wave</td>
<td>367</td>
<td>.001</td>
<td>.009</td>
</tr>
<tr>
<td>Neighborhood Danger x Fearful Temperament x Wave</td>
<td>367</td>
<td>.001</td>
<td>.004</td>
</tr>
<tr>
<td>Harsh Parenting x Neighborhood Danger x Fearful Temperament</td>
<td>137</td>
<td>&lt; .001</td>
<td>.006</td>
</tr>
<tr>
<td>Harsh Parenting x Neighborhood Danger x Fearful Temperament x Wave</td>
<td>367</td>
<td>.004</td>
<td>.004</td>
</tr>
</tbody>
</table>

Note: + p < .10; * p < .05; ** p < .01
**Hypothesis 1: Harsh parenting predicts increases in children’s problem behavior during early childhood.**

Partial support for the expectation that harsh parenting practices would predict increases in total problem behaviors emerged. Consistent with expectations, harsh parenting explained significant proportions of variance associated with the initial level of problem behaviors ($\beta = .04$, $p < .01$; see Table 3), but did not explain change in total problem behaviors over time. Mothers who were harsher with their children at ages 2 and 4 years old also rated their children as engaging in more problem behaviors. Notably, the within family variance associated with harsh parenting was not statistically significant, indicating that the effect of harsh parenting on problem behaviors was similar across both children. Given the lack of statistically significant within family variance in harsh parenting, the likelihood that neighborhood danger and/or fearful temperament will moderate the association between harsh parenting and change in children’s problem behavior is unlikely.

**Hypothesis 2: Level of neighborhood danger moderates the effect of harsh parenting on change in children’s total problem behaviors.**

Exposure to harsher parenting was expected to be more strongly associated with both the initial level and rate of change in total problem behavior for children residing in more dangerous neighborhoods as compared to children residing in less dangerous neighborhoods. A trend towards statistical significance emerged for neighborhood danger and initial level of total problem behaviors at wave 1 ($\beta = .02$, $p < .10$; see Table 3), but did not explain change in problem behaviors over time. Children who lived in more dangerous neighborhoods at wave 1 were rated as having higher levels of problem behaviors. In contrast to expectations, neighborhood danger did not moderate the association between harsh parenting and total
problem behaviors either at initial levels or with change in problem behaviors over time. The main effects of harsh parenting and neighborhood danger were stronger than the interaction between harsh parenting x neighborhood danger.

**Hypothesis 3:** Temperamentally fearful children will be more sensitive to variations in harsh parenting and neighborhood danger as manifested in increases in problem behaviors.

Consistent with the three way hypothesis, temperamentally fearful children were expected to be most vulnerable to the combined effects of exposure to harsher parenting and neighborhood danger such that temperamentally fearful children would evidence the highest initial level and greatest rates of change in total problem behavior when they experienced both harsher parenting and dangerous neighborhood conditions. The main effect of fearful temperament did not explain significant variance associated with initial level of total problem behaviors or change in total problem behaviors over time (see Table 3). Furthermore, the beta coefficient associated with three-way fearful temperament x neighborhood danger x harsh parenting term did not explain statistically significant portions of the variance associated with the initial level of total problem behaviors or change in total problem behaviors. Thus, no support emerged for the expectation that the impact of harsher parenting and exposure to more neighborhood danger would differentially effect children’s development of problem behaviors in general.

**Planned Alternative Analyses**

In order to ensure that the pattern of associations that resulted for the total problem behavior scores were consistent with patterns for internalizing and externalizing problems separately, four multilevel regression equations were computed. These models replicated the
analyses for total problem behaviors with a few slight modifications. The first two models replicated the total problem behavior models but substituted initial level and rates of change in internalizing and externalizing problems as the dependent variable. The second set of models replicated the total problem behavior models, but these models also controlled for the covariation in externalizing and internalizing problems respectively. Results of these multilevel models are presented in Table 4 and results will be discussed in turn.

**Externalizing Problems.** Results of the unconditional means model predicting externalizing problems indicated considerable variability in externalizing behaviors within individual (i.e., across time; \( e = .04 \)), within family (\( r_0 = .03, p < .01 \)), and between family (\( u_{00} = .04, p < .01 \)). On average, mothers reported .66 externalizing behaviors per child (possible range = 0 to 3). The conditional growth model predicting externalizing behaviors included the main effects of child age, child sex, wave (i.e., time), harsh parenting, neighborhood danger, and fearful temperament as well as all two-way interactions, three-way interactions, and the four-way interaction (harsh parenting x neighborhood danger x fearful temperament x wave). Results of the conditional growth model are presented in Table 4. Generally, boys were reported as having marginally more externalizing behaviors than girls (\( \beta = .04, p < .10 \)). Furthermore, older children had lower levels of externalizing problems than younger children (\( \beta = -.01, p < .01 \)). Like total problem behaviors, externalizing behaviors significantly decreased over time (\( \beta = -.05, p < .01 \)).
Table 4. Results of the Multilevel Regression Analyses Estimating Direct and Interactive Effects of Harsh Parenting, Neighborhood Danger, and Fearful Temperament on Change in Internalizing and Externalizing Behaviors for Younger and Older Siblings

<table>
<thead>
<tr>
<th>Fixed Effects</th>
<th>Externalizing Behaviors</th>
<th>Internalizing Behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>S.E.</td>
</tr>
<tr>
<td>Interception</td>
<td>.659**</td>
<td>.026</td>
</tr>
<tr>
<td>Wave</td>
<td>-.050**</td>
<td>.009</td>
</tr>
<tr>
<td>Internalizing Behaviors</td>
<td>.728**</td>
<td>.027</td>
</tr>
<tr>
<td>Child Age</td>
<td>-.005**</td>
<td>.001</td>
</tr>
<tr>
<td>Child Sex</td>
<td>.043+</td>
<td>.024</td>
</tr>
<tr>
<td>Harsh Parenting</td>
<td>.046**</td>
<td>.014</td>
</tr>
<tr>
<td>Neighborhood Danger</td>
<td>.019*</td>
<td>.010</td>
</tr>
<tr>
<td>Fearful Temperament</td>
<td>.010</td>
<td>.019</td>
</tr>
<tr>
<td>Harsh Parenting × Wave</td>
<td>-.005</td>
<td>.008</td>
</tr>
<tr>
<td>Neighborhood Danger × Wave</td>
<td>-.005</td>
<td>.004</td>
</tr>
<tr>
<td>Fearful Temperament × Wave</td>
<td>.016</td>
<td>.011</td>
</tr>
<tr>
<td>Harsh Parenting × Neighborhood Danger</td>
<td>.006</td>
<td>.006</td>
</tr>
<tr>
<td>Harsh Parenting × Fearful Temperament</td>
<td>.008</td>
<td>.017</td>
</tr>
<tr>
<td>Neighborhood Danger × Fearful Temperament</td>
<td>-.008</td>
<td>.008</td>
</tr>
<tr>
<td>Harsh Parenting × Neighborhood Danger × Wave</td>
<td>-.004</td>
<td>.004</td>
</tr>
<tr>
<td>Harsh Parenting × Fearful Temperament × Wave</td>
<td>.001</td>
<td>.010</td>
</tr>
<tr>
<td>Neighborhood Danger × Fearful Temperament × Wave</td>
<td>&lt; .001</td>
<td>.005</td>
</tr>
<tr>
<td>Harsh Parenting × Neighborhood Danger × Fearful Temperament</td>
<td>.006</td>
<td>.007</td>
</tr>
<tr>
<td>Harsh Parenting × Fearful Temperament × Wave</td>
<td>.004</td>
<td>.004</td>
</tr>
</tbody>
</table>

Note: + p < .10; * p < .05; ** p < .01
Regarding study hypotheses, harsh parenting was significantly associated with initial reports of externalizing problems ($\beta = .05, p < .01$), indicating that children who received harsher parenting were rated higher in externalizing behavior problems than children receiving less harsh parenting. The main effect of neighborhood danger on initial level of externalizing behaviors also was statistically significant ($\beta = .02, p < .05$), indicating that children living in more dangerous neighborhoods were rated as having more externalizing behavior problems. However, neighborhood danger did not moderate the effect of harsh parenting on initial reports of externalizing behaviors or change in externalizing problems over time. Lastly, the three-way interaction between harsh parenting, neighborhood danger, and fearful temperament was not associated with externalizing behaviors at wave 1 or change in externalizing behaviors over time.

Next, a multilevel model was computed predicting externalizing behaviors controlling for the covariation of internalizing problems at level 1. Internalizing problems were contemporaneously a strong predictor of externalizing behaviors at each assessment wave ($\beta = .73, p < .01$; see Table 4). At each assessment wave, children rated high on internalizing problems also were rated high on externalizing problems. After controlling for levels of internalizing problems, a statistically significant sex effect emerged; mothers rated boys higher on externalizing problems than girls ($\beta = .04, p < .01$). After controlling for internalizing problems, however, the magnitude of the effects of harsh parenting ($\beta = .02, p < .10$) and neighborhood danger ($\beta = .01, p < .10$) on initial levels of externalizing behaviors became only marginally statistically significant. No statistically significant main or interactive effects of fearful temperament on initial level of externalizing behavior problems or change in externalizing problems emerged. In contrast to expectations, the three-way interaction did not explain significant variance in change in externalizing behaviors over time.
**Internalizing Problems.** Results of the unconditional means model predicting internalizing problems indicated considerable variability in internalizing behaviors within individual (i.e., across time; \( e = .04 \)) and between family (\( \mu_{00} = .05, p < .01 \)). However, significant variance in internalizing behaviors within families did not emerge, indicating that mothers’ rated both children similarly on internalizing behavior problems (mean = .45, possible range 0 – 3). Modeling the conditional growth model indicated that internalizing problems decrease significantly over time (\( \beta = -.02, p < .05 \)). Harsh parenting significantly predicted initial levels of internalizing behaviors (\( \beta = .03, p < .05 \)), indicating that mothers observed to be harsher during structured parenting interactions reported their children as higher initial levels of internalizing behavior problems. However, harsh parenting did not explain significant variance in change in internalizing behavior problems over time. Neighborhood danger was not directly associated with the initial level or change in internalizing behavior problems over time. Additionally, no evidence emerged to suggest that neighborhood danger moderated the association between harsh parenting and initial reports of internalizing behaviors or change in internalizing problems over time. Finally, fearful temperament did not explain significant variance in initial levels or change in internalizing behavior problems over time, including the proposed three-way interaction (i.e., harsh parenting x neighborhood danger x fearful temperament).

The multilevel model predicting internalizing problems was re-estimated with the statistical control of externalizing behaviors at level 1. Not surprisingly, children rated high on externalizing problems also were rated high on internalizing problems (\( \beta = .63, p < .01 \)). Interestingly, when controlling for externalizing problems, rates of internalizing behaviors demonstrated a statistically significant increase over time (\( \beta = .01, p < .05 \)). Regarding the effect
of child sex, girls were reported as having slightly more internalizing problems than boys ($\beta = -.03$, $p < .10$). After controlling for externalizing problems, fearful temperament was negatively associated with initial levels of internalizing problems ($\beta = -.03$, $p < .05$). That is, children observed to be more temperamentally fearful also were rated as having fewer internalizing behavior problems by mothers, net of overall level of externalizing problems. Direct and interactive effects of harsh parenting and neighborhood danger did not emerge. Furthermore, the beta coefficient associated with the three-way interaction was not statistically significant.

**Exploratory Analyses**

Repeatedly, the beta coefficients associated with child age were statistically significant indicating that older children were reported as having less problem behaviors than younger children. Similarly, problem behaviors decreased over time for both siblings. Quite possibly, some children are more susceptible to the impact of harsh parenting, neighborhood danger, and fearful temperament based on age. Consequently, exploratory analyses were estimated to evaluate the study hypotheses separately for younger and older siblings. Using hierarchical multiple regression equations, these models consider whether fearful temperament differentially moderates the association between parenting and neighborhood danger for older vs. younger children. Since these analyses were exploratory, only total problem behavior models were re-estimated.

Two hierarchical regression equations were computed to evaluate study hypotheses separately for younger (see Table 5) and older children (see Table 6). Regarding younger children’s problem behaviors, a hierarchical regression equation was computed with child sex, age, and age 2 problem behaviors entered in step 1. The change in $R^2$ associated with this step was statistically significant ($\Delta R^2 = .22; F = 12.69, p < .01$); only the main effect of age 2 problem
behaviors accounting for statistically significant portions of the overall variance ($\beta = .47, p < .01$). Step 2 estimated the amount of variance explained by harsh parenting, neighborhood danger, and fearful temperament. None of the beta coefficients were statistically significant. Two-way interactions (neighborhood danger x fearful temperament, neighborhood danger x harsh parenting, and fearful temperament x harsh parenting) were entered in the third step. These interactions did not explain significant variance in age 4 problem behaviors. The last step, including the three-way interaction term for harsh parenting x neighborhood danger x fearful temperament, did not significantly predict age 4 problem behaviors ($\beta = .09, p > .05$).

Table 5. Results of the Regression Analyses Estimating Direct and Interactive Effects of Fearful Temperament, Harsh Parenting, and Neighborhood Danger on Change in Total Problem Behaviors from Age 2 to Age 4

<table>
<thead>
<tr>
<th>Step</th>
<th>$\Delta R^2 (\Delta F)$</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>.217 (12.689**)</td>
<td></td>
</tr>
<tr>
<td>Child Age</td>
<td></td>
<td>-.056</td>
</tr>
<tr>
<td>Child Sex</td>
<td></td>
<td>.004</td>
</tr>
<tr>
<td>Problem Behaviors Age 2</td>
<td></td>
<td>.466**</td>
</tr>
<tr>
<td>Step 2</td>
<td>.006 (.317)</td>
<td></td>
</tr>
<tr>
<td>Fearful Temperament</td>
<td></td>
<td>.050</td>
</tr>
<tr>
<td>Harsh Parenting</td>
<td></td>
<td>-.019</td>
</tr>
<tr>
<td>Neighborhood Danger</td>
<td></td>
<td>.052</td>
</tr>
<tr>
<td>Step 3</td>
<td>.011 (.626)</td>
<td></td>
</tr>
<tr>
<td>Harsh Parenting x Neighborhood Danger</td>
<td></td>
<td>-.058</td>
</tr>
<tr>
<td>Fear x Neighborhood Danger</td>
<td></td>
<td>.086</td>
</tr>
<tr>
<td>Fear x Parenting</td>
<td></td>
<td>-.057</td>
</tr>
<tr>
<td>Step 4</td>
<td>.006 (1.101)</td>
<td></td>
</tr>
<tr>
<td>Fear x Parenting x Danger</td>
<td></td>
<td>.087</td>
</tr>
</tbody>
</table>

Note: + $p < .10$; * $p < .05$; ** $p < .01$

N = 140
Regarding change in older children’s total problem behaviors from age 4 (wave 1) to age 6 (wave 3), after controlling for child age, sex, and initial levels of total problem behaviors ($\Delta R^2 = .26$; $F = 11.71, p < .01$; see Table 6), fearful temperament, harsh parenting, and neighborhood danger did not explain statistically significant portions of the variance in total problem behaviors at wave 3 (see Table 6). The next step of the equation estimated the three interaction terms. A statistically significant change in $R^2$ emerged ($\Delta R^2 = .05; F = 3.43, p < .05$) and the beta coefficients associated with fearful temperament x neighborhood danger ($\beta = -.17, p < .05$) and fearful temperament x harsh parenting ($\beta = .17, p < .05$; see Table 6) were statistically significant. Finally, the effect of the three-way interaction was estimated. Again a statistically significant change in $R^2$ emerged ($\Delta R^2 = .03; F = 5.55, p < .05$) and the beta coefficient associated with the three-way interaction was statistically significant ($\beta = .20, p < .05$; see Table 6).

Table 6. Results of the Regression Analyses Estimating Direct and Interactive Effects of Fearful Temperament, Harsh Parenting, and Neighborhood Danger on Change in Total Problem Behaviors from Age 4 to Age 6

<table>
<thead>
<tr>
<th>Step</th>
<th>$\Delta R^2 (\Delta F)$</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1:</strong></td>
<td>.248 (15.205**)</td>
<td></td>
</tr>
<tr>
<td>Child Age</td>
<td>.065</td>
<td></td>
</tr>
<tr>
<td>Child Sex</td>
<td>-.020</td>
<td></td>
</tr>
<tr>
<td>Problem Behaviors Age 4</td>
<td>.489**</td>
<td></td>
</tr>
<tr>
<td><strong>Step 2:</strong></td>
<td>.030 (1.899)</td>
<td></td>
</tr>
<tr>
<td>Fearful Temperament</td>
<td>.086</td>
<td></td>
</tr>
<tr>
<td>Harsh Parenting</td>
<td>.144+</td>
<td></td>
</tr>
<tr>
<td>Neighborhood Danger</td>
<td>-.002</td>
<td></td>
</tr>
<tr>
<td><strong>Step 3:</strong></td>
<td>.053 (3.521*)</td>
<td></td>
</tr>
<tr>
<td>Harsh Parenting x Danger</td>
<td>.021</td>
<td></td>
</tr>
<tr>
<td>Fear x Danger</td>
<td>-.168*</td>
<td></td>
</tr>
<tr>
<td>Fear x Parenting</td>
<td>.169*</td>
<td></td>
</tr>
<tr>
<td><strong>Step 4:</strong></td>
<td>.027 (5.580*)</td>
<td></td>
</tr>
<tr>
<td>Fear x Parenting x Danger</td>
<td>.197*</td>
<td></td>
</tr>
</tbody>
</table>

Note: + p < .10; * p < .05; ** p < .01
N = 141
Fearful temperament was expected to moderate the association between harsh parenting x neighborhood danger and children’s problem behaviors, therefore the three-way interaction was decomposed by first splitting the sample above and below the mean of fearful temperament. Next, hierarchical regression equations were re-computed separately for the high (n = 83) and low (n = 57) fearful temperament groups. Child sex, age, and initial levels of total problem behaviors were statistically controlled in both models. After considering the main effects of harsh parenting and neighborhood danger, the neighborhood danger x harsh parenting interaction term was not statistically significant for high ($\beta = .01, p > .05$) or low ($\beta = -.02, p > .05$) fearful temperament groups. Next, the sample was split one standard deviation above the mean (n = 18) and below (n = 122). Again, after controlling for child sex, age, and initial levels of total problem behaviors as well as harsh parenting and neighborhood danger, neither beta coefficient for the neighborhood danger x harsh parenting interaction term was statistically significant ($\beta = .03, p > .05$ at high levels; $\beta = -.01, p > .05$ at low levels).

Next, the three-way interaction was decomposed by first splitting the sample above and below the mean of neighborhood danger. Next, hierarchical regression equations were re-computed separately for the high (n = 65) and low (n = 75) neighborhood danger groups (see Table 7). First considering the low neighborhood danger group, after statistical controlling for child sex, age, and initial level of total problem behaviors as well as fearfulness and harsh parenting, the fearful temperament x harsh parenting interaction term was not statistically significant (see Table 7). In the high neighborhood danger group, the fearful temperament x harsh parenting interaction term was statistically significant ($\beta = .45, p < .01$; see Table 7) after controlling for the effects of child sex, age, initial level of total problem behaviors and harsh parenting and fearful temperament.
Table 7. Results of Post-Hoc Regression Analyses Estimating Direct and Interactive Effects of Fearful Temperament and Harsh Parenting on Change in Total Problem Behaviors for Families Living in a Dangerous Neighborhood

<table>
<thead>
<tr>
<th></th>
<th>$\Delta R^2 (\Delta F)$</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child Age</td>
<td>.163 (4.023*)</td>
<td>.031</td>
</tr>
<tr>
<td>Child Sex</td>
<td></td>
<td>.020</td>
</tr>
<tr>
<td>Problem Behaviors Age 4</td>
<td></td>
<td>.406**</td>
</tr>
<tr>
<td><strong>Step 2:</strong></td>
<td>.072 (2.832+)</td>
<td></td>
</tr>
<tr>
<td>Fearful Temperament</td>
<td></td>
<td>-.076</td>
</tr>
<tr>
<td>Harsh Parenting</td>
<td></td>
<td>.300*</td>
</tr>
<tr>
<td><strong>Step 3:</strong></td>
<td>.115 (10.476**)</td>
<td></td>
</tr>
<tr>
<td>Fear x Parenting</td>
<td></td>
<td>.452**</td>
</tr>
</tbody>
</table>

Note: + $p < .10$; * $p < .05$; ** $p < .01$
N = 65

Then, the interaction was decomposed following the procedures outlined by Cohen and colleagues (2003). First, the simple slopes of the effect of harsh parenting on wave 3 total problem behaviors was estimated at 1 standard deviation above the mean, at the mean, and 1 standard deviation below the mean of fearful temperament. The slope for high fearful temperament was statistically significant ($b = .09; t = 2.80, p < .01$; see Figure 1), indicating that for highly fearful children, less harsh parenting was associated with lower levels of problem behaviors in the context of more neighborhood danger. The slope for children with low and mean levels of fearful temperament was not statistically significant, indicating that for less fearful children, harsher parenting was not associated with change in total problem behavior scores in more dangerous neighborhoods.
Figure 1. Fearful Temperament Moderates the Association between Harsh Parenting and Total Problem Behaviors from Age 4 to Age 6 within Dangerous Neighborhoods

Discussion

Clarifying the circumstances by which harsh parenting influences change in children’s overall level of problem behaviors during early childhood was the focus of study. Consistent with previous research (e.g., Bayer et al., 2006; Denham et al., 2000; Shaw et al., 2003), harsher parenting was expected to predict increases in problem behaviors over time for both toddler and preschool aged children. Adding to the paucity of research examining neighborhood danger as a context that may amplify the impact of harsh parenting on emerging problem behaviors (e.g., Callahan et al., 2011), harsher parenting was expected to predict greater increases in problem behaviors for those children residing in the most dangerous neighborhoods. Finally, and unique to the current study, temperamentally fearful children were expected to be most vulnerable to the negative effects of exposure to harsher parenting and neighborhood danger. That is, children observed to be most temperamentally fearful were hypothesized to demonstrate greater increases
in problem behavior if they also received harsher parenting within the context of a dangerous neighborhood. Augmenting existing research, the current longitudinal study relied on a sample of siblings, both of whom were in early childhood at the first assessment (i.e., age 2 and age 4). The impact of parenting, neighborhood, and temperament were not expected to vary by cohort age (i.e., toddlerhood vs. preschool-aged).

Contrary to expectations, support for hypothesized associations emerged only among the older sibling cohort. Specifically, fearful temperament moderated the association between harsh parenting and change in total problem behaviors for preschool-aged children residing in the most dangerous neighborhoods. The following sections will first discuss the importance of having a longitudinal design of siblings within families. Next, the moderating role of fearful temperament on the association between harsh parenting and change in problem behaviors across the preschool period for families living in dangerous neighborhoods will be examined. Finally, strengths, limitations, future directions, and implications for intervention will be reviewed.

**Advantages of a Longitudinal, Within-Family Sibling Design: Differential Patterns of Associations by Age**

Unique to the present study was the inclusion of two siblings within each family; such an approach provides an opportunity to rigorously evaluate the effect of individual characteristics (e.g., temperament, age, and sex) on the influences of exposure to harsh parenting and neighborhood danger on problem behaviors, while controlling for the unobserved shared experiences within families. Furthermore, measuring total problem behaviors at three time points for each child allows us to examine change in problem behaviors over time and the extent to which harsh parenting, neighborhood danger, and fearful temperament influence this change. Although not hypothesized, child age partially explained variance in problem behaviors at wave
1 (younger sibling: age 2; older sibling: age 4). Specifically, older children were reported as having fewer problem behaviors than younger siblings. Likewise, problem behaviors significantly decreased across time for younger and older children. This finding is consistent with previous research showing that problem behaviors, particularly externalizing problems, decrease across early childhood (i.e., age 2 to age 6; e.g., Fanti & Henrich, 2010; Gilliom & Shaw, 2004). Also consistent with previous research, internalizing problems, net of externalizing problems, slightly increased from ages 2 to 4 and 4 to 6 (e.g., Fanti & Henrich, 2010; Gilliom & Shaw, 2004).

Including two siblings within each family made it possible to examine variability in the effects of study constructs between both age cohorts (toddlers vs. preschoolers). It was hypothesized that harsh parenting would influence both siblings similarly such that harsher parenting would be associated with more problem behaviors when children were 2 and 4 years old and that harsher parenting would be associated with higher levels of problem behaviors from ages 2 to 4 and 4 to 6. The present study provided partial evidence for this hypothesis. Harsher parenting was contemporaneously associated with higher levels of problem behaviors when children were 2 and 4 years old. However, harsh parenting did not affect the decline in problem behaviors across time. Interestingly, descriptive statistics revealed that parents were harsher with their younger children compared to older children. As previously mentioned, toddlerhood is marked by increases in children’s mobility and desire for autonomy, which requires parents to diligently monitor toddlers and begin limit setting and using discipline strategies (Shaw & Bell, 1993). Consistently, parents of toddlers may rely on harsher parenting due to increases in parenting stress associated with the transition into toddlerhood (e.g., Williford, Calkins, & Keane, 2007).
Although mothers tend to be harsher with younger children, results of the present study reveal that an over-reliance on harsh parenting with older children was more detrimental in terms of children’s social and emotional adjustment. In the present study, harsher parenting towards 4-year-old older siblings was related to higher ratings of problem behaviors when children were 4 and 6 years old, but harsh parenting towards 2-year-olds was not correlated with younger siblings’ levels of problem behaviors at 2 or 4 years old. Notably, after controlling for shared experiences within families using a multilevel model, there was no longer significant variance in the effect of harsh parenting within families. That is, when parents rely on harsh parenting strategies it similarly influences both siblings’ problem behaviors. However, harsh parenting differentially affects children in different families. Family-level characteristics that are not measured in the present study (e.g., poverty, social support) may explain the variance in effects of harsh parenting between families.

Taken together, older siblings are rated as having less problem behaviors compared to younger siblings and problem behaviors decreased over time for all children. Furthermore, correlations reveal that harsh parenting differentially affects older and younger cohorts. Specifically, parents who rely on harsh parenting practices rate their older children as having higher levels of problem behaviors at age 4 and age 6 but not their younger children. Although this differential effect of harsh parenting by age did not persist for siblings in the same family as revealed by the multilevel model, hypotheses were examined separately for younger and older children. Temperamentally fearful preschool-aged children who were exposed to harsher parenting experienced the highest levels of problem behaviors, net of initial levels, within the most dangerous neighborhoods. These findings will be discussed in the following section.
The Interactive Effects of Harsh Parenting, Neighborhood Danger, and Fearful Temperament on Change in Children’s Problem Behaviors

Neighborhood danger was expected to moderate the association between harsh parenting and problem behaviors such that harsh parenting was more strongly associated with problem behaviors within dangerous neighborhoods. Conceptually, the combination of exposure to unpredictable and/or threatening events in the neighborhood and harsh parenting is particularly distressing for young children and provides multiple models of aggressive, hostile, and negative behavior (e.g., Callahan et al., 2011). The present study did not find support for this hypothesis. However, when considering the role of fearful temperament, a significant three-way interaction was supported for the older sibling cohort.

Among the older sibling cohort only, temperamentally fearful children residing in the most dangerous neighborhoods experienced higher levels of problem behaviors at age 6, net of age 4 problem behaviors, when exposed to harsher parenting. Some investigators argue that toddler aged children are less vulnerable to the negative impact of living in a disadvantaged neighborhood because they are less exposed to the dangers in the neighborhood and they are less cognitively aware of these dangers (e.g., Winslow & Shaw, 2007). Other investigators report that toddler aged children who experience harsher parenting and reside in more dangerous neighborhoods do experience elevated levels of problem behaviors (e.g., Callahan et al., 2011). Thus, while the findings may be mixed regarding mechanisms by which neighborhood danger and harsh parenting effect young children’s problem behaviors, evidence is accumulating to suggest that by the preschool period experiencing neighborhood danger increases children’s risk for developing problem behaviors (Callahan et al., 2011; Linares et al., 2001).

Strengths, Limitations, and Future Directions
The present investigation had a number of strengths and weaknesses and raises issues for future research. Regarding the strengths of the study, observational measures of harsh parenting and fearful temperament were used, which reduces the concern of shared method variance. Although mothers reported on neighborhood characteristics and children’s problem behaviors, observational measures of parenting and temperament reduce the risk of inflated correlations between harsh parenting and problem behaviors and fearful temperament and problem behaviors. Second, very little research has considered the interactive effects of fearful temperament and neighborhood danger and virtually no research has also considered the role of harsh parenting. Furthermore, existing research that has examined fearful temperament by neighborhood interactions was evaluated during middle to late childhood and not during the early childhood period. Finally, the ability to use a multi-level, within family sibling design is a robust measure of differential susceptibility as it allows researchers to consider how children’s individual differences within the same family affect the influence of environmental characteristics on social and emotional adjustment.

The present study is not without limitations. First, a larger sample size would have been ideal when testing such a complex model. Furthermore, within family variance is limited due to the small number of individuals (2 siblings) within each group. This is a common problem regarding within family designs. Second, results may not generalize to more ethnically and economically diverse populations, as this is a very low-income, predominantly African American sample. Third, harsh parenting was only measured during one interaction, the matching task. Measures of parenting in this context may not generalize to other contexts that more accurately reflect parenting in a stressful situation. Notably, levels of harsh parenting were low to moderate on average and parents were rated higher on intrusiveness than negative regard. Therefore, not
many parents are using harsh parenting, but rather behaviorally controlling parenting. This may explain the inconsistent findings regarding harsh parenting’s influence on children’s problem behaviors in the present study. Similarly, fearful temperament was only measured during one observational task. It is quite common for researchers to combine a battery of multiple measures of fearful temperament; including both observational and parent report measures (e.g., Kochanska et al., 2007). Distress and avoidance in response to a robot may not translate to fear in other aspects of a child’s life. Finally, including both ends of a fearful temperament spectrum (i.e., fearlessness and fearfulfulness) would add to the present study. Quite possibly, harsh parenting may differentially influence problem behaviors for temperamentally fearful children compared to temperamentally fearless children (e.g., Cornell & Frick, 2007).

Another limitation of the present study is that it only measures one side of a differential susceptibility model. The differential susceptibility hypothesis posits that children vary in their susceptibility to environmental influences for better or worse (Belsky & Pluess, 2009). That is, some children will do better than others in a positive environment but these same children will do worse in a negative environment. Future research would benefit from examining the potential protective influence of positive parenting for temperamentally fearful children, particularly within a dangerous neighborhood. Moreover, positive outcomes could also be measured instead of problem behaviors, such as social competence.

Implications for Intervention

Consistent with previous research (e.g., Bayer et al., 2006; Denham et al., 2000; Shaw et al., 2003), the influences of parenting on children’s social and emotional development are substantial during the early childhood period. This is particularly true within a disadvantaged context (e.g., Kohen, Leventhal, Dahinten, & McIntosh, 2008) and specifically within dangerous
neighborhoods (e.g., Callahan et al., 2011). Harsh parenting seems to be associated with more negative outcomes for young children (Bayer et al., 2006; Denham et al., 2000; Shaw et al., 2003), while positive parenting may be more protective (e.g., Dishion, Shaw, Connell, Gardner, Weaver, & Wilson, 2008; Sanders, 2008), although the present study does not measure this effect. Therefore, community interventions should focus on providing parents with information that discourages harsh parenting and promotes positive parenting. Existing research has supported the beneficial effects of parenting interventions within disadvantaged communities (e.g., Dishion et al., 2008; Sanders, 2008). Specifically, increases in positive parenting as a result of intervention strategies have been associated with decreases in young children’s problem behaviors (Dishion et al., 2008). Less research has considered how individual characteristics of children should be considered within these interventions.

Within a dangerous neighborhood, parents may discourage children’s signs of fear because fear may communicate vulnerability (e.g., Nelson, Leerkes, O’Brien, Calkins, & Marcovitch, 2012). Harsh and/or intrusive responses to children’s signs of fear may result in increases in young children’s problem behaviors (e.g., Oldehinkel et al., 2006). Therefore, a greater understanding of parents’ motives for engaging in specific parenting practices is essential to design effective intervention programs that are aligned with parenting goals and child needs. Helping parents understand the implications of responding to a temperamentally fearful child with hostility, negative affect, and intrusiveness will likely result in more successful and collaborative interventions.

Interventions may also benefit from programs that target children of specific ages. Relevant to the present study, preschool-aged children may be more sensitive to the influences of living in a dangerous neighborhood compared to younger age groups. When children start
attending preschool they may have more exposure to events in their neighborhood and a better understanding of the threatening nature of living in a dangerous neighborhood (Winslow & Shaw, 2007). Therefore, community interventions may benefit from addressing fears, anxiety, or aggressive behavior that result from living in a dangerous neighborhood beginning during the preschool period.
References


Vita

Brenna Sapotichne was born in Greensburg, Pennsylvania. She obtained her Bachelor of Science in Applied Developmental Psychology from the University of Pittsburgh in 2008. Brenna joined the University of New Orleans Psychology graduate program to pursue a PhD in Applied Developmental Psychology and became a member of Professor Dr. Laura Scaramella’s Families in Transition research group in 2010.