

**PROTECTIVE FACTORS AND THE DEVELOPMENT OF RESILIENCE AMONG
BOYS FROM LOW-INCOME FAMILIES**

by

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The purpose of the study was to advance our understanding of resilience by studying multiple protective factors associated with positive adjustment among an ethnically diverse sample of 226 low-income boys followed prospectively from ages 1.5 to 12, using trajectories of neighborhood quality from ages 1.5-10 to define risk status. The results indicated that child IQ, nurturant parenting, parent-child relationship quality, and marital quality measured in early childhood were all significantly associated with a composite measure tapping low levels of antisocial behavior and high levels of social skills at ages 11 and 12. However, these results were qualified by the fact that marital quality was only significantly related to positive social adjustment in the context of low levels of risk. Results suggest that with the exception of marital quality, these protective factors operate in a comparable manner with respect to positive social adjustment for this predominantly low-income urban sample of boys.

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PREFACE

I would like to thank Daniel S. Shaw, Susan B. Campbell, Robert McCall, and Jennifer Silk for their comments on earlier versions of this article; Bobby Jones and JeeWon Cheong for their statistical consultation; Emily B. Winslow and Madeleine Root for their help in collecting census data; and finally the research assistants and families of the Pitt Mother and Child Project who made this possible. This research was supported by grants awarded to the second author from the National Institute of Mental Health (#MH50907 and MH01666).

1.0 INTRODUCTION

As the developmental psychopathology perspective has gained prominence over the past several decades, researchers have become increasingly interested in delineating the mechanisms and processes through which psychopathology develops (Cummings, Davies, & Campbell, 2000). One approach to identifying children at risk is to examine factors that are associated with maladjustment. However, even in contexts of extreme risk, not all children experience negative outcomes. As such, important knowledge can be gained from focusing on factors associated with child positive adjustment, particularly in the context of risk. The study of resilience provides information on conditions under which established risk factors are not associated with negative outcomes (Masten, 2001). In combination with research on vulnerability, such research can help to inform theories of psychopathology and guide public policy and intervention efforts to improve the lives of children at risk for maladaptive outcomes (Masten, 2001; Masten & Curtis, 2000).

Despite the variability with which resilience has been defined and examined, research has consistently identified three domains of protective factors for children living in high-risk environments: 1) child characteristics, 2) family characteristics, and 3) community characteristics (Yates, Egeland, & Sroufe, 2003). For example, children who demonstrate high levels of abilities, such as intelligence and emotion regulation, typically demonstrate more adaptive outcomes in high-risk contexts than those with lower levels of these abilities. Similarly, nurturant parent-child relationships, high quality schools, and safe neighborhoods are generally associated with positive outcomes (Masten & Reed, 2002).

Despite growing interest in the study of resilience, research has been limited in a number of ways. First, there are still relatively few prospective, longitudinal studies examining multiple aspects of risk, protective factors, and positive adjustment (Masten et al., 1999). Second, little is known about the effects of protective factors in early childhood on subsequent functioning

(Yates et al., 2003). Finally, although there are a few notable examples of studies that have examined resilience in diverse, low-SES samples (Gorman-Smith, Tolan, & Henry, 1999; Owens & Shaw, 2003; Seidman, 1991), many studies have utilized predominantly European-American, middle-class samples (e.g., Criss, Pettit, Bates, Dodge, & Lapp, 2002; Masten et al., 1999).

The present study aims to advance our understanding of resilience by investigating multiple protective factors associated with positive social adjustment among an ethnically diverse sample of 310 low-income boys followed prospectively from early childhood to early adolescence. Protective factors in both child (e.g., IQ, emotion regulation) and family (e.g., nurturant parenting, parent-child relationship, and marital quality) domains were measured in early childhood to optimize their potential relevance for prevention and early intervention. Adversity was established at the community level, defined by neighborhood risk over time. Specific protective factors were expected to be more strongly associated with positive social adjustment in the context of high risk than low risk.

2.0 LITERATURE REVIEW

2.1 DEFINING RESILIENCE

Broadly defined, resilience refers to the process through which positive outcomes are achieved in the context of adversity (Luthar, Cicchetti, & Becker, 2000a). To satisfy this definition, two criteria must be met. First, it is essential to focus on high-risk samples, because resilience is not positive adjustment per se but rather positive adjustment in the context of high levels of adversity. Risk, a context or factor that is associated with negative outcomes, has been operationalized in a number of ways, including parental psychopathology (Masten & Coatsworth, 1995), socioeconomic disadvantage (Garmezy, 1991; Werner & Smith, 1982, 1992), urban poverty and community violence (Luthar, 1999; Richters & Martinez, 1993), negative life events (Masten et al., 1999; O'Dougherty-Wright, Masten, Northwood, & Hubbard, 1997), and child maltreatment (Cicchetti, Rogosch, Lynch, & Holt, 1993; Moran & Eckenrode, 1992).

In addition to establishing the presence of risk, researchers must determine that the child demonstrates a “good” or “positive” outcome (Masten, 2001). Whether a good outcome is operationalized as merely the absence of a negative outcome (e.g., conduct disorder, adult psychopathology) versus the presence of positive adjustment (e.g., academic or social competence) is a matter of controversy and largely depends on the researcher’s theoretical orientation. Debate also exists concerning whether resilience should be defined according to external adaptation criteria (e.g., absence of antisocial behavior, academic achievement), internal criteria (e.g., psychological well-being or low levels of distress), or both (Luthar, 1999; Luthar et al., 2000a). For example, studies of inner-city adolescents have found that even those doing well by external standards may exhibit high rates of internal distress (Luthar, 1991; Luthar, Doernberger, & Zigler, 1993). Such findings illustrate that despite the fact that early writings referred to children who did well despite adversity as “invulnerable” (Pines, 1975), resilience is

rarely an absolute or global outcome. Rather, it is circumscribed and may change over time relative to both the course of development and life circumstances (Masten & Garmezy, 1985; Werner & Smith, 1982), as well as the manner in which it is assessed.

Another source of confusion concerns the conceptualization of resilience as a process versus an individual trait (Luthar et al., 2000a). When resilience is viewed as a personal trait, it can foster perspectives that blame individuals for their negative outcomes. Furthermore, although individual characteristics can contribute to positive outcomes in the context of adversity, resilience is best captured as a dynamic process involving transactions between the child and his or her environment (Luthar & Zelazo, 2003). Defining resilience as an individual trait also does little to elucidate processes underlying resilience or to inform the design of preventive interventions (Luthar et al., 2000a).

2.2 DEFINING RISK

Although resilience requires risk, there have been relatively few studies of resiliency conducted on children living in poverty, arguably the most prevalent and pervasive risk factor (Gorman-Smith, Tolan, & Henry, 1999; Owens & Shaw, 2003, Seidman, 1991); instead most studies have utilized European-American, middle-class samples (e.g., Crisset et al., 2002; Masten et al., 1999). The inner-city poor contend with a substantial number of stressors and adversities, including community violence, crowding, poor quality schools, and inadequate housing (McLoyd, 1998; Sampson, Morenoff, & Earls, 1999). The chronicity and severity of poverty also appears to be particularly important. Although poverty is typically conceptualized as a dichotomous and static variable, children living in extreme or chronic poverty tend to have worse outcomes than children exposed to less severe or intermittent poverty (Duncan, Brooks-Dunn, & Klebanov, 1994; Guo, 1998; Korenman, Miller, & Sjaastad, 1995). Arguably, children growing up in chronic poverty are exposed to a wide array of risks that are both qualitatively and quantitatively more adverse than those experienced by most children living in middle-class environments.

Low income by itself does not always accurately represent environmental conditions, however, because housing and financial support may actually be adequate due to other sources of

support, such as extended family (Campbell, Shaw, & Gilliom, 2000). For example, a single mother may have a very small personal income, but if she lives with her parents and receives the benefits associated with their income she may not experience many of the hardships typically associated with low income (e.g., living in a dangerous environment, decreased access to resources, etc.). Conversely, living in a poor, dangerous neighborhood virtually guarantees exposure to risk factors outside the home that affect child development, leading some researchers to suggest that it may be a better measure of overall environmental risk than income alone (Campbell et al., 2000). Although critics point out that neighborhood risk is often confounded with demographic and family risk (Plotnick & Hoffman, 1999; Rowe & Rodgers, 1997), studies that controlled for such factors, as well as experimental studies which randomly assigned families to more affluent neighborhoods, have found significant albeit modest effects for neighborhood quality on child outcome (see Leventhal & Brooks-Gunn, 2003, for a review). Thus, neighborhood risk provides a good proxy measure for environmental risk, encompassing a variety of risk factors above and beyond its independent effect.

2.3 PROTECTIVE FACTORS

Protective factors are defined as characteristics of the child, family, and wider environment that reduce the negative effect of adversity on child outcome (Masten & Reed, 2002). A number of factors, including child IQ, emotion regulation, temperament, parenting, low parental discord, advantaged SES, effective schools, and safe neighborhoods, have been found to contribute to positive outcomes in the context of high risk (see Masten & Reed, 2002, for a review). Similar to the issues surrounding the definition of resilience, the specificity of protective factors is also controversial. Early researchers defined protective factors as those variables that interacted with risk status to predict outcome (Garmezy, Masten, & Tellegen, 1984; Rutter, 1987); that is, only variables that were *more* strongly associated with positive outcomes in the context of high risk, as opposed to low risk, were considered to be protective. In more recent years, however, this term has been used to refer to all factors associated with positive outcomes in high-risk groups, regardless of whether relationships are stronger for children living in high-risk contexts (Luthar & Zelazo, 2003). Luthar and colleagues (2000b) argue that while interaction effects (positive

effects only, or to a greater degree, in children at risk) provide useful knowledge on the processes that function specifically under conditions of risk, main effects can also be informative. For example, in designing interventions for at-risk children, addressing any and all factors that moderate the effects of risk are likely to be beneficial.

The main versus interaction effects debate also has implications for sample selection when conducting research on resilience. If the criterion for resilience is based on the increased importance of a protective factor in the context of high-risk (i.e., interactive effects), a sample that is heterogeneous in risk status would be preferable (Masten & Reed, 2002). However, others have argued that within-group designs utilizing individuals homogeneous on a particular risk condition allow for a better understanding of resilience processes (Seidman & Pedersen, 2003). For example, in large samples that are heterogeneous on risk factor status, those at highest risk “would likely be found to be problematic, and the considerable variation in their relationships with family and peers, as well as in their associated psychological and behavioral outcomes, would be obscured” (pp. 337, Seidman & Pedersen, 2003). Thus, although there are potential benefits to utilizing either heterogeneous or homogeneous risk groups, within-group designs with relatively homogeneous samples allow researchers to capture the considerable diversity of developmental trajectories of children at-risk for maladaptive outcomes and certainly do not preclude identifying important factors that moderate risk status. Moreover, in cases where only high-risk groups are studied, main effects that differentiate between those with positive and negative outcomes may actually represent interaction effects (Owens & Shaw, 2003; Roosa, 2000).

2.4 CHILD CHARACTERISTICS

Many child characteristics, including IQ, facets of temperament such as effortful control and negative emotionality, self esteem, and internal locus of control, have been investigated as potential protective factors (Masten & Reed, 2002). Perhaps two of the most important child characteristics are IQ and emotion regulation (Masten & Coatsworth, 1998).

2.4.1 Child IQ

IQ is one of the most widely researched and validated protective factors in the child domain (Masten & Coatsworth, 1998). There are several reasons why IQ may be important in high-risk contexts. First, children with high IQs may be more likely to possess effective information-processing and problem-solving skills, which enable them to contend with the stresses and challenges they encounter. Indeed, one of the initial purposes of IQ tests was to aid in the selection of officers and the placement of soldiers in different types of military service (Kaufman, 1990), the reasoning being that men of higher intelligence would be better equipped to cope with the ordeals of war. Children with higher intellectual skills should also perform better at school; increased academic success is associated with the adoption of social norms and integration into prosocial peer groups (Masten & Coatsworth, 1998). For children living in high-risk contexts, IQ may be particularly important because of the depth and breadth of adversity they face (e.g., dangerous neighborhoods, exposure to deviant peers, poor and overcrowded schools, reduced access to prosocial vs. antisocial after-school activities). In lower risk contexts, however, positive adjustment may be less dependent on IQ, because such children face fewer obstacles in fewer contexts (e.g., family, school, neighborhood) and therefore may need a smaller number of resources to achieve positive socioemotional outcomes.

Across risk status, child IQ has consistently been found to predict a range of positive outcomes, including academic achievement, prosocial behavior, and peer social competence (Masten, Garmezy, Tellegen, Pellegrini, Larkin, & Larsen, 1988; Masten et al., 1999), as well as the absence of antisocial behavior (Kandel et al., 1988; Kolvin, Miller, Fleeting, & Kolvin, 1988; White, Moffit, & Silva, 1989) and other types of psychopathology (Radke-Yarrow & Brown, 1993; Tiet et al., 1998; Tiet, Bird, Hoven, Wu, Moore, Davies, 2001; Werner & Smith, 1982, 1992). Although significant interaction effects are relatively rare in the resilience literature, evidence suggests that IQ may be particularly important in protecting against maladaptive outcomes associated with a range of risk factors, including maternal psychopathology (Tiet et al., 2001), paternal criminal behavior (Kandel et al., 1988; Kolvin et al., 1988), and negative life events (Masten et al., 1988; Masten et al., 1999).

2.4.2 Emotion Regulation

Emotion regulation has been studied less frequently as a protective factor than IQ, but there is ample research to suggest that it is an important component of successful adaptation (Masten & Coatsworth, 1998). Emotion regulation refers to monitoring, evaluating, and modifying the intensity and duration of emotional reactions to accomplish one's goals (Eisenberg et al., 1997a; Thompson & Calkins, 1996). It has historical roots in the concepts of ego control and ego resiliency (Masten & Coatsworth, 1998). Children who are adept at managing their emotions may be better able to proactively cope with stressors (Buckner, Mezzacappa, & Beardslee, 2003) and thereby decrease the associated negative effects. For example, a child in a frustrating situation who is able to direct her attention to a nearby toy might be better able to decrease her negative reactivity than a child who fixates on the frustrating situation. Theoretically, she should be also less likely to engage in oppositional behavior, such as hitting or throwing a tantrum, because of her ability to modulate negative emotion. Such children may be less likely to become involved in coercive cycles with their caregivers and therefore may receive more support from their social environment. Across contexts of risk, such children should function better in school and social relationships because they are able to modulate negativity and emotional expression. However, emotion regulation skills might play an even more salient role in high-risk contexts where stressors would be more frequent and more pervasive than in lower-risk contexts.

Indeed, research demonstrates that a lack of control over emotion is associated with problem behaviors (Calkins & Fox, 2002; Eisenberg et al., 1996), while the ability to manage one's emotional expression predicts more positive social functioning in middle childhood both contemporaneously and longitudinally (Buckner et al., 2003; Eisenberg et al., 1997a; Eisenberg et al., 1997b). Furthermore, studies of resilience have found that factors associated with emotion regulation (e.g., self-help skills, ego control, and ego resiliency) are related to positive adjustment across risk status, and that such factors appear to be especially important in the context of adversity (Cicchetti et al., 1993; Cicchetti & Rogosch, 1997; Werner & Smith, 1982, 1992).

2.5 FAMILY CHARACTERISTICS

Research on protective factors within the family has generally focused on the parental and marital systems.

2.5.1 Parenting Strategies

Theory suggests that children whose parents are warm and responsive to their offspring's emotional needs and at the same time firm in setting limits on inappropriate behavior are better able to self-regulate and explore their environment (Baumrind, 1971; Thompson, 1998). Parents teach their children the skills they need to succeed in later developmental tasks, set guidelines for acceptable behavior, and provide opportunities for cognitive and social stimulation (Masten & Coatsworth, 1998). Although some have attributed the association between parenting and child outcome to genetic covariation (e.g., Rowe, 1994), research on parenting interventions supports the conclusion that parenting can play a protective role (see Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000, for a review). While competent parenting is associated with positive adjustment in general, it may be particularly important for children from high-risk contexts, because parents may be able to counteract other negative forces in the environment.

A wide variety of specific parenting practices have been investigated, including warmth, consistent discipline, responsiveness, structure, and monitoring (Masten & Reed, 2002). One of the factors most consistently associated with positive outcomes is nurturant, responsive parenting. Across risk status, various aspects of nurturant or responsive parenting have been associated with lower levels of externalizing/internalizing behavior (Kim-Cohen, Moffitt, Caspi, & Taylor, 2004; Martin, 1981; Masten et al., 1988; 1999; Werner & Smith, 1982, 1992; Wyman et al., 1999) and delinquency (Kolvin et al., 1988), as well as higher levels of peer social competence (Masten et al., 1999; Wyman et al., 1999) and school achievement (Masten et al., 1999). Few studies have examined the interaction of parenting with risk status, but there is some evidence that parenting may be more strongly associated with child outcomes in the context of high risk (Masten et al., 1999).

2.5.2 Parent-Child Relationship Quality

In addition to specific parenting practices, the nature of the parent-child relationship has also been examined in relation to positive child outcomes. Theoretically, having a good relationship with a parent prepares the child to engage in healthy productive relationships with other people in the social environment. In support of this idea, Ingoldsby and colleagues (2001) found that having a good relationship with at least one parent was associated with less conflictual relationships with siblings, teachers, and peers. Researchers have found that the quality and closeness of the parent-child relationship relates to child outcomes across risk status (Emery & Forehand, 1996; Radke-Yarrow & Brown, 1993; Stouthamer-Loeber et al., 1993; Stouthamer-Loeber, Loeber, Wei, Farrington, & Wikström, 2002), and that it appears to be particularly important for children experiencing higher levels of risk (e.g., poverty; Owens & Shaw, 2003; Werner & Smith, 1982).

2.5.3 Marital Quality

As family therapists have long noted, the quality of the marital relationship can have a significant impact on child outcome (Nichols & Schwartz, 1998). Researchers have posited a combination of direct and indirect mechanisms to explain this relationship (e.g., Emery, 1982). Much research has focused on how the quality of the marriage influences parenting and the parent-child relationship, for example by increasing the parent's psychosocial resources and ability to consistently deal with child behavior (e.g., Belsky, Youngblade, & Pensky, 1989; Belsky, Youngblade, Rovine, & Volling, 1991; Cox, Owen, Lewis, & Henderson, 1989; Kerig, Cowan, & Cowan, 1993). Considerable research also demonstrates that marital quality can affect child outcome through other more direct pathways (Benzies, Harrison, & Magill-Evans, 1998; Cummings, Goeke-Morey, & Papp, 2004; Emery, Fincham, & Cummings, 1992; Miller, Cowan, Cowan, Hetherington, & Clingempeel, 1993; Shek, 2000). For example, a positive marital relationship may increase children's emotional security, which in turn affects the ability to cope with daily stressors (Davies & Cummings, 1994). Conversely, marital conflict threatens children's sense of security and induces emotional distress, rendering them vulnerable to emotional and behavioral dysregulation (Davies & Cummings, 1994).

Research demonstrates that while interparental conflict predicts a range of deleterious child outcomes (Cummings & Davies, 2002), marital relationships characterized by low conflict or the use of constructive tactics to resolve conflict are associated with low levels of child emotional and behavioral problems (Belsky et al., 1991; Benzies et al., 1998; Cummings et al., 2004; McHale, Freitag, Crouter, & Bartko, 1991; Miller et al., 1993; Peleg-Popko & Dar, 2001; Shek, 2000). Marital quality is also positively associated with attachment security (Belsky, 1996; Goldberg & Easterbrooks, 1984; Howes & Markman, 1989), the attainment of cognitive and motoric milestones (Porter, Wouden- Miller, Silva, & Porter, 2003), and higher levels of functioning as measured by affect and task orientation (Goldberg & Easterbrooks, 1984). Indeed, studies of children at high risk cite low discord between parents as a key protective factor (Benzies et al., 1998; Emery & Forehand, 1996; Masten & Garmezy, 1985; Masten & Reed, 2002; Werner & Smith, 1982). For example, in a study of preterm infants, high marital quality at 12 months was one of the only predictors of low behavior problems at 4 years (Benzies et al., 1998).

3.0 STATEMENT OF PURPOSE

The study of resilience can provide researchers and policy makers with important information regarding the conditions under which established risk factors are not associated with negative outcomes. In combination with research on vulnerability, such research can inform theories of psychopathology and guide prevention and intervention efforts in populations at high risk for psychopathology (Masten, 2001). Despite growing interest in this area, the majority of studies on resilience have relied on cross-sectional methodologies investigating predominantly European-American, middle-class samples (e.g., Criss et al., 2002; Masten et al., 1999), rather than more ethnically and socioeconomically diverse, low-income samples. In addition, there is still a need for research examining multiple aspects of risk, protective factors, and positive adjustment (Masten et al., 1999), as well as for research on the effect of protective factors in early childhood on subsequent functioning (Yates et al., 2003).

More specifically, the current study aims to increase our understanding of resilience by using a prospective, longitudinal design employing observational and questionnaire measures from multiple informants to track the effects of protective factors measured in early childhood as they relate to outcomes among a sample of predominantly low-income male youth in early adolescence. Family adversity was defined by neighborhood quality measured longitudinally from age 1.5- to 10 years-old, and resilient adaptation was defined by low levels of externalizing problems and above-average levels of social adjustment as rated by multiple informants. It was hypothesized that resilience would be associated with the presence of specific child and family characteristics, including child IQ, emotion regulation skills, nurturant parenting, the quality of the parent-child relationship, and marital quality. Analyses focused on the examination of both direct and interactive associations of child and family factors in early childhood on later child adjustment.

4.0 HYPOTHESES

In accord with the extant literature, the following hypotheses were tested.

1a. Direct effects of child protective factors. It was hypothesized that child IQ and emotion regulation skills, measured in early childhood, would be associated with child positive social adjustment in early adolescence, with child positive social adjustment defined by low levels of externalizing behavior *and* above-average levels of social skills.

1b. Interactive effects of child protective factors. In line with the theoretical definition of a protective factor (e.g., Garmezy, Masten, & Tellegen, 1984), child IQ and emotion regulation were expected to be more strongly related to child positive social adjustment in the context of persistently high versus persistently low or descending neighborhood risk.

2a. Direct effects of family protective factors. Nurturant parenting, parent-child relationship quality, and marital quality, measured in early childhood, were expected to be positively associated with positive social adjustment in early adolescence.

2b. Interactive effects of family protective factors. In line with the theoretical definition of a protective factor (e.g., Garmezy, Masten, & Tellegen, 1984), nurturant parenting, parent-child relationship quality, and marital quality were expected to be more strongly related to positive social adjustment in early adolescence in the context of persistently high or ascending versus persistently low or descending neighborhood risk.

5.0 METHOD

5.1 PARTICIPANTS

Participants in this study were part of the Pitt Mother and Child Project (PMCP), a longitudinal study of child vulnerability and resiliency in low-income families. In 1991 and 1992, 310 infant boys and their mothers were recruited from Allegheny County Women, Infant, and Children (WIC) Nutrition Supplement Clinics when the boys were between 6 and 17 months old. At the time of recruitment, 53% of the target children in the sample were European American, 36% were African American, 5% were biracial, and 6% were of other races (e.g., Hispanic American or Asian American). Two-thirds of mothers in the sample had 12 years of education or less. The mean per capita income was \$241 per month (\$2,892 per year), and the mean Hollingshead SES score was 24.5, indicative of a working class sample. Thus, a large proportion of the families in this study could be considered high risk due to their low socioeconomic status.

Retention rates have generally been high at each of ten time points from age 1.5- to 12-years old, with 90-94% of the initial 310 participants completing visits at ages 5 and 6. Some data are available on 89% or 275 participants at ages 10, 11, or 12. When compared with those who dropped out at earlier time points, participants who remained in the study at ages 11 and 12 showed no difference on the CBCL Externalizing factor at ages 2, 3.5 or 5 (all p values $> .50$). In fact, similar comparisons using the narrow-band CBCL Aggression factor show that retained participants had significantly higher scores at ages 2 ($F = 7.42, p < .01$) and 3.5 ($F = 7.42, p < .01$) than those participants who no longer participated at ages 11 or 12. These results suggest that children of families who dropped out of the study were not more likely to exhibit conduct problems than children of families who continued to participate.

5.2 PROCEDURES

Target children and their mothers were seen in the home and/or the lab for two- to three-hour visits at ages 1.5, 2, 3.5, 5, 5.5, 6, 8, 10, 11, and 12 years old. During these visits, mothers completed questionnaires regarding socio-demographic characteristics, family issues (e.g., parenting, family member's relationship quality, maternal well being), and child behavior. At these visits, mothers and other family members (siblings, alternative caregivers) were also videotaped interacting with each other and/or the target child in age-appropriate tasks, including mother-son clean-up tasks in early childhood and sibling play or discussion tasks during preschool and school-age periods. Children were interviewed regarding their own adjustment starting at age 5.5. Beginning at age 6 and continuing through age 12, children's teachers were asked to complete several questionnaires on the child's adjustment, including the Social Skills Rating System. The visits with the child and mother at ages 1.5, 3.5, 5, and 11 were conducted in the lab, and the age 2 assessment was a joint home/lab visit; all other visits were conducted in the participants' home. Participants were reimbursed for their time at the end of each visit.

5.3 MEASURES

To form more generalizable constructs, efforts were made to aggregate across time and/or informants whenever possible (Patterson, Reid, & Dishion, 1992). In cases in which data for a composited measure were missing at one of two time points (e.g., youth report of antisocial behavior at ages 11 and 12) or for one of two informants, data from the one data point were used to minimize missing data.

5.3.1 Risk Factors

5.3.1.1 Neighborhood Risk

Neighborhood risk was ascertained using data from early to middle childhood (i.e., ages 1.5, 2, 3.5, 5, 5.5, 6, 8, and 10 years old) by geocoding addresses according to U.S. census data at

the block group level, the smallest unit for which all census data are available. Addresses were collected from 1991-2003, so both 1990 and 2000 census data were used. For data from assessments collected between 1990 and 1995, the 1990 census data were used; for data from assessments collected between 1996 and 2003, the 2000 census data were used. Based on methods devised by Wikström and Loeber (2000) and adapted by Winslow (2001) and Schonberg et al. (2005), a composite variable of neighborhood poverty was generated using the following census block group level variables: 1) median family income, 2) percent families below poverty level, 3) percent households on public assistance, 4) percent unemployed, 5) percent single-mother households, 6) percent African American, 7) percent Bachelor degree and higher. These individual variables were standardized, summed, and then averaged (after reverse scoring median family income and percent Bachelor's degree) to create an overall neighborhood risk score for each block group. Past research demonstrates that these variables correlate highly and are supported by factor analyses (Ingoldsby, Shaw, Schonberg, & Flanagan, 2003; Wikström & Loeber, 2000).

In the current study, risk status was determined by both the persistence and severity of neighborhood risk using groups identified based on Nagin's (2005) semiparametric, group-based approach for analyzing trajectories (TRAJ). This method determines the number of trajectories within a given population and then estimates the proportion of individuals following each trajectory. Consequently, children can be assigned to groups based on their exposure to persistent high versus persistent low versus ascending or descending neighborhood risk from age 1.5 to 10.

5.3.2 Protective Factors

5.3.2.1 Child IQ

Child intelligence was assessed at age 5.5 (the earliest assessment at which IQ was measured) using a four-subtest short form of the Wechsler Preschool and Primary Scale of Intelligence-Revised (WPPSI-R, Wechsler, 1989), a commonly used measure of children's cognitive abilities. The Block Design, Geometric Design, Information, and Vocabulary subtests were selected because of the magnitude of their individual factor loadings, split-half reliability coefficients (BD: $r = .85$; GD: $r = .79$; I: $r = .84$; V: $r = .84$), and the high reliability and validity coefficients of this set of subtests (.92 and .91, respectively; Sattler, 1990). Full Scale IQ (FSIQ)

scores were derived according to prorating procedures described by Tellegen and Briggs (1967, cited in Sattler, 1990).

5.3.2.2 Emotion Regulation

During the age 3.5 visit, mothers and sons engaged in a waiting task, in which the child was required to wait for a cookie for 3 minutes (Marvin, 1977). This task was designed to measure children's coping strategies and ability to regulate affect in a delay-of-gratification context. During the 3 minutes, children had to wait for the cookie with little stimulation to occupy their time. All toys and activities were removed from the room, and the mother was instructed to complete questionnaires. Mothers were also told not to allow the child to have the cookie until the end of the waiting period. At the end of 3 minutes, the examiner signaled to the mother to give the cookie to the child.

The primary objective in using this measure was to represent child emotion regulation strategies that presumably will be associated with positive outcomes in later childhood, including sustained regulation of negative emotions and the ability to distract oneself. Thus, the following previously-coded ratings of strategy and affect were used to generate an emotion regulation variable that focuses on children who show high levels of active distraction and infrequent displays of anger during the waiting task.

Specifically, strategies were coded using a system adapted by Gilliom et al. (2002) from the work of Grolnick and colleagues (1996). The presence or absence of child active distraction was scored in 10-second intervals. Active distraction was defined as purposeful behaviors in which the focus of attention was shifted from the delay object or task, including fantasy play, exploration of the room, singing, talking with mother, turning lights on and off. At age 3.5, percent agreement with a master coder was 92.5% and kappa was .72.

Displays of child anger were also coded from videotape using procedures adapted by Cole, Zahn-Waxler, and Smith (1994) that identify basic emotions through facial action and vocal quality cues. Intensity of anger was rated in seconds on a scale of 0-3, with 0 indicating "none," 1 indicating "mild," 2 indicating "moderate," and 3 indicating "high". The number of seconds that the child demonstrated mild to high anger was summed to arrive at the total amount of time that the child exhibited some form of anger. Agreement with a master coder was 88%

and kappa was .76. There was no coder membership overlap between the active distraction and affect coding teams. Coders were unaware of the study hypotheses.

For the present study, the standardized anger expression score (total time) was subtracted from the standardized active distraction score to generate an emotion regulation variable ($r = -.39, p < .01$).

5.3.2.3 Nurturant Parenting

Maternal levels of nurturant, responsive parenting were assessed via observation at age 2 using the Home Observation for Measurement of the Environment (HOME; Caldwell & Bradley, 1984). This commonly used measure combines the use of observational ratings and data gathered from an interview with the parent to generate indices of maternal behavior and quality of the home environment. Each item of the HOME is rated as '0' or '1' based on the item's absence or presence, respectively. Two of the six subscales were aggregated in the present study to create a single measure of Nurturant Parenting. The Acceptance subscale is comprised of eight items assessing maternal response to child misbehavior or distress (e.g., "Parent does not shout at child"). Two items regarding the family home (i.e., "At least ten books are present and visible," "Family has a pet") were omitted from the scale in the current study because they do not reflect parent-child interactions about misbehavior, rendering this a 6-item scale. The 11-item Emotional/Verbal Responsivity subscale rates communicative and affective parent-child interactions (e.g., "Parent responds verbally to child's verbalizations"). Past research has demonstrated inter-observer agreement of .80 and above, as well as internal consistency of subscales in the moderate range (Bradley, 1993). To generate a scale of Maternal Nurturance, items from the 6-item Acceptance and 11-item Emotional/Responsivity scales will be summed. Internal consistency for the Nurturance variable was found to be adequate in the present sample ($\alpha = .74$).

5.3.2.4 Parent-Child Relationship Quality

Parent-child relationship quality was measured at ages 5 and 6 (the earliest assessment of this construct) using the Adult-Child Relationship Scale, an adaptation of the Student-Teacher Relationship Scale (Pianta, Steinberg, & Rollins, 1995). The original questionnaire, which focused on teacher-child relationship quality, was modified to assess maternal perception of

openness and conflict in the relationship with their child. The Openness scale consists of 5 items such as “this child likes telling me about himself” and “it’s easy to be in tune with what this child is feeling;” whereas the Conflict scale consists of 10 items, including “this child and I always seem to be struggling with each other” and “this child feels I am unfair to him.” A composite of these two scales was used to assess parent-child relationship quality ($r = -.45, p < .001$). An average of the openness and conflict scores from ages 5 and 6 was used to create an overall score for each scale; then the conflict score was subtracted from the openness score to obtain the final score for parent-child relationship quality.

5.3.2.5 Marital Quality

Maternal perception of the level of satisfaction in her marital or significant-other relationship was assessed at the age 1.5-, 2-, and 3.5-year-old visits using the short form of the Marital Adjustment Test (MAT; Locke & Wallace, 1959). Prior research demonstrates that this measure differentiates between harmonious and disturbed marriages (Hershorn & Rosenbaum, 1985; Locke & Wallace, 1959; Rosenbaum & O’Leary, 1981) and also predicts child behavior problems (Emery & O’Leary, 1982). In situations in which mothers were recently separated, they were asked to report on that period of the past year when they were still living with their partner. In cases where mothers were not married, they were instructed to complete the scale on their most intimate adult relationship, including their live-in boyfriend, girlfriend, relative, or current dating partner. The word “relationship” or “close relationship” was substituted for “marriage,” and for relationships that were non-sexual in nature, the single item concerning sex relations was omitted. This strategy is sensitive to the fact that 35% of the mothers in the study were single, and allowed for the inclusion of important information on a close relationship considered by the mothers to have primacy. An average of the scores from the 1.5, 2, and 3.5 year visits was used to create an overall score for each participant.

5.3.3 Child Positive Social Adjustment

To generate a measure of child positive social adjustment, measures of both antisocial behavior and social skills in early adolescence ($r = -.29, p < .001$) were combined to ensure that positive social adjustment was not based solely on the absence of disruptive behavior or the presence of

social skills. Youth report was utilized to assess antisocial behavior at ages 11 and 12 because of the increasing covert nature of antisocial activities during latter school-age and early adolescence, and because maternal reports tend to become increasingly unreliable as children near adolescence (Loeber & Schmalting, 1985).

Due to the relatively high degree of observability of social skills compared to many antisocial activities during this age period, both parent report at age 11 and teacher report at ages 11 and 12 were used to evaluate boys' social skills ($r = .26, p < .01$). This also provided multiple perspectives on the child's adjustment. To be included in the final analyses, participants needed to have data on both externalizing behavior and social skills; participants without data on one or both measures were excluded.

5.3.3.1 Adolescent Antisocial Behavior

At ages 11 and 12, children completed an adapted version of the Self-Report of Antisocial Behavior questionnaire (SRA; Elliott, Huizinga, & Ageton, 1985), a semi-structured interview assessing the frequency of delinquent behavior, alcohol and drug use, and related offenses. Because the current participants were at the lower end of the age range for this questionnaire (ages 11-17), several items regarding substance use (e.g., intravenous drug use) were removed due to the low base rates at these ages, leaving 10 items for the present version (e.g., "Have you hit other students or gotten into a fight with them?" "Have you taken something from a store without paying for it?"). Previous research utilizing the current sample found adequate internal consistency at ages 10 and 11 ($\alpha = .71$; Shaw, Criss, Schonberg, & Beck, 2004). A composite of the average problem scores at ages 11 and 12 was used in the present analyses. As noted above, when only one score was available, the age-11 or age-12 report was used as the SRA score.

5.3.3.2 Child Social Skills

Mothers completed the Social Skills Rating System (SSRS; Gresham & Elliott, 1990) at child age 11, and teachers completed the SSRS at child ages 11 and 12. The SSRS is a questionnaire measuring child cooperation, assertiveness, and self-control with peers and adults (e.g., "attends to instructions," "appropriately tells you when he or she thinks you have treated him or her unfairly," "controls temper in conflict situations with peers"). The SSRS parent and

teacher versions have four-week test-retest reliability ranging from .75 to .88, and internal consistencies of .87 and .94, respectively (Gresham & Elliot, 1990). Additionally, both versions of the SSRS demonstrate adequate content and criterion-related validity (Gresham & Elliot, 1990). At age 11, the standardized total social skills scores from mother-report and teacher-report were averaged and then aggregated with the teacher-reported standardized total social skills at age 12.

As previous researchers studying resilience have utilized both dichotomous and continuous variables to define adjustment (Masten & Reed, 2002), positive adjustment in the current study was examined in both ways to determine whether similar results would be obtained. To be defined as “positively adjusted” in the first instance, children needed to have scores below the median for externalizing behavior (i.e. lower than the 50th percentile of externalizing behavior) *and* scores above the median for social skills (i.e., higher than the 50th percentile of social skills). Using this strategy, 80 out of 300 children fell into the “positively adjusted” group. However, because a dichotomous measure of positive adjustment limits the range of scores for continuously-measured variables, positive adjustment was also examined as a continuous variable. To create a continuous variable of positive adjustment, children’s scores on the SRA were converted to *z* scores at ages 11 and 12, respectively, then summed and averaged across age, and finally subtracted from the aggregated standardized score on the SSRS.

6.0 DATA ANALYSIS

The primary goal of the proposed research was to investigate the relation between particular child (i.e., IQ and emotion regulation) and family (i.e., responsive parenting, parent-child relationship, and marital quality) factors in early childhood and child positive social adjustment in early adolescence. Analyses focused on the examination of the direct effects of child and family factors as well as how child and family factors interacted with neighborhood risk in relation to later child adjustment. As previously mentioned, child positive social adjustment was calculated both as a dichotomous variable and as a continuous variable; thus, separate analyses were computed to examine associations between child and family factors and both dichotomous and continuous outcomes of child positive social adjustment.

For Hypotheses 1b and 2b, trajectory group analyses were conducted using Nagin's (2005) semi-parametric growth modeling procedures. This method determines the number of trajectories within a given population and then estimates the proportion of individuals following each trajectory. Consequently, children can be assigned to groups based on their exposure to persistent high versus persistent low versus ascending or descending neighborhood risk from age 1.5 to 10. Although such trajectories do not technically follow Kraemer and colleagues' (2001) recommendation that a moderator should temporally precede the variable it is moderating, this method was chosen because it provides a *dynamic* representation of risk. Follow-up analyses investigated: 1) the direct effects of child and family factors on child adjustment, and 2) the interaction between child and family factors and neighborhood risk on child adjustment. A more detailed description of the analytic strategies that were used to test the hypotheses is provided below.

7.0 RESULTS

Prior to presenting results for each of the study's four main hypotheses, descriptive statistics and intercorrelations will be described for the independent and dependent variables. This will be followed by discussing the process of how trajectories of neighborhood risk were selected. Next, direct associations between child and family protective factors and child positive social adjustment will be examined, followed by an examination of interactions between individual child and family protective factors and neighborhood risk in relation to child positive social adjustment.

7.1 DESCRIPTIVE STATISTICS AND BIVARIATE CORRELATIONS

Descriptive statistics for all study variables appear in Table 1.

Table 1: Descriptive statistics

	N	Mean	SD
WPPSI-R ¹ (short)	234	93.81	12.76
Emotion Regulation	247	.05	1.56
HOME ² subscales	291	13.54	3.15
ACRS ³	289	2.00	1.05
Marital Adj. Test	311	101.66	25.84
Neighborhood Risk	306	.29	.94
Social Skills-teacher	187	36.54	9.57
Social Skills-mother	240	51.73	10.28
Self-Report of Antisocial Behavior	262	.18	.19

¹ Wechsler Preschool and Primary Scale of Intelligence – Revised

² Home Observation for Measurement of the Environment

³ Adult-Child Relationship Scale

Many of the measures used in the present study were either constructed for the purpose of this study or modified from their original format, making direct comparisons with other samples difficult. However, whenever possible such comparisons will be discussed. For example, the mean IQ for boys in the present study ($M = 93.81$, $SD = 12.76$) was approximately half a standard deviation lower than that reported in normative samples ($M = 100$, $SD = 15$; Wechsler, 1989). Maternal ratings of marital quality ($M = 101.66$, $SD = 25.85$) were similar to the original standardization sample mean ratings ($M = 100$, $SD = n/a$; Locke & Wallace, 1959). The mean raw score for teacher ratings of social skills at ages 11 and 12 was 36.54 ($SD = 9.57$), which is slightly lower than the normative mean scores for boys in grades 6 and 7 ($M = 39.7$, $SD = 11.2$; $M = 36.2$, $SD = 9.5$, respectively; Gresham & Elliott, 1990). Similarly, mother-rated scores for social skills at age 11 ($M = 51.73$, $SD = 10.28$) were slightly below the normative mean for boys in grade 6 ($M = 53.1$, $SD = 7.4$). Table 2 includes descriptive statistics from the 1990 and 2000 censuses for the neighborhood risk census variables for the present sample and for all residents

in Allegheny County, PA, from which the present sample was drawn. As can be seen, the sample is consistently at higher levels of risk on all of the variables. Total average risk scores for the sample by trajectory group are presented in Table 3.

Intercorrelations among the predictor variables are presented in Table 4. There were positive significant relationships between child IQ and maternal nurturance ($r = .32, p < .001$); and between parent-child relationship (PCRQ) and child emotion regulation (ER; $r = .27, p < .001$), maternal nurturance ($r = .27, p < .001$), and marital quality ($r = .26, p < .001$).

Table 2: Descriptive Statistics for Neighborhood Risk Census Variables

1990 Census Variables	<u>Sample</u>		<u>Allegheny County</u>	
	Mean	<i>SD</i>	<i>SD</i>	Mean
1. % African American	25.38	33.88	33.88	11.20
2. % single mother households	9.69	10.79	10.79	5.52
3. % Bachelors degree or higher	13.96	13.04	13.04	22.6
4. % unemployed	10.46	10.01	10.01	10.06
5. % households on public assistance	14.09	13.70	13.70	7.98
6. Median family income	\$28,316.75	\$12,827.10	\$12,827.10	\$35,338.00
7. % families below poverty	16.65	17.48	17.48	8.71
<u>2000 Census Variables</u>				
1. % African American	26.21	31.85	31.85	12.33
2. % single mother households	10.79	9.59	9.59	6.38
3. % Bachelors degree or higher	17.70	13.58	13.58	28.34
4. % unemployed	4.61	3.60	3.60	3.72
5. % households on public assistance	5.55	6.09	6.09	3.09
6. Median family income	\$39,008.97	\$16,100.49	\$16,100.49	\$49,815.00
7. % families below poverty	14.95	13.97	13.97	7.94

Table 3: Descriptive Statistics for Neighborhood Risk by Trajectory Group

Trajectory Group	<u>1990 census</u>		<u>2000 census</u>	
	Mean	<i>SD</i>	Mean	<i>SD</i>
1. Lowest risk group	-.60	.33	-.70	.28
2. Low risk group	-.09	.29	-.03	.31
3. Moderate risk group	.64	.33	.79	.47
4. High descending risk group	1.85	.47	.40	.57
5. Chronic risk group	2.49	.44	1.81	.71

Table 4: Intercorrelations Among Protective Factors

Protective factor	2	3	4	5
1. WPPSI-R ¹ (short form)	.13 ^a	.32***	.12 ^a	-.11 ^a
2. Observed emotion regulation	.----	.09	.27***	.09
3. HOME ²		.----	.27***	.10 ^a
4. Adult-Child Relationship Scale			.----	.26***
5. Marital Adjustment Test				.----

^a $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

¹Wechsler Preschool and Primary Scale of Intelligence – Revised

²Home Observation for Measurement of the Environment

7.2 ESTIMATED TRAJECTORIES OF NEIGHBORHOOD RISK

A semi-parametric mixture model for censored data was used to estimate trajectories of neighborhood risk based on block-group level census information (Nagin, 2005). Several decision criteria are employed to determine the best-fitting model: 1) the statistical significance of the trajectory parameter estimates for each group, which determines the appropriate shape of the individual trajectories; 2) the Bayesian Information Criteria (BIC), which informs the selection of the optimal number of trajectories; and 3) the posterior probability of membership in each group for each individual based on their actual data sequence. Statistical significance of the trajectory parameter estimates provides information on the model fit of each trajectory group, including indices for intercept, linear, quadratic, and cubic models. BIC scores emphasize parsimony, thus they include a penalty for adding additional trajectory groups (taking into account sample size). Finally, posterior probabilities offer another indicator of the precision of model fit by delineating the likelihood that an individual person would be assigned to each estimated trajectory group based on their observed data. The more accurately the trajectory group reflects the individual's observed data, the higher the posterior probability that the individual would be assigned to that particular trajectory. The individual posterior probabilities for each individual within a trajectory group can be averaged to reveal how well that particular trajectory represents the observed data of the individual group members. Generally, a group average posterior probability over .70 is considered adequate (Nagin, 2005).

To account for the fact that data from both the 1990 and 2000 censuses were used to estimate neighborhood risk, census year was added as a covariate so that the estimated models would more accurately represent the observed data. The BIC scores for a three, four, five, and six group model were compared (Table 5), and although the BIC was highest for the six group model, the five group model was ultimately selected for theoretical reasons (Figure 1; Nagin, 2005). The six group model split the three lower-risk trajectories from the five group model into four low-risk trajectories, one of which contained only six participants. Because the primary goal of this study was to compare low-risk and high-risk neighborhood trajectories, the distinction among these lower risk trajectories was not deemed important. For the five group model, the trajectory coefficients representing linear trends were significant for the two highest risk trajectories (high descending risk group: $n = 22$; chronic high risk group: $n = 34$); thus the other

three groups could be represented by an intercept-only trajectory (i.e., the trajectories were flat; lowest risk group: $n = 81$; low risk group: $n = 107$; moderate risk group: $n = 62$). Model selection was corroborated by examining posterior probabilities, which were uniformly high, ranging from .89 to .98 (Table 6).

Table 5: Bayesian Information Criteria (BIC) by Model Type

Model	Order ^a	BIC
a. Three group	0 1 1	-2260.43
b. Four group	0 0 1 1	-2196.24
c. Five group	0 0 0 1 1	-2098.37
d. Six group	0 0 0 0 1 1	-2092.90

^a Entries in this column represent the parameters used to approximate each group's trajectory. For example, a two group model with order = 0 1 would represent a group with a zero-order polynomial (defined only by the intercept) and a second group with a first-order polynomial (defined by an intercept and a linear growth term)

Table 6: Mean Posterior Assignment Probabilities for the Five Group Model

Posterior probability	1	2	3	4	5
1. Lowest risk (n=81)	.89	.11	.00	.00	.00
2. Low risk (n=107)	.08	.89	.03	.00	.00
3. Moderate risk (n=62)	.00	.05	.93	.01	.00
4. Descending risk (n=22)	.00	.00	.01	.98	.02
5. High risk (n=34)	.00	.00	.00	.02	.98

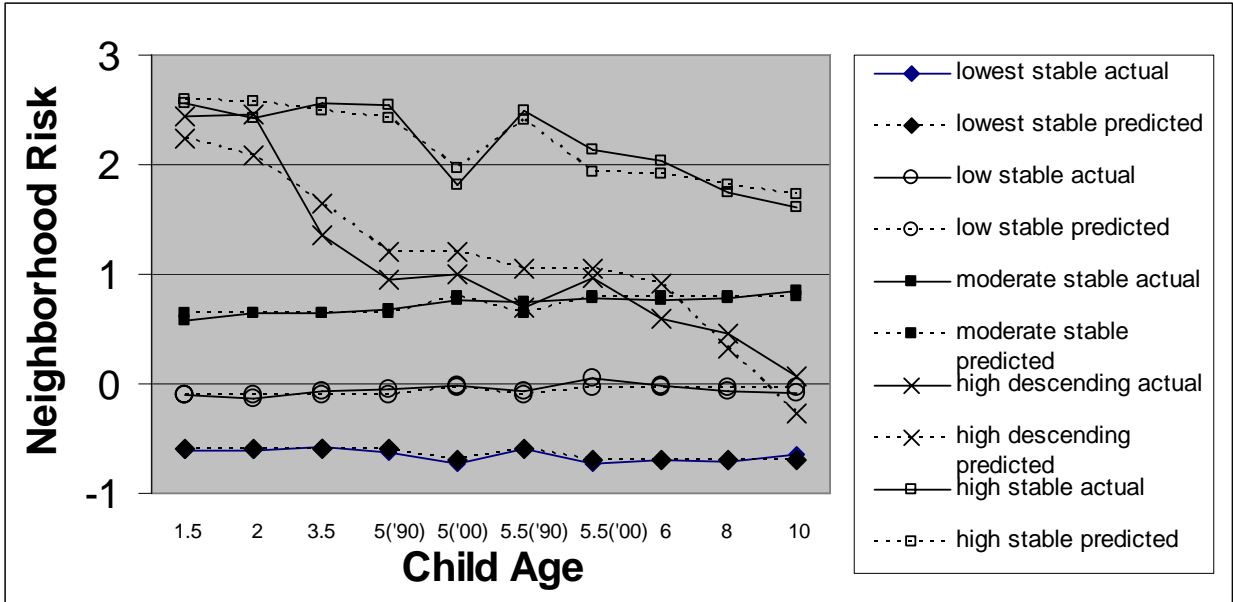


Figure 1: Trajectories of neighborhood risk

7.3 HYPOTHESES 1A AND 2A

The hypotheses that child and family factors assessed in early childhood would be directly associated with later positive child outcomes were examined in two ways. First, a series of Pearson correlations were computed to assess individual associations between child (i.e., child IQ, emotion regulation) and family (i.e., maternal nurturance, parent-child relationship quality, marital quality) factors and a continuous measure of child positive social adjustment (SSRS score – SRA score). As expected, all of the child and family factors were significantly associated with later positive social adjustment, with the exception of emotion regulation, which was a nonsignificant trend (Table 7). Second, five separate point biserial correlations were computed to assess the individual relationships between the child and family factors and a dichotomous measure of child positive social adjustment (i.e., threshold was set at above median scores on the SSRS and below median scores on the SRA to be considered resilient). Results were similar to the first analysis (Table 7), although the strength of correlations was generally reduced in magnitude compared to correlations using a continuous measure of child positive social adjustment.

Table 7: Correlations between protective factors and positive adjustment

Independent Variables	Continous Positive Adjustment	Dichotomous Positive Adjustment
Child IQ	.28***	.17*
Emotion Regulation	.13 ^a	.09
Maternal Nurturance	.35***	.25***
Parent-Child Relationship Quality	.36***	.25***
Marital Quality	.16*	.14*

^a $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

7.4 HYPOTHESES 1B AND 2B

To examine the hypothesis that child and family factors would be more strongly related to positive social adjustment in the context of more adverse trajectories of neighborhood risk, a series of hierarchical multiple regressions were conducted. Independent variables were centered prior to creating the interaction terms. When significant interactions were identified, they were examined using the procedure described by Aiken and West (1991), in which the relation between the protective factor and positive outcome is examined separately within each neighborhood trajectory group (e.g., low risk, high risk). Because neighborhood risk is a categorical variable, each trajectory received a dummy code, with either the chronic risk or the high descending risk group serving as the reference group; hence, two separate regressions were computed for each protective factor. Contrary to study hypotheses, none of the interactions between the child protective factors and neighborhood risk were significant, using either the chronic risk or high descending risk trajectories as the reference group (Table 8). With chronic risk as the reference group, the interaction between parent-child relationship quality (PCRQ) and the two lowest risk trajectories approached significance (Lowest risk: $B = .56, p < .10$; Low risk: $B = .59, p < .10$; Table 9). Follow-up analyses using the Aiken and West method (1991) described above revealed that contrary to hypotheses, there was a positive relationship between

PCRQ and child social adjustment only in the context of low or moderate neighborhood risk (Lowest risk: $B = .623$, $p < .01$; Low risk: $B = .01$, $p < .01$; Moderate risk: $B = .348$, $p < .05$). This relationship was nonsignificant at higher levels of risk, such that children at high descending or chronic risk who had high levels of PCRQ were not more likely to have positive outcomes in the context of high parent-child relationship quality.

Table 8: Hierarchical Regression Analyses Predicting Positive Adjustment from Child Factors with Neighborhood Risk as a Moderator

Independent Variables	Chronic risk vs. other neighborhood groups			Independent Variables	High desc. risk vs. other neighborhood groups		
	<i>B</i>	<i>SE</i>	β		<i>B</i>	<i>SE</i>	β
<u>Child IQ</u>							
Child IQ	.04	.02	.39 ^a	Child IQ	.01	.02	.06
Lowest risk	.56	.38	.17	Lowest risk	1.20	.41	.37**
Low risk	.45	.36	.15	Low risk	1.09	.39	.36**
Moderate risk	-.20	.39	-.06	Moderate risk	.44	.42	.12
High desc. risk	-.64	.48	-.13	Chronic risk	.64	.48	.15
IQ x lowest risk	-.02	.03	-.10	IQ x lowest risk	.01	.03	.05
IQ x low risk	-.03	.03	-.14	IQ x low risk	.01	.03	.07
IQ x moderate risk	.00	.03	.00	IQ x moderate risk	.04	.03	.11
IQ x high desc. risk	-.04	.03	-.13	IQ x chronic risk	.04	.03	.13
<u>Child Emotion Regulation (ER)</u>							
Child ER	.33	.22	.34	Child ER	-.19	.35	-.19
Lowest risk	1.37	.37	.40***	Lowest risk	.99	.42	.29*
Low risk	1.32	.36	.41***	Low risk 2	.94	.41	.29*
Moderate risk	.38	.38	.10	Moderate risk	.00	.43	.00
High desc. risk	.38	.48	.07	Chronic risk	-.38	.48	-.08
ER x lowest risk	-.17	.26	-.09	ER x lowest risk	.35	.37	.19
ER x low risk	-.35	.25	-.21	ER x low risk	.17	.37	.01
ER x moderate risk	-.17	.26	-.09	ER x moderate risk	.35	.38	.18
ER x high desc. risk	-.52	.42	-.12	ER x chronic risk	.52	.42	.17

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

Table 9: Hierarchical Regression Analyses Predicting Positive Adjustment from Parenting Factors with Neighborhood Risk as a Moderator

Chronic risk vs. other neighborhood groups				High desc. risk vs. other neighborhood groups			
Independent Variables	<i>B</i>	<i>SE</i>	β	Independent Variables	<i>B</i>	<i>SE</i>	β
<u>Maternal Nurturance (Nurt)</u>							
Nurt	.07	.08	.14	Nurt	.17	.11	.34
Lowest risk	1.14	.35	.33**	Lowest risk	.65	.43	.19
Low risk	.97	.34	.31**	Low risk	.48	.42	.15
Moderate risk	.42	.36	.11	Moderate risk	-.08	.44	-.02
High desc. risk	.49	.48	.09	Chronic risk	-.49	.48	-.11
Nurt x lowest risk	.05	.11	.04	Nurt x lowest risk	-.05	.13	-.05
Nurt x low risk	.12	.12	.11	Nurt x low risk	.02	.13	.01
Nurt x moderate risk	.04	.11	.03	Nurt x moderate risk	-.07	.13	-.06
Nurt x high desc. risk	.10	.13	.07	Nurt x chronic risk	-.10	.13	-.09
<u>Parent-Child Relationship Quality (PCRQ)</u>							
PCRQ	.06	.26	.04	PCRQ	.42	.27	.29
Lowest risk	1.34	.32	.39***	Lowest risk	.92	.38	.27*
Low risk	1.07	.31	.33**	Low risk 2	.65	.37	.20 ^a
Moderate risk	.42	.33	.11	Moderate risk	.00	.39	.00
High desc. risk	.42	.42	.08	Chronic risk	-.42	.42	-.09
PCRQ x lowest risk	.56	.32	.19 ^a	PCRQ x lowest risk	.21	.33	.07
PCRQ x low risk	.59	.33	.18 ^a	PCRQ x low risk	.23	.34	.07
PCRQ x moderate risk	.29	.30	.12	PCRQ x moderate risk	-.07	.31	-.03
PCRQ x high desc. risk	.36	.38	.09	PCRQ x chronic risk	-.36	.38	-.08

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

Table 10: Hierarchical Regression Analyses Predicting Positive Adjustment from Marital Quality with Neighborhood Risk as a Moderator

Chronic risk vs. other neighborhood groups				High desc. risk vs. other neighborhood groups			
Independent Variables	<i>B</i>	<i>SE</i>	β	Independent Variables	<i>B</i>	<i>SE</i>	β
Marital Quality (MQ)	.00	.01	-.05	Marital Quality (MQ)	-.02	.01	-.35
Lowest risk	1.42	.33	.41***	Lowest risk	1.28	.38	.37**
Low risk	1.12	.32	.35**	Low risk	.98	.37	.31**
Moderate risk	.35	.35	.09	Moderate risk	.21	.39	.05
High desc. risk	.14	.43	.03	Chronic risk	-.14	.43	-.03
MQ x lowest risk	.01	.01	.10	MQ x lowest risk-	.03	.01	.26*
MQ x low risk	.02	.01	.20 ^a	MQ x low risk	.04	.01	.34**
MQ x moderate risk	.01	.01	.09	MQ x moderate risk	.03	.01	.23 ^a
MQ x high desc. risk	-.02	.02	-.09	MQ x chronic risk	.02	.02	.11

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

Using descending risk as the reference group, there were significant interactions between marital quality and the lowest risk trajectory ($B = .03, p < .05$), as well as the second lowest risk trajectory ($B = .04, p < .01$). The interaction between marital quality and the moderate risk trajectory approached significance ($B = .03, p < .10$; Table 10). Follow-up analyses revealed that there was a significant positive relationship between marital quality and child social adjustment only at the second lowest level of risk ($B = .019, p < .01$; Figure 2). Thus, for children at the lowest level of risk or at the moderate, high descending, or chronic levels of risk there was no relationship between high levels of parental marital quality and child positive social adjustment. No other significant interactions between the family factors and neighborhood risk were found.

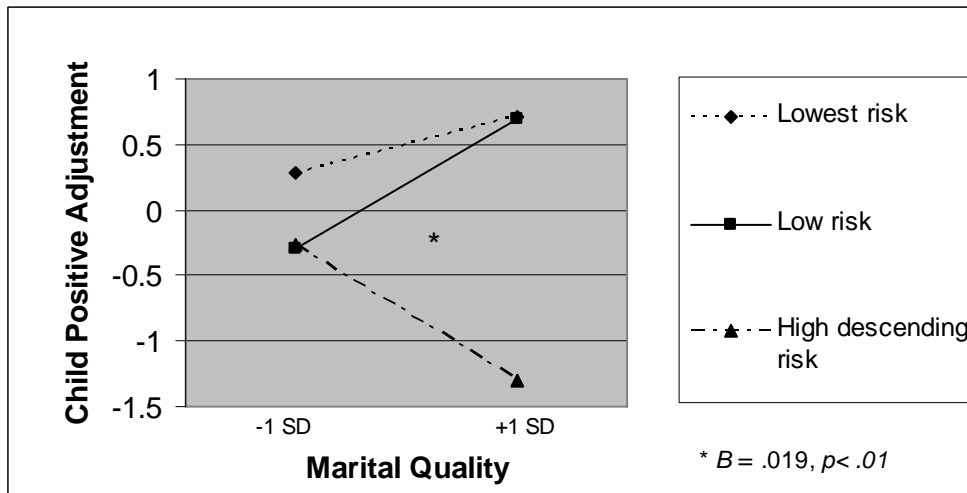


Figure 2. Relationship between marital quality and positive adjustment at three levels of neighborhood risk

Second, a series of logistic regressions were computed using the dichotomous outcome variable of positive social adjustment. None of the interactions were significant (Tables 11-13), although several of them approached significance. With high descending risk as the reference group, there was a trend toward interactions between the two child factors and moderate risk (IQ: $B = .12, p < .10$; ER: $B = 1.46, p < .10$). Follow-up analyses demonstrated that high levels of IQ were associated with child positive social adjustment only in the context of moderate risk ($B = .11, p < .05$); there was no relation between ER and positive adjustment within any of the different levels of risk. Finally, the interaction between marital quality and the lowest level of

risk approached significance ($B = .05, p < .10$); follow-up analyses revealed that high levels of marital quality were only associated with positive outcomes for boys at the lowest level of risk ($B = .03, p < .05$).

Table 11: Logistic Regression Analyses Predicting Positive Adjustment from Child Factors with Neighborhood Risk as a Moderator

Independent Variables	Chronic risk vs. other neighborhood groups				High desc. risk vs. other neighborhood groups				
	<i>B</i>	<i>SE</i>	Wald	OR	Independent Variables	<i>B</i>	<i>SE</i>	Wald	OR
<u>Child IQ</u>									
IQ	.09	.06	2.43	1.09	IQ	-.02	.05	.09	.99
Lowest risk	.81	.63	1.66	2.23	Lowest risk	1.91	.92	4.30*	6.77
Low risk	.32	.61	.28	1.38	Low risk	1.43	.92	2.45	4.18
Moderate risk	-.27	.69	.15	.77	Moderate risk	.84	.97	.76	2.32
High desc. risk	-1.11	1.03	1.17	.33	Chronic risk	1.11	1.03	1.17	3.03
IQ x lowest risk	-.09	.06	1.87	.92	IQ x lowest risk	.02	.06	.09	1.02
IQ x low risk	-.08	.06	1.60	.93	IQ x low risk	.03	.05	.27	1.03
IQ x moderate risk	.02	.08	.05	1.02	IQ x moderate risk	.12	.07	2.76 ^a	1.13
IQ x high desc. risk	-.10	.08	1.89	.90	IQ x chronic risk	.10	.08	1.89	1.11
<u>Child Emotion Regulation (ER)</u>									
ER	43.76	6792.84	.00	1.0E+19	ER	-.90	.79	1.30	.41
Lowest risk	52.59	7969.02	.00	6.9E+22	Lowest risk	1.86	.99	3.54 ^a	6.39
Low risk	52.35	7969.02	.00	5.4E+22	Low risk 2	1.62	.98	2.73 ^a	5.05
Moderate risk	51.19	7969.02	.00	1.7E+22	Moderate risk	.46	1.07	.19	1.58
High desc. risk	50.73	7969.02	.00	1.1E+22	Chronic risk	-50.73	7969.02	.00	.00
ER x neighborhood	-43.72	6792.84	.00	.00	ER x neighborhood	.94	.81	1.34	2.57
ER x low risk	-43.77	6792.84	.00	.00	ER x low risk	.89	.81	1.21	2.44
ER x moderate risk	-43.20	6792.84	.00	.00	ER x moderate risk	1.46	.88	2.74 ^a	4.31
ER x high desc. risk	-44.66	6792.84	.00	.00	ER x chronic risk	44.66	6792.84	.00	2.5E+19

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

Table 12: Logistic Regression Analyses Predicting Positive Adjustment from Parenting Factors with Neighborhood Risk as a Moderator

Independent Variables	Chronic risk vs. other neighborhood groups				Independent Variables	High desc. risk vs. other neighborhood groups			
	<i>B</i>	<i>SE</i>	Wald	OR		<i>B</i>	<i>SE</i>	Wald	OR
<u>Maternal Nurturance (Nurt)</u>									
Nurt	.19	.18	1.10	1.20	Nurt	.49	.30	2.66	1.62
Lowest risk	1.00	.60	2.79 ^a	2.71	Lowest risk	.97	.78	1.54	2.64
Low risk	.50	.59	.73	1.65	Low risk	.48	.78	.38	1.61
Moderate risk	.19	.63	.09	1.21	Moderate risk	.16	.81	.04	1.18
High desc. risk	.03	.88	.00	1.03	Chronic risk	-.03	.88	.00	.97
Nurt x lowest risk	-.03	.21	.02	.97	Nurt x lowest risk	-.33	.32	1.03	.72
Nurt x low risk	.04	.22	.03	1.04	Nurt x low risk	-.26	.32	.67	.77
Nurt x moderate risk	-.11	.21	.28	.89	Nurt x moderate risk	-.41	.32	1.66	.66
Nurt x high desc. risk	.30	.35	.75	1.35	Nurt x chronic risk	-.30	.35	.75	.74
<u>Parent-Child Relationship Quality (PCRQ)</u>									
PCRQ	.26	.52	.24	1.29	PCRQ	1.44	.85	2.84 ^a	4.21
Lowest risk	1.20	.57	4.43 [*]	3.32	Lowest risk	1.48	.87	2.92 ^a	4.41
Low risk	.75	.57	1.70	2.11	Low risk	1.03	.87	1.40	2.80
Moderate risk	.33	.62	.28	1.39	Moderate risk	.61	.90	.46	1.84
High desc. risk	-.28	.96	.09	.75	Chronic risk	.28	.96	.09	1.33
PCRQ x lowest risk	.25	.63	.16	1.28	PCRQ x lowest risk	-.93	.92	1.03	.39
PCRQ x low risk	.46	.63	.53	1.58	PCRQ x low risk	-.72	.92	.62	.49
PCRQ x moderate risk	.20	.61	.11	1.22	PCRQ x moderate risk	-.98	.91	1.15	.38
PCRQ x high desc. risk	1.18	1.00	1.39	3.25	PCRQ x chronic risk	-1.18	1.00	1.39	.31

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

Table 13: Logistic Regression Analyses Predicting Positive Adjustment from Marital Quality with Neighborhood Risk as a Moderator

Chronic risk vs. other neighborhood groups					High desc. risk vs. other neighborhood groups				
Independent Variables	<i>B</i>	<i>SE</i>	Wald	OR	Independent Variables	<i>B</i>	<i>SE</i>	Wald	OR
Marital Quality (MQ)	.00	.02	.04	1.00	MQ	-.02	.02	.63	.98
Lowest risk	1.30	.58	5.00*	3.69	Lowest risk	1.60	.76	4.42*	4.95
Low risk	.90	.57	2.49	2.46	Low risk	1.20	.75	2.53	3.31
Moderate risk	.27	.63	.18	1.31	Moderate risk	.56	.79	.50	1.76
High desc. risk	-.30	.87	.12	.74	Chronic risk	.30	.87	.12	1.34
MQ x lowest risk	.02	.02	1.18	1.03	MQ x lowest risk	.05	.03	3.31 ^a	1.05
MQ x low risk	.01	.02	.19	1.01	MQ x low risk	.03	.03	1.57	1.03
MQ x moderate risk	-.01	.02	.25	.99	MQ x moderate risk	.01	.03	.16	1.01
MQ x high desc. risk	-.02	.03	.55	.98	MQ x chronic risk	.02	.03	.55	1.02

^a $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

7.5 COMPARISON ANALYSES OF NEIGHBORHOOD RISK

To examine the added utility of using a trajectory analysis approach in comparison to more time-limited or traditional (i.e., mean level over time) assessments of neighborhood risk, three additional series of hierarchical regression analyses were computed to see if similar or different patterns of results would emerge. In each regression equation a protective factor was entered first; followed by either the entry of early neighborhood risk (average of neighborhood risk scores at ages 1.5 and 2 years), late neighborhood risk (average of neighborhood risk scores at ages 8 and 10 years), or mean neighborhood risk (average of neighborhood risk scores at all assessment points); and finally the interaction between the protective factor and neighborhood risk variable. As can be seen in Tables 14-16, results were generally similar but somewhat less robust to those found using trajectories of neighborhood risk. PCRQ interacted with late and mean levels of neighborhood risk (Late risk: $B = -.31, p < .01$; Mean risk: $B = -.20, p < .05$); the interaction between PCRQ and early risk approached significance ($B = -.13, p < .10$). Follow-up analyses for PCRQ were computed following guidelines prescribed by Aiken and West (1991), in which simple slopes were calculated at one standard deviation below and one standard deviation above the mean for early risk, mean risk, and late risk. Higher levels of PCRQ were more strongly associated with positive social adjustment in the context of lower levels of risk, regardless of the time point at which risk was measured (i.e., early, late, or mean risk). In contrast with the prior analyses, none of the interactions involving marital quality were significant.

Table 14: Hierarchical Regression Analyses Predicting Positive Adjustment from Protective Factors-Early Neighborhood Risk as a Moderator

Independent Variables	<i>B</i>	<i>SE</i>	β	Independent Variables	<i>B</i>	<i>SE</i>	β
<u>Child IQ</u>				<u>Child Emotion Regulation (ER)</u>			
IQ	.03	.01	.24**	ER	.12	.07	.12 ^a
Early neighborhood risk	-.27	.09	-.23**	Early neighborhood risk	-.38	.09	-.27***
IQ x early risk	-.01	.01	-.06	ER x early risk	.02	.07	.02
<u>Maternal Nurturance (Nurt)</u>				<u>Parent-Child Relationship Quality (PCRQ)</u>			
Nurt	.17	.04	.34***	PCRQ	.54	.10	.38***
Early neighborhood risk	-.28	.09	-.23**	Early neighborhood risk	-.34	.08	-.27***
Nurt x early risk	-.04	.03	-.12	PCRQ x early risk	-.13	.07	-.12 ^a
<u>Marital Quality (MQ)</u>							
MQ	.01	.00	.16*				
Early neighborhood risk	-.40	.08	-.31***				
MQ x early risk	-.01	.00	-.11				

^a $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Table 15: Hierarchical Regression Analyses Predicting Positive Adjustment from Protective Factors-Late Neighborhood Risk as a Moderator

Independent Variables	<i>B</i>	<i>SE</i>	β	Independent Variables	<i>B</i>	<i>SE</i>	β
<u>Child IQ</u>				<u>Child Emotion Regulation (ER)</u>			
IQ	.03	.01	.22**	ER	.10	.07	.10
Late neighborhood risk	-.45	.11	-.29***	Late neighborhood risk	-.63	.11	-.39***
IQ x late risk	-.01	.01	-.02	ER x late risk	-.01	.07	-.01
<u>Maternal Nurturance (Nurt)</u>				<u>Parent-Child Relationship Quality (PCRQ)</u>			
Nurt	.14	.03	.27***	PCRQ	.51	.09	.36***
Late neighborhood risk	-.53	.11	-.33***	Late neighborhood risk	-.67	.10	-.41***
Nurt x late risk	-.03	.03	-.07	PCRQ x late risk	-.31	.09	-.22**
<u>Marital Quality (MQ)</u>							
MQ	.01	.00	.15*				
Late neighborhood risk	-.65	.11	-.40***				
MQ x late risk	.00	.00	-.01				

^a $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Table 16: Hierarchical Regression Analyses Predicting Positive Adjustment from Protective Factors-Mean Neighborhood Risk as a Moderator

Independent Variables	<i>B</i>	<i>SE</i>	β	Independent Variables	<i>B</i>	<i>SE</i>	β
<u>Child IQ</u>				<u>Child Emotion Regulation (ER)</u>			
IQ	.02	.01	.20**	ER	.10	.07	.10
Mean neighborhood risk	-.38	.11	-.25**	Mean neighborhood risk	-.60	.11	-.37***
IQ x mean risk	3.32E005	.01	.00	ER x mean risk	.00	.07	.00
<u>Maternal Nurturance (Nurt)</u>				<u>Parent-Child Relationship Quality (PCRQ)</u>			
Nurt	.15	.04	.29***	PCRQ	.54	.10	.38***
Mean neighborhood risk	-.44	.11	-.27***	Mean neighborhood risk	-.52	.10	-.32***
Nurt x mean risk	-.03	.03	-.08	PCRQ x mean risk	-.20	.10	-.14*
<u>Marital Quality (MQ)</u>							
MQ	.01	.00	.12 ^a				
Mean neighborhood risk	-.59	.10	-.37***				
MQ x mean risk	-.01	.00	-.10				

^a $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

7.6 REANALYSIS WITH AFRICAN AMERICAN PARTICIPANTS

Upon closer examination of the ethnic composition of the neighborhood risk trajectories, it was determined that both the chronic risk and high descending risk groups were almost entirely comprised of African American (AA) boys (100% and 95.45%, respectively). To ensure that the previous results were not due to ethnic composition differences in the trajectory groups (i.e., the vast majority of the higher-risk neighborhood groups were AA and majority of lower risk groups were European American [EA]), the analyses were recomputed utilizing only the African American participants for all trajectory groups ($n = 96$). Because this greatly reduced sample size and the present study was primarily interested in differences between low and high risk groups, the lowest and second lowest risk trajectories were combined for these analyses. Results were similar to comparisons including EA and AA participants; however, the relation between IQ and positive outcome was reduced to a trend ($r = .22, p < .10$), and marital quality was no longer significantly associated with positive outcome ($r = .06, p = ns$; Table 17). Similarly, there were no significant interactions between individual protective factors and neighborhood risk; however, the interaction between PCRQ and low risk ($B = 1.39, p < .10$) and the interaction between marital quality and moderate risk ($B = .03, p < .10$) approached significance (Tables 18-20). Follow-up analyses demonstrated that in line with results using the full sample, high levels of PCRQ were only associated with positive social adjustment at low ($B = 1.45, p < .05$) levels of risk; this relationship approached significance at moderate ($B = .36, p < .10$) levels of risk, and was nonsignificant at the higher levels of risk.

Table 17: Correlations Between Protective Factors and Positive Adjustment (African American boys only)

Independent Variable	Positive youth adjustment
1. Child IQ	.22 ^a
2. Child Emotion Regulation	.09
3. Maternal Nurturance	.23*
4. Parent-child relationship quality	.25*
5. Marital Quality	.06

^a $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

**Table 18: Hierarchical Regression Analyses Predicting Positive Adjustment from Child Factors with Neighborhood Risk as a Moderator
(African American boys only)**

Chronic risk vs. other neighborhood groups				High desc. risk vs. other neighborhood groups			
Independent Variables	<i>B</i>	<i>SE</i>	β	Independent Variables	<i>B</i>	<i>SE</i>	β
<u>Child IQ</u>							
Child IQ	.04	.03	.38 ^a	Child IQ	.01	.02	.05
Low risk	.39	.57	.10	Low risk	1.03	.59	.26 ^a
Moderate risk	-.11	.42	-.04	Moderate risk	.53	.45	.18
High desc. risk	-.64	.49	-.19	Chronic risk	.64	.49	.21
IQ x low risk	-.00	.04	.01	IQ x low risk	.04	.04	.13
IQ x moderate risk	-.03	.04	-.11	IQ x moderate risk	.01	.04	.04
IQ x high desc. risk	-.04	.03	-.20	IQ x chronic risk	.04	.03	.19
<u>Child Emotion Regulation (ER)</u>							
Child ER	.33	.24	.37	Child ER	-.19	.37	-.21
Low risk	1.12	.58	.25 ^a	Low risk	.74	.61	.17
Moderate risk	.50	.43	.16	Moderate risk	.12	.47	.04
High desc. risk	.38	.51	.10	Chronic risk	-.38	.51	-.11
ER x low risk	-.37	.30	-.23	ER x low risk	.15	.42	.09
ER x moderate risk	-.21	.28	-.16	ER x moderate risk	.31	.40	.23
ER x high desc. risk	-.52	.44	-.16	ER x chronic risk	.52	.44	.25

^a $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

**Table 19: Hierarchical Regression Analyses Predicting Positive Adjustment from Parental Factors with Neighborhood Risk as a Moderator
(African American boys only)**

Chronic risk vs. other neighborhood groups				High desc. risk vs. other neighborhood groups			
Independent Variables	<i>B</i>	<i>SE</i>	β	Independent Variables	<i>B</i>	<i>SE</i>	β
<u>Maternal Nurturance (Nurt)</u>							
Nurt	.07	.09	.14	Nurt	.17	.12	.33
Low risk	.93	.52	.22 ^a	Low risk	.44	.59	.12 ⁰
Moderate risk	.44	.42	.13	Moderate risk	-.05	.51	-.02
High desc. risk	.49	.53	.13	Chronic risk	-.49	.53	-.15
Nurt x low risk	.24	.25	.11	Nurt x low risk	.14	.26	.06
Nurt x moderate risk	-.03	.13	-.03	Nurt x moderate risk	-.13	.15	-.15
Nurt x high desc. risk	.10	.15	.11	Nurt x chronic risk	-.10	.15	-.13
<u>Parent-Child Relationship Quality (PCRQ)</u>							
PCRQ	.06	.30	.04	PCRQ	.42	.31	.29
Low risk	.65	.56	.14	Low risk	.23	.61	.05
Moderate risk	.36	.40	.11	Moderate risk	-.06	.47	-.02
High desc. risk	.42	.49	.11	Chronic risk	-.42	.49	-.12
PCRQ x low risk	1.39	.78	.20 ^a	PCRQ x low risk	1.03	.79	.15
PCRQ x moderate risk	.30	.37	.14	PCRQ x moderate risk	-.06	.38	-.03
PCRQ x high desc. risk	.36	.43	.12	PCRQ x chronic risk	-.36	.43	-.12

^a $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

**Table 20: Hierarchical Regression Analyses Predicting Positive Adjustment from Marital Quality with Neighborhood Risk as a Moderator
(African American boys only)**

Chronic risk vs. other neighborhood groups				High desc. risk vs. other neighborhood groups			
Independent Variables	<i>B</i>	<i>SE</i>	β	Independent Variables	<i>B</i>	<i>SE</i>	β
Marital Quality (MQ)	-.00	.01	-.05	Marital Quality (MQ)	-.02	.01	-.33
Low risk	1.05	.54	.23 ^a	Low risk	.91	.57	.20
Moderate risk	.33	.42	.10	Moderate risk	.19	.46	.06
High desc. risk	.14	.49	.04	Chronic risk	-.14	.49	-.04
MQ x low risk	.03	.03	.11	MQ x low risk	.04	.03	.18
MQ x moderate risk	.02	.02	.17	MQ x moderate risk	.03	.02	.34 ^a
MQ x high desc. risk	-.02	.02	-.13	MQ x chronic risk	.02	.02	.16

^a $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

8.0 DISCUSSION

The purpose of the present study was to examine the relations among multiple child and family protective factors, neighborhood risk, and positive social adjustment in a sample of urban, low SES boys followed from infancy to early adolescence. In line with hypotheses, individual child and family protective factors were found to be associated with positive social adjustment in early adolescence, albeit emotion regulation only approached statistical significance. Contrary to hypotheses, when interactions between individual protective factors and neighborhood risk trajectories were investigated to test whether associations varied according to risk, only marital quality was found to interact with neighborhood risk. High levels of marital quality were significantly related to positive outcomes only for boys in neighborhoods characterized by relatively low risk (i.e., second lowest risk group). Overall, results were generally stronger when the continuous versus dichotomous measure of child positive social adjustment was utilized.

8.1 DIRECT ASSOCIATIONS BETWEEN PROTECTIVE FACTORS AND POSITIVE SOCIAL ADJUSTMENT

The finding that high levels of child and family protective factors were associated with positive social adjustment corroborates other literature on protective factors (e.g., Masten et al., 1999; White et al., 1989; Cicchetti & Rogosch, 1997). Indeed, child IQ and parenting variables are among the most consistently found factors associated with prosocial outcomes for children (Yates et al., 2003). Researchers have posited that high levels of intelligence can help children contend with the stressors that they encounter in their everyday lives (Masten & Coatsworth, 1998). Similarly, nurturant, supportive parenting and a positive, close relationship with a parent may help children to navigate a stressful environment by providing them with valuable

interpersonal and social resources (Masten & Coatsworth, 1998), as well as foster internal working models of trust in relationships with peers and adults outside of the family (Thompson, 1998).

8.2 INTERACTIONS BETWEEN PROTECTIVE FACTORS AND NEIGHBORHOOD RISK TRAJECTORIES

Marital quality was the only protective factor in which the direct association with positive social adjustment was qualified by a significant interaction with neighborhood risk. In contrast with expectations, this suggests that child IQ, emotion regulation, nurturant parenting, and parent-child relationship quality assessed in early childhood are comparably associated with positive social adjustment in early adolescence across levels of neighborhood risk. Conversely, high levels of marital quality were only associated with positive outcomes for those children in the second lowest neighborhood risk trajectory.

These findings are important for two reasons. First, we did not find support for the notion that selected child and family protective factors appear to be more important in contexts of greater versus lesser neighborhood adversity. In fact, three of the five protective factors explored in this study were associated with youth positive outcome regardless of the level of neighborhood risk. These findings differ from other studies which found that both parenting (Masten et al., 1999) and intellectual functioning (e.g., Masten et al., 1988, 1999; Werner & Smith, 1982) were more strongly associated with positive outcomes in the context of risk factors, including negative life events and high cumulative risk across child and family domains, respectively. However, it should be noted that the current sample could be classified as entirely high risk due to low SES, while other studies tended to be comprised of predominantly middle class or normative samples (Masten et al., 1988, 1999; Werner & Smith, 1982). Thus it is possible that the children in the “lower” risk groups of the current study were exposed to a higher level of risk than even the highest risk groups of other studies that did find interactions (e.g., Masten et al., 1988, 1999; Werner & Smith, 1982). Consequently, it is possible that more interactions with neighborhood risk may have been identified in the current study had the range of SES been less restricted.

In addition, the finding that high levels of marital quality were associated with positive social adjustment for children only in the second lowest neighborhood risk trajectory suggests the possibility of a threshold effect and/or a ceiling effect. More specifically, high levels of marital quality were not associated with positive outcomes for children at either the lowest level of risk or at the two highest levels of risk. Previous research has found that marital quality is associated with low levels of child emotional and behavioral problems (e.g., Belsky et al., 1991; Cummings et al., 2004), but there is a dearth of information on whether this relation is moderated by the level of risk. For children at the lowest level of neighborhood risk, marital quality may be less salient because these children face fewer obstacles and may need a smaller number of resources to achieve a positive outcome. However, for children at high levels of neighborhood risk, marital quality may be less critical to their adjustment relative to other stressors in their daily lives (e.g., exposure and/or threat of violence in the neighborhood and school). The finding that protective factors in the home may not have much effect at high levels of risk is corroborated by research by Tolan and colleagues (2003), who found that the relationship between parenting and antisocial behavior in the most impoverished Chicago neighborhoods was fully mediated by external environmental forces. Similarly, Shaw and colleagues (2004) found that while high family hierarchical structure (i.e., setting firm limits) served a protective function in relation to adolescent antisocial behavior among European American youth living in average to moderate levels of neighborhood adversity, this protective effect was not found for African American youth living in the highest risk neighborhoods (i.e., projects).

8.3 TRAJECTORIES OF NEIGHBORHOOD RISK

One of the strengths of the current study is that an objective, dynamic measurement of neighborhood risk was used to define adversity. As previously discussed, neighborhood risk may be a better measure of actual risk than low income or education alone because it includes a broader range of risks, including community violence, deviant peers, and decreased access to resources (Campbell et al., 2000). In comparison to measures of risk such as parental psychopathology or negative life events, neighborhood risk is a good proxy for overall environmental risk because it virtually ensures exposure to a wide array of stressors and

adversities in multiple domains (e.g., family, school, peers). Furthermore, neighborhood risk was defined using U.S. Census Bureau statistics at multiple time-points, allowing for measurement of the chronicity and course of neighborhood risk, and also eliminating potential reporter bias that might have occurred as a result of relying on parental reports.

To further investigate the added utility associated with using a dynamic representation of neighborhood risk, the current results were compared with those obtained using traditional approaches, such as mean levels of neighborhood risk over time or assessments of neighborhood risk at the beginning or end of the study period. First, a fuller picture of changes in neighborhood risk was possible using the trajectories of neighborhood risk. Although most families in the study did not vary significantly over time in their level of risk, the two highest risk trajectories had negative linear slopes, indicating that for these families neighborhood risk decreased significantly over time. In particular, by the age 10 assessment the high descending risk trajectory had decreased to levels below that of the moderate risk trajectory. However, as mean levels of neighborhood risk yielded different results from those obtained utilizing trajectories (i.e., PCRQ, rather than marital quality, interacted with risk), it is not clear which measure provides a more accurate or meaningful representation of neighborhood adversity. Similar results were found when only late assessments of neighborhood were used to define risk. Unfortunately, limiting the evaluation of neighborhood to later time points limits data on potential targets for early intervention. Finally, when neighborhood risk was defined using only early time points, no significant interactions were found. All in all, it appears that there may be a benefit to measuring neighborhood risk at multiple points over time, as the negative outcomes associated with neighborhood risk do not appear to be due to a primacy effect, at least in this particular sample.

8.4 LIMITATIONS

There were a number of limitations to the present study that should be noted. First, participants were low-income, urban boys and it is unclear whether these results would generalize to girls or to boys and girls living in rural or suburban areas. Indeed, research suggests that pathways to externalizing behavior may be somewhat different for girls (Pepler & Craig, 2005). Similarly,

protective factors associated with positive outcomes and resilience processes may also differ by child gender and geographic context.

Second, due to low SES, the majority of the families in the study could be conceptualized as high-risk, thus it is not possible to say whether the direct relations between the protective factors and positive social adjustment hold for less economically-deprived groups, or whether different or more robust interactions would have been identified within a sample covering a broader range of SES. However, as Seidman and Pedersen (2003) have pointed out, high-risk samples such as the current one allow within-group heterogeneity to be examined more closely, which can further explicate resilience processes and highlight variability in trajectories for at-risk children.

Third, sample sizes within the highest two trajectory groups were considerably smaller than the other groups, which limited power and the possibility of finding interactions between protective factors and neighborhood risk. Furthermore, ethnicity was highly correlated with neighborhood risk, with the top two trajectory groups comprised almost entirely of African Americans. However, when the analyses were recomputed using only data from African American participants, similar albeit weaker results were found, suggesting that ethnicity was less of a confound than may have been expected.

Fourth, as previously noted, single mothers were allowed to complete the marital quality questionnaire on another significant adult relationship, such as their boyfriend, girlfriend, or relative that shared household responsibilities. This was sensitive to the fact that 35% of the mothers in our study were single and allowed for the collection of important information on the mothers' satisfaction in their closest relationship. However, due to differences in measurement from other studies, the generalizability of the current findings regarding marital quality may be somewhat questionable. It is also possible that the trajectory group differences in the relation between marital quality and positive social adjustment were driven by trajectory group differences in the presence of a romantic partner. For example, mothers in the lower risk trajectories may have been more likely to be in romantic relationships than mothers in higher risk trajectories. However, when a chi square test was performed to see whether the probability of completing the questionnaire on a romantic partner differed by trajectory group, although there was an expected significant difference between mothers in lower and higher risk trajectory groups, the percentages of mothers in the lowest three trajectory groups with a romantic partner

did not differ. This suggests that the presence of a romantic partner did not entirely account for the interaction, because if this were the case, one would expect the associations between marital quality and positive social adjustment in the lowest risk trajectories to be similar, which they were not.

8.5 SUMMARY AND CLINICAL IMPLICATIONS

This study provides important information on the relations among child and protective factors, neighborhood risk, and positive social adjustment in urban, low-SES boys. These findings highlight the importance of examining both main effects and interactions, even if they are unexpected, as both provide important information for prevention and intervention efforts. It is critical to know which groups may benefit from a given intervention, whether it be all groups or specific subsets.

Consistent with prior research, the current findings emphasize the importance of child IQ and the family environment in promoting children's positive social adjustment but contrary to other studies do not suggest that such factors are more important for children living in high-risk contexts. The results suggest that prevention programs focusing on providing children with cognitively stimulating and nurturing environments would seem to hold promise for promoting positive outcomes for children from low-income contexts across a range of adversity. It remains unclear, however, whether modifying one protective factor is sufficient to improve outcome, particularly in the context of high risk; interventions targeting multiple domains may prove more successful at counteracting the multiple risks associated with neighborhood adversity (Henggeler, 1999; Shaw, Dishion, Supplee, Gardner, & Arnds, 2006). Future research on the relations between multiple domains of protective factors, neighborhood risk, and positive adjustment is needed, particularly in girls, and in boys and girls from rural and suburban contexts. Only through continued research on the conditions under which at-risk children achieve positive outcomes can resilience processes be fully understood and incorporated into prevention and intervention programs.

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