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“Effects of cumulative risk on behavioral and psychological well-being in first grade: Moderation by neighborhood context”

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Abstract

This study builds upon existing research by examining whether risk indices for child psychological well-being behave in the same way in different types of neighborhoods. Specifically, we sought to determine if neighborhood characteristics acted to exacerbate or, alternatively, to buffer risk factors at the family and/or child level. Families with a child entering first grade in Fall 2002 were recruited from Baltimore City neighborhoods, defined as census block groups. This study included 405 children, and data came from an interview with the primary caregiver and an assessment of the first grader. The dependent variables were externalizing behavior and internalizing problems. A family risk index consisting of 13 measures, and a child risk index consisting of three measures were the main independent variables of interest. We examined the effects of these indices on child psychological well-being and behavior across two neighborhood characteristics: neighborhood potential for community involvement with children and neighborhood negative social climate. Results of multivariate analyses indicated that cumulative family risk was associated with an increase in both internalizing and externalizing behavior problems. Perceived negative social climate moderated the effect of family risks on behavior problems such that more risk was associated with a larger increment in both externalizing behavior problems and psychological problems for children living in high versus low risk neighborhoods. These findings further emphasize the importance of considering neighborhood context in the study of child psychological well-being.

Keywords

neighborhoods; child mental health; USA; behavioral adjustment

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INTRODUCTION

Child behavior problems have been identified as being responsible for the greatest reduction in quality of life for children between ages 1 and 19 (U.S. Public Health Service, 2000). Children with behavior problems are more likely to experience academic failure, to drop out of school, to become involved in delinquent behavior as adolescents, and less likely to become productive members of society once they reach adulthood. Identified risk factors for child behavior problems include parenting factors that is characterized by low warmth, rejection of the child, and harsh/inconsistent discipline (Conger, Ge, Elder, Lorenz, & Simons, 1994; Criss, Pettit, Bates, Dodge, & Lapp, 2002; Dodge, Pettit, & Bates, 1994; Hill, Bush, & Roosa, 2003; Pettit, Bates, & Dodge, 1997) as well as environmental factors such as family poverty (Dodge & Pettit, 2003).

Simons and his colleagues contend that any theory linking parenting with child outcomes is conceptually incomplete without the consideration of the effects of context (Simons, Johnson, Conger, & Lorenz, 1997). One context that is experiencing renewed interest is the context of the residential neighborhood. The impetus of this interest has been documentation of accelerated rates of urban poverty coupled with heightened isolation of poor communities, both disproportionately affect ethnic minorities (Jargowsky, 1997; Wilson, 1987). Living in a poor neighborhood affects child behavior, after controlling for individual and family characteristics, but results are inconsistent (Brody et al., 2001; Caughy, O'Campo, & Muntaner, 2003; Caughy, O'Campo, & Nettles, 2008; Leventhal & Brooks-Gunn, 2000; Xue, Leventhal, Brooks-Gunn, & Earls, 2005). Neighborhood poverty has indirect effects on child outcomes through its influences on parenting, which often mediates the relationship between neighborhood disadvantage and child behavior. Living in impoverished neighborhoods leads to more child mistreatment, (Coulton, Korbin, & Su, 1999) less maternal warmth (Klebanov, Brooks-Gunn, & Duncan, 1994). As Wilson (1987, 1991) discussed, neighborhood factors such as poverty, danger, and poorly developed social networks weaken the expression of positive parenting (Burton & Jarrett, 2000, Kotchick & Forehand, 2002).

The utilization of risk indices has a long history in the developmental literature, largely motivated by a desire to enhance our ability to identify children at heightened risk for poor outcomes and to facilitate targeted implementation of early intervention strategies. A fundamental assumption of a "cumulative" risk approach is that the accumulation of risks has an effect above and beyond the effects of individual risks. Early work by Rutter (1979) examined six family risks including severe marital discord, low social status, large family size, paternal criminality, maternal mental disorder, and foster placement (Appleyard, Egeland, van Dulmen, & Sroufe, 2005). As the number of risks a child was exposed to increased, so too did child psychological disorder (Forehand, Biggar, & Kotchick, 1998). Since then, cumulative risk indices have expanded to include child, peer, school, and neighborhood risks and have been used to examine outcomes such as problem behavior, academic achievement, academic adjustment and depressed mood (Appleyard et al., 2005; Deater-Deckard, Dodge, Bates, & Pettit, 1998; Gerard & Buehler 2004a,b; Forehand, Biggar, & Kotchick, 1998; Sameroff, Seifer, Barocas, Zax, & Greenspan, 1987).

Individual risks are dichotomized and summed to produce an overall risk index. There is no set of risks considered the 'gold standard', and risk indices have ranged in size from 2 to 15 items or more (e.g. Deater-Deckard, et al., 1998; Gerard & Buehler, 2004a). Deater-Deckard and colleagues (1998) found that separate risk indices for child, sociocultural, parenting/ caregiving, and peer risks each independently contributed to the variance in externalizing behaviors scores. Atzaba-Poria and colleagues (2004) further found that separate risk indices capturing risks at the individual, socio/environmental, and broader social levels were differentially associated with problem behaviors with externalizing behavior problems

associated with the socio/environmental index, and internalizing problems associated with individual and broader social context scores.

One shortcoming of the cumulative risk research to date has been a lack of examination of contextual effects, specifically characteristics of the community in which a child lives. A few studies have included neighborhood factors as components of the risk index itself such as neighborhood safety, problems, satisfaction, and quality (Gerard & Buehler, 2004a,b). However, the possibility of multiplicative risk, that is that neighborhood characteristics could act to exacerbate or, alternatively, buffer risk at the child or family level, has not been examined.

There is evidence that neighborhood characteristics moderate associations between family level factors and child behavioral outcomes. For example, Simons et al. (2002) found a positive association in African American families between corporal punishment and child conduct problems, but only in communities in which physical discipline was rare. Silk, Sessa, Morris, Steinberg, and Avenevoli (2004) found that neighborhood cohesion buffered children against the negative impact of hostile parenting on child externalizing behavior problems.

Roche and Leventhal (2009) draw upon the work of Jencks and Mayer (1990) as well Simons et al. (2005) to propose a typology of three models to characterize the manner in which neighborhoods and family factors may interact to affect youth development. In an *amplified disadvantage model*, the negative impact of family level risk factors such as harsh parenting and inconsistent discipline are magnified in neighborhoods characterized by high levels of risk factors such as high concentrated economic disadvantage, low social cohesion, and high physical and social disorder. According to an *amplified advantages model*, the effects of positive parenting such as nurturance and firm discipline are greater in low risk, well-organized neighborhoods. Another way to conceptualize the amplified advantages model is that high risk neighborhoods undermine the benefits of positive parenting practices. Finally, the *family compensatory effects model* proposes that strong family management strategies such as high levels of nurturance and parent involvement are more important for positive youth outcomes in high risk neighborhoods compared to lower risk neighborhoods. The preponderance of the evidence supports an amplified disadvantages model, followed by a family compensatory model. The presence of family and child risk factors is more strongly associated with such poor child outcomes as risky behavior, delinquency, behavior problems, and depression in neighborhoods characterized by concentrated economic disadvantage, physical disorder, and low social cohesion (Brody et al., 2001; Ge et al., 2002; Gorman-Smith et al., 2000; Rankin & Quane, 2002; Roche et al., 2005; Roche et al., 2007). Evidence supporting the family compensatory model includes reports that parental monitoring is more strongly associated with decreased externalizing problems in neighborhoods with higher levels of residential instability (Beyers et al., 2003), that nurturant parenting is more strongly associated with positive child adjustment in economically disadvantaged neighborhoods (Brody et al., 2001), and that an authoritative parent discipline style is more strongly associated with lower behavior problems and depression in risky neighborhoods (Meyers & Miller, 2004; Natsuaki et al. 2007). These two models (amplified disadvantages and family compensatory) can be viewed as two sides of the same coin. Neighborhoods characterized by high levels of economic disadvantage and high levels of physical and social disorder appear to function to magnify the importance of supportive family factors as well as exacerbate the negative effects of family and child risk factors.

The purpose of this study was to build upon existing research by examining whether risk indices behaved in the same way in different types of neighborhoods. Specifically, we sought to determine if neighborhood characteristics acted to exacerbate or, alternatively, to buffer risk factors at the family and/or child level. We focused on two neighborhood social processes: neighborhood potential for community involvement with children and *neighborhood negative*

social climate. Neighborhood community involvement with children (CIC) taps both the degree of cohesion among community members as well as the likelihood of adult action on behalf of children in the community. It is important to expand our measures of neighborhood conditions beyond measures of neighborhood structural characteristics such as economic conditions and population characteristics to include measures of neighborhood social processes. Theories of neighborhood effects suggest that the negative impact of concentrated economic disadvantage operates by disrupting the social relationships in neighborhoods that provide support to families and role models for youth (Cutrona, Wallace, & Wesner, 2006; Furstenberg & Hughes, 1997; Nettles, Caughy, & O'Campo, 2008; Roosa, Jones, Tein, & Cree, 2003; Sampson, 1992; Tienda, 1991). Neighborhood measures such as neighborhood CIC and negative social climate tap important characteristics that not only differentiate economically disadvantaged neighborhoods from more advantaged neighborhoods but also distinguishes between economically disadvantaged neighborhoods.

Much of the research that has examined interactions of neighborhood by family/child risk, however, has focused on adolescents. We build upon this research by examining these interactions in a younger sample of children between ages 5 and 7 years of age. Consistent with the amplified disadvantages model, we hypothesized that neighborhood social risk such as low levels of neighborhood CIC and high levels of neighborhood negative social climate would exacerbate the negative impact of family and child risk factors on child behavior problems.

METHOD

Participants

This study was part of a larger study of the influence of neighborhood, family and child factors on adjustment in first grade. Families with a child entering first grade in Fall 2002 were recruited from Baltimore City neighborhoods, defined as census block groups, through door-to-door-canvassing, targeted mailing lists, and referrals from other participants. The home interview consisted of an interview with the primary caregiver and an assessment of the child. A total of 405 families participated in the study. The number of participants per block group ranged from 1 to 14, with an average of 2.48. Of the 405 primary caregivers, 349 (85.3%) were mothers. Fathers ($n = 27$) made up 6.6% of the sample, and grandparents ($n = 19$) made up 4.6%. The remaining caregivers were either other relatives (2.4%) or unrelated individuals (1.0%). About half (50.1%) of the children were girls. With respect to racial composition, 63% of the children were African American, and 37% were not. Nearly 40% (37.1%) were living at less than 100% of the federal poverty level, while one in five (20.5%) were living at 335% of the poverty level or better.

Measures

Child behavior problems were assessed using the Child Behavior Checklist (CBCL, Achenbach & Rescorla 2001). The CBCL is a parent-report measure that yields subscale scores for internalizing problems and externalizing problems. Raw scores were converted to t-scores, with higher scores reflecting greater problem behaviors.

Neighborhood potential for community involvement with children and neighborhood negative social climate were measured using seven subscales of the Neighborhood Environment for Children Rating Scales (NECRS), a parent-report measure (Coulton, Korbin, & Su, 1996). A confirmatory factor analysis supported a two factor structure for these seven subscales, $\chi^2(15) = 22.18$, $p = .054$, $GFI = .97$, $RMSEA = .055$. The four subscales used as indicators of neighborhood potential for community involvement with children (CIC) included willingness of adults in the neighborhood to intervene in acts of delinquency, willingness to intervene in

acts of child misbehavior, willingness to assist children in need, and level of social interaction in the neighborhood. These scales were averaged to create a composite measure of CIC. Higher scores reflect a greater amount of potential for community involvement with children in the neighborhood. The individual-level internal reliability of this composite was .78. Using methods outlined by O'Brien (1990), reliability of the CIC measure at the neighborhood level was calculated as .95. Three subscales were used as indicators of neighborhood negative social climate included physical/social disorder, fear of retaliation, and fear of victimization. Physical/social disorder (15 items) reflected frequency of neighborhood problems including trash, graffiti, abandoned cars, drug dealers, gangs, and loitering. Fear of retaliation (7 items) reflected the likelihood a child, teen, or adult would become angry and yell or retaliate if his/her behavior was corrected by someone else. Fear of victimization (14 items) reflected how worried one was about being the victim of a property and/or personal crime. These scales were averaged to create an index of neighborhood negative social climate ($\alpha = .76$, neighborhood level reliability = .98).

All multivariate analyses were adjusted for concentrated economic disadvantage. This measure was comprised of percent of individuals below poverty, percent receiving public assistance, percent unemployed, and percent of households that were female-headed with children (Sampson et al., 1997, 1999). The construction of this index was proposed by Sampson and is widely used in the urban sociology literature. It is also very similar to the measure proposed by Claudia Coulton. From Sampson, Morenoff & Earls (1997), the rationale for its inclusion is derived from the work of William Julius Wilson who, in his 1987 book *The Truly Disadvantaged*, argued that “the geographic concentration of low-income residents, especially of African Americans and female-headed families, stems from macroeconomic changes related to the deindustrialization of central cities and the out-migration of middle-class residents” (Sampson et al., 1997, p. 637). Sampson et al. also draw upon the work of Massey and Denton (1993) who argue that this type of geographic concentration of poverty in turn fuels other cumulative forms of disadvantage. All variables were drawn from the 2000 Census, standardized, and averaged to create the concentrated economic disadvantage composite.

Gender, race, and family poverty status were also controlled. Family size and income data were used to estimate family poverty status based on federal poverty guidelines.

Risk Factor Measures—A number of measures relating to family and child characteristics utilized in other studies of cumulative risk indices or associated with child behavioral problems were examined. Measures that had significant correlations in this sample with the outcomes were chosen to create cumulative risk indices. Thirteen measures were considered family risks, and three were considered child risks. Family characteristics included child-to-adult ratio, maternal education, marital status, current household smoking status, maternal depression, inter-partner violence, life stress, parental medical condition affecting parenting, harsh parenting, hostility, parental monitoring, parental affection, and parental eliciting behavior. Child risk indices included difficult temperament, very low birth weight, and low cognitive ability.

Child-to-adult ratio was defined as the number of children less than 18 years of age divided by the number of other people in the household 18 and over. Maternal education was the education of the primary caregiver, most often the mother, and was dichotomized as less than high school and high school or higher. Marital status measured whether the adult respondent was married or not at the time of the survey. Current household smoking status indicated whether there was at least one smoker who currently lived in the household.

Maternal depression was assessed using the Center for Epidemiological Studies Depression Scale Revised (CES-D-R): The original 20-item CES-D is a self-report measure that was

designed to assess symptoms of depression in the general population (Radloff, 1977). The revised version has excellent internal consistency reliability. In this sample, the internal consistency was .86.

Inter-partner violence was measured using the HITS scale (Sherin et al, 1998) and is comprised of four self-report items assessing emotional and physical violence on a 5-point Likert scale (0 = never happens; 4 = frequently) including how often your partner insults or talks down to you, screams or curses at you, threatens you with harm, and physically hurts you. An additional item (how often partner restricts actions) was added to assess emotional control. If a respondent answered “rarely” or more frequently for any item, the respondent was coded 1 indicating any versus no violence. The internal reliability of the five item scale was .66.

Life stress was assessed using a variation of the Social Readjustment Rating Scale first introduced in 1967 by Holmes and Rahe (Turner & Wheaton, 1995) and consisted of 14 self-report items measuring both positive stress such as a recent marriage and negative stress such as the death of a family member. For each event within a year of the survey, adult respondents rated how stressful the event was on the household as a whole on a scale from 1 (not stressful) to 4 (very stressful). Items were weighted and then summed to create an overall score. The score had a possible range of 0 to 56, an actual range of 0 to 28, and a mean of 2.94 (SD = 3.86). The internal reliability of the scale was .62.

The presence of a parental medical condition affecting parenting was based on the answer to a direct question asking the adult respondents whether a current medical condition affected their parenting.

Harsh parental discipline was assessed using a measure developed by Shumow, Vandell, & Posner (1999). Only the harsh discipline subscale (5 items) was used ($\alpha = .64$). Observed hostility within the parent-child relationship was captured during a video-taped session during the home visit. Described in detail by Clark and Ladd (2000), the video-taped session included seven conversational episodes initiated by the interviewer. The parent and child sat together, and in the first episode the parent was asked to tell a story of when the child was born or when the child was a small baby, the purpose of which was to elicit a narrative that was personally relevant to the child but for which he/she had no personal knowledge. The child then picked the topic of the next episode using a set of cards provided by the interviewer. In all, the child told six stories: something fun that happened at school, something not so fun that happened at school, something fun that happened at home, something not so fun that happened at home, something fun for the child that happened with the parent, and something not so fun for the child that happened with the parent. The parent was told that he/she could ‘help out’ in the story-telling.

Videotapes were reviewed and coded by two graduate students, and estimates of interrater reliability, based on an intraclass correlation coefficient (ICC) (Shrout & Fleiss, 1979), ranged from .83 to .96 at the beginning of coding and from .87 to .98 midway through coding. Each episode was coded for 14 items based on the coding system used by Clark and Ladd (2000). Episodes were deemed “unratable” if they lasted <30 seconds and included fewer than three interactive turns. The number of ratable episodes per child ranged from 0 to 7 (mean = 6.51, SD = 1.06). A total of 360 (89%) had at least five ratable episodes. The hostility score was created by averaging parent-child anger, parent demandingness, and parent hostility at the episode level and then averaging across episodes ($\alpha = .82$).

Parenting behavior was measured using three subscales from the Survey Measure of Mother-Child Relationship for Middle Childhood (SMMCRMC) (Mariner, Zaslow, Floryan, & Botsko, 1998). Monitoring included seven parent-report items regarding the parent's knowledge of his/her child's whereabouts, friends, homework and television viewing ($\alpha = .74$). Expression of

Affection consisted of three maternal report and three interviewer observation items ($\alpha = .60$), and Eliciting consisted of five parent-report items measuring the degree to which a parent encourages communication from and engages in activities preferred by his/her child ($\alpha = .74$).

Child difficult temperament was assessed using the Revised Dimensions of Temperament Survey (DOTS-R; Windle & Lerner, 1986), a 54 item parent-report measure developed to assess behavioral style from infancy to adulthood. The DOTS-T included nine subscales which were dichotomized and combined by an algorithm provided by the authors resulting in a single temperament score that ranged in our data from 0 to 5. The internal consistency of the measure was .82. Higher scores indicate more difficult temperament.

Very low birth weight was defined as weighing less than 1500 grams (3 pounds, 4 ounces) at birth, as reported by the adult respondent.

Cognitive ability was assessed using the Kaufman Brief Intelligence Test (K-BIT). The K-BIT is appropriate for individuals between ages 4 and 90, can be administered by paraprofessionals and has strong concurrent validity with other intelligence measures (Childers, Durham, & Wilson, 1994; Prewett, 1995; Prewett & McCaffery, 1993).

Cumulative Risk Scores—In keeping with the extant literature on cumulative risk, each measure was first dichotomized (1 = higher risk, 0 = lower risk). Table 1 defines the risk cutoff as well as the proportion of children who were considered at higher risk for each measure. For some, the cutoff was clear. For others, higher risk was arbitrarily defined as the worst (highest or lowest depending on the variable) 25–30%, similar to methods used elsewhere (e.g. Forehand et al., 1998; Gerard & Buehler, 2004). Incidence of risk factors for individual items ranged from 3.0% for very low birth weight to 58.5% for a single parent family.

Two cumulative risk indices were constructed. A sum of the total number of family risks served as the family risk index. Those with three or more missing components were not assigned a family risk score. This occurred in only three instances. The index had an average of 4.71 (SD = 2.10, range 0 to 11). Although we initially explored computing separate indices for “structural” household risks (family composition, low maternal education, etc) versus family “process” risks (quality of parent-child interaction), we chose to combine them because of sample size issues. When stratifying the sample by risk status and neighborhood conditions, some of the cell sizes were too small to allow for stable estimation of mean differences in the outcomes. A study with a larger sample size might be able to more effectively discriminate between sources of risk. An advantage of combining these types of risk factors into a single index is that the objective nature of the structural factors compensates for the same source bias that may be associated with some of the family process factors.

A child risk index was also created and included three child items – very low birth weight, difficult temperament, and low cognitive ability. Because there were only three items in the entire index, no missing values on individual components were allowed resulting in a score for 367 children (average = .37, SD = .55, range 0).

Analytic Plan

A correlation matrix of study variables was utilized to examine the bivariate associations between the risk indices and child behavior problems, and between the risk indices, child behavior problems and the covariates. Stata's XTREG procedure (StataCorp, 2003) was used to examine the association between neighborhood characteristics, family and child risk indices and behavior problems. XTREG is an analytic method which adjusts for the clustering of observations. Because we were interested in the influence of neighborhood social processes

over and above neighborhood structural characteristics, all analyses were adjusted for neighborhood concentrated economic disadvantage.

In results discussed but not shown, we examined whether the risk indices were associated with behavior problems in an additive or threshold way by adding quadratic terms of each risk index into the main effects models. By doing so, we were able to determine whether the addition of each individual risk to an overall risk index was important (additive effect) or whether cumulative risks were only associated with an outcome after they had reached a certain number, or threshold (Appleyard et al., 2005).

Finally, we tested for interactions between the risk indices and the neighborhood variables. Interactions with each of the two neighborhood variables were entered into separate models so as not to overload the analyses.

RESULTS

A correlation matrix of study variables is presented in Table 2. The family risk index was more strongly correlated with child behavior problems than was child risk. The child risk index was positively correlated with externalizing problems but not internalizing problems. Family risk was positively correlated with both internalizing and externalizing problems, and the magnitude of the correlations was 2–3 times that of the child risk index. Family poverty, neighborhood concentrated economic advantage, and neighborhood negative social climate were positively correlated with both child behavior problems as well as risk.

Multivariate Results

Tables 3 and 4 present the multivariate regression results for externalizing and internalizing behavior problems, respectively. For both, net of other factors, girls and African Americans had fewer behavior problems than did boys and/or non-African Americans. The cumulative child risk index was not significantly associated with behavior problems, although the cumulative family risk index was positively associated with both externalizing and internalizing problems. Quadratic terms were entered into the models to test for a threshold effect (not shown). The quadratic term was not significant in either model, suggesting that the family risk index acted in an additive way. That is, each additional risk a child was exposed to was associated with increased behavior problems. Children did not have to reach a certain number of risks (threshold) before experiencing a negative impact.

Family risk was particularly important in families rating their neighborhoods negatively in terms of perceived social climate, as indicated by a significant interaction between the family risk index and perceived neighborhood negative social climate (see Model 2 in Tables 3 and 4). While each additional family risk was associated with an increase of 1.34 points in externalizing behavior for children who lived in neighborhoods with a more positive perceived social climate, it was associated with an increase of 2.54 points on the externalizing behavior scale for children who lived in neighborhoods with very negative perceived social climate. Although the relation was similar for internalizing behavior, the interaction failed to reach customary levels of statistical significance. The interaction between family risk and perceived negative social climate is displayed in the Figure, with predicted scores plotted for each family index score.

We explored the possibility that the pattern of associations might differ by child gender. There were no significant interactions between child gender and family risk or child gender and child risk. There was a single significant three-way interaction between child gender, family risk, and CIC (analyses available upon request), but because it was the only significant gender

interaction that emerged from the 16 gender x risk interactions examined, we hesitate to over interpret it.

DISCUSSION

The purpose of this study was to examine how cumulative exposure to risk was associated with differences in child behavior problems in the first grade and, specifically, how the impact of cumulative risk might differ by the neighborhood context in which children live. Results indicated that family risk factors were a stronger predictor of child problem behavior than were child risk factors. This differed somewhat from the findings of Atzaba-Poria et al (2004) who found that a child risk index was predictive of internalizing problems among a group of English and Indian children aged 7 to 9.6 years. One might contend that the stronger association we found between the family risk index and child behavior problems was an artifact of two things: (1) the larger number of items in the family risk index, and (2) the reliance on objective rather than subjective factors for the child index. Although the larger range for the family risk index may be an issue, it should be noted that Atzaba-Poria et al (2004) found significant relations between a child risk index comprised of only two items and child internalizing problems. Furthermore, the child index we used was not entirely comprised of objective items. Child difficult temperament is based on parent report.

Family risk factors included demographic risks, family environment risks, and parenting risks. A cumulative risk index assessing the presence of these factors indicated that increasing risk was associated with higher levels of externalizing and internalizing problems for children. Consistent with an amplified disadvantages model of neighborhood effects, results indicated that neighborhood risk acted as a multiplicative risk factor in the face of family risk such that increasing exposure to family risk factors was associated with a larger increment in behavior problems for children living in higher risk neighborhoods. Neighborhood risk appeared to exacerbate the impact of family risk factors. It is interesting to note, however, that the significant interactions shown in the Figure illustrate a cross-over effect. It is only when children were exposed to five or more family risks that those in higher risk neighborhoods had higher behavior scores than children in lower risk neighborhoods. In higher NSC neighborhoods, the change in child behavior problems scores associated with a family risk score one standard deviation higher than the mean level of risk would be 5.33 points for externalizing problems, an effect size of .53. This would be considered a large effect size.

The study of neighborhood factors in the cumulative risk literature is limited. To our knowledge, no study has examined the effects of neighborhood context on family risk factors on first-graders. In a study of adolescents, Gerard and Buehler (2004a,b) included four neighborhood factors measuring quality, problems, satisfaction, and safety in their 15-item cumulative risk index. While the importance of considering neighborhood factors was acknowledged, by including them in the risk index itself the authors failed to consider the potential impact of the neighborhood as a moderator of risk. As we have demonstrated, it appears that neighborhood context acts in a multiplicative, rather than additive, way.

There are a number of limitations of this study that should be kept in mind when interpreting the results. First, the sample of children is from an urban setting that does not include significant proportions of Hispanics. As such, the findings may not be generalizable to more diverse urban settings or to suburban or rural settings. Neighborhood ethnic density and its relation to several child/adolescent health outcomes have been explored extensively (see e.g., Fagg, Curtis, Stansfeld, & Congdon, 2006) and could be a relevant factor for the outcomes we examined. Unfortunately, the city of Baltimore does not lend itself to careful studies of the role of ethnic density, unless ethnicity is defined to include cultural or geographic or other distinctions within the broad racial designations of European American and African American, the two groups

that make up the substantial majority of the city's population. The role of ethnic density should be addressed in future research in contexts with greater diversity.

Another limitation of this study was that the risks included in our indices were not exhaustive and may not have included all relevant risk factors. For example, it would have enhanced the assessment of family risk if we had more detailed information regarding parental substance abuse issues or family conflict, as these have been shown to have negative implications for child emotional well-being. Another limitation of this study was we used census block groups to proxy neighborhoods. Census block groups may or may not be good approximations of what participants envision when they are asked about their neighborhoods. In addition, although we used analytic methods to account for clustering effects, even these methods represent an oversimplification of the complexity of contextual effects. For example, children may spend time in residences or care settings in different parts of the city that may have very different ecological characteristics from the area where they reside.

In addition, the study results may be limited by the fact that measures of the outcome (child behavior problems) were derived from the same reporter (the parent) as some of the predictor variables. This is referred to as “common method variance” or “same source bias” (Duncan & Raudenbush, 1999; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). This is primarily an issue for the measures of perceived neighborhood social processes and child behavior problems, as both are based on parent report. The family and child risk factors are based on a mix of parent report and interviewer-assessed measures. Future research should attempt to replicate these findings by triangulating outcomes assessed in different ways.

Finally, selection into neighborhoods is undoubtedly a non-random process, and so it is possible that neighborhood effects are expressions of unobserved background characteristics. We attempted to account for these selection factors by including individual characteristics associated with neighborhood selection including family poverty level and race/ethnicity.

Despite these limitations, the findings have important implications for future research and intervention development with families and young children. This is one of the first studies to demonstrate empirically that characteristics of the communities in which children live can either exacerbate or buffer the effects of the risk factors more proximal to the child. Therefore, an attention to community factors and how to foster protective factors at the community-level is an important component of intervention strategies to support children and their families. Future research should more explicitly examine processes at the neighborhood level and how they can be fostered to support healthy child and family functioning.

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Figure.

The effect of cumulative family risk on externalizing behavior scores within low and high negative social climate neighborhoods.

Table 1

Frequencies of Risk Factors and Indices

Category	Measures	Definition of <i>Higher Risk</i>	Prevalence of Risk ^a	
			n	%
<u>Child risk factors</u>	Very low birth weight	Birth weight $\leq$ 1500 grams	12	3.0
	Difficult temperament	Score of 4+ difficult temperament scale	24	6.3
	Low cognitive ability	Lowest 25% KBIT score	114	28.6
<u>Family risk factors</u>	Child to adult ratio	Greater than or equal to 2	155	38.4
	High life stress	Score of 8 or more	43	11.9
	Low maternal education	Less than high school	79	19.6
	Single parent	Respondent is unmarried	237	58.5
	Inter-partner violence	Yes to psychological or physical abuse	196	49.9
	Maternal Depression	Scored 18 or higher on CESD-II-R	115	28.9
	Current smoking in hhold	Anyone in household currently smokes	195	48.2
	Parent Medical Condition	Parent has condition that affects parenting	66	16.3
	Child/parent hostility	Highest 25%	95	24.8
	Harsh parenting	Highest 20%	75	19.4
	Parental monitoring	Highest 30%	126	31.3
	Parental eliciting	Highest 30%	122	30.3
	Parental Affection	Highest 30%	120	31.2
			Mean	SD
<u>Cumulative Risk Indices</u>	Child index	Sum of child risk factors	.37	.55
	Family index	Sum of family risk factors	4.71	2.10

^aDenominators vary due to missing data

Table 2

Intercorrelations of study variables.

	1	2	3	4	5	6	7	8	9	10
1. Externalizing problems	1.00									
2. Internalizing problems	.60**	1.00								
3. Child risk index	.12*	.04	1.00							
4. Family risk index	.34**	.24**	.21**	1.00						
5. Poverty	-.11*	-.06	-.27**	.31**	1.00					
6. Economic disadvantage (Eco)	.09+	.06	.22**	.38**	-.34**	1.00				
7. Perceived negative social climate (NSC)	.12*	.12*	.28**	.31**	-.36**	.33**	1.00			
8. Perceived community involvement w/children (CIC)	-.02	-.05	-.15**	-.17**	.25**	-.20**	-.40**	1.00		
9. Girl ^a	-.11*	-.11*	.05	.03	.07	.01	.01	.02	1.00	
10. African American ^a	-.03	-.04	.20**	.27**	-.42**	.34**	.10*	-.17**	-.02	1.00

^aSpearman correlations

+ p ≤ .10

* p ≤ .05

** p ≤ .01

Table 3
Regression of CBCL externalizing behavior problems score on cumulative risk and neighborhood characteristics

	Model 1		Model 2		Model 3	
	b (se)	z	b (se)	z	b (se)	z
Constant	45.90 (1.78)	25.84**	47.43 (2.01)	23.62**	45.47 (1.88)	24.17**
Poverty	.00 (.00)	-.14	-.14 (.34)	-.41	.00 (.00)	-.16
African American	-2.80 (1.15)	-2.43*	-3.18 (1.22)	-2.61**	-2.69 (1.17)	-2.30*
Girl	-2.98 (.93)	-3.2***	-2.87 (.94)	-3.06**	-2.98 (.93)	-3.20**
Economic Disadvantage (Eco)	1.38 (1.48)	.93	.75 (1.57)	.48	1.16 (1.50)	.77
Family index	1.61 (.24)	6.65**	1.34 (.29)	4.69**	1.67 (.26)	6.31**
Child index	1.11 (.88)	1.25	2.01 (1.07)	1.87+	1.15 (.97)	1.19
Perceived Negative Climate (NSC)	--	--	-6.44 (3.02)	-2.13*	--	--
Perceived Community Involvement (CIC)	--	--	--	--	1.51 (2.71)	.56
Family index *NSC	--	--	1.20 (.52)	2.31*	--	--
Child index *NSC	--	--	-1.83 (1.88)	-.97	--	--
Family index *CIC	--	--	--	--	-2.26 (.57)	-.45
Child index *CIC	--	--	--	--	.79 (2.21)	.36
Rho	.14		.18		.15	

+
p ≤ .10

*
p ≤ .05

**
p ≤ .01

Table 4
Regression of CBCL internalizing behavior problems score on cumulative risk and neighborhood characteristics

	Model 1		Model 2		Model 3	
	b (se)	z	b (se)	z	b (se)	z
Constant	46.22 (1.86)	24.80**	47.42 (2.11)	22.45**	45.71 (1.99)	22.96**
Poverty	.00 (.00)	-.11	-.05 (.36)	-.13	.00 (.00)	-.06
African American	-2.60 (1.22)	-2.14*	-2.32 (1.29)	-1.80 ⁺	-2.51 (1.25)	-2.01*
Girl	-2.13 (0.97)	-2.18*	-2.01 (.99)	-2.04*	-2.11 (.98)	-2.15*
Economic Disadvantage (Eco)	1.44 (1.59)	.91	.63 (1.66)	.38	1.36 (1.63)	.83
Family index	1.12 (0.25)	4.43**	.73 (.30)	2.42*	1.23 (0.28)	4.42**
Child index	.15 (0.92)	.16	.06 (1.13)	.05	-.23 (1.02)	-.22
Perceived Negative Climate (NSC)	--	--	-5.28 (3.17)	-1.66 ⁺	--	--
Perceived Community Involvement (CIC)	--	--	--	--	1.89 (2.86)	.66
Family index * NSC	--	--	1.29 (.54)	2.38*	--	--
Child index * NSC	--	--	.01 (1.98)	.00	--	--
Family index * CIC	--	--	--	--	-.53 (.60)	-.87
Child index * CIC	--	--	--	--	2.24 (2.32)	.97
Rho	.18		.18		.19	

⁺ $p \leq .10$

* $p \leq .05$

** $p \leq .01$