

Hyperactivity, Impulsivity, Inattention (HIA) and Conduct Problems among African American Youth: The Roles of Neighborhood and Gender

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Abstract This study replicated and extended prior research by examining neighborhood context as a moderator of the relation between the constellation of hyperactivity, impulsivity, and attention (HIA) difficulties and conduct problems among African American youth (11–16 years old; 55% girls) from single mother homes ($N=193$). Using audio computer-assisted interview (ACASI) software, mother-child dyads provided ratings of HIA difficulties and two domains of conduct problems: aggression and rule-breaking. In addition, both subjective (mother-report) and objective (census data) indices of neighborhood context were assessed. Findings revealed that both subjective and objective indices of neighborhood context moderated the relation between HIA and conduct problems, but the pattern of moderation differed depending on the index and combination of reporters. Future research directions and implications of the findings are discussed.

Keywords Neighborhood · Conduct problems · African American · Single mother

African American youth are significantly more likely to endorse self-reported conduct problems, including aggression and rule-breaking behaviors, than European American youth and are overrepresented in delinquency statistics as well (e.g., Tittle and Paternoster 2000; Elliott et al. 1989; U.S. Department of Justice 2003). For example, self-report data indicates that African American youth, compared to European American youth, are approximately 1.5 times more likely to engage in general delinquency and more than twice as likely to be involved in more serious and violent delinquent acts (Elliott et al. 1989). Additionally, African American youth account for approximately 43% of all juvenile arrests for violent crimes, which is more than three times the rate for European American juveniles, and about 28% of all juvenile arrests for property crimes, which is two times the rate for European American juveniles (U.S. Department of Justice 2003). African American youth raised in single parent homes (56%) are at an even greater risk for conduct problems, due at least in part, to the compromises in parenting and economic hardship often associated with single motherhood (e.g., McLoyd 1990; Murry et al. 2001; U.S. Census 2005). Accordingly, identifying correlates of conduct problems among this high risk group is critical for the development of successful prevention and intervention programs (e.g., Elliott 1994; Elliott and Ageton 1980; U.S. Department of Justice 2003).

One well-established correlate of conduct problems among youth generally, including African American youth, is the constellation of hyperactivity, impulsivity, and inattention (HIA) (Angold et al. 1999; Caron and Rutter 1991; Loeber and Keenan 1994). HIA, the core dimensional components of attention-deficit/hyperactivity disorder (ADHD), is manifested in the inability of a child to control

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and/or anticipate the consequences of his or her behavior (Moffitt 1993). HIA is considered a risk factor for a range of adjustment difficulties (e.g., Waschbusch 2002), including earlier onset and more severe conduct-disordered behaviors (e.g., Loeber et al. 1997; Moffitt & Caspi 2001; Silverthorn et al. 2001). Although a risk factor, the co-occurrence of HIA and conduct-disordered behaviors is found in only 30–50% of cases of youth exhibiting either of these behavioral difficulties (Anderson et al. 1987; Biederman et al. 1991; Cohen et al. 1993), suggesting that other variables likely moderate a child's risk for conduct problems in the presence of HIA difficulties (Rutter et al. 1998). One moderator of particular relevance for African American youth from single mother homes may be neighborhood context.

African American families are significantly more likely than European American families to reside in communities characterized by socioeconomic (SES) disadvantage, including high levels of unemployment, residential instability, lower levels of education, social isolation, and crime and violence (Duncan et al. 1994; Pinderhughes et al. 2001; Sampson, Raudenbush, and Earls 1997). As a consequence of the aforementioned neighborhood risks, and associated dearth of neighborhood resources (e.g., libraries, parks, etc.), African American neighborhoods are overrepresented in communities characterized as “low SES” in the bulk of neighborhood research. Indeed, findings suggest that youth in low SES communities (i.e., African American youth) fare worse on a range of outcomes, including conduct problems (e.g., Aneshensel and Sucoff 1996; Leventhal and Brooks-Gunn 2000). Although fewer studies have examined variability within and between the neighborhoods in which African American youth reside, findings to date reveal that variability within even the lowest SES communities is associated with youth adjustment (e.g., Forehand et al. 2000; Leventhal & Brooks-Gunn 2000), and neighborhood context may moderate the impact of individual risk factors on the adjustment of African American youth (e.g., Brody et al. 2003; Ge et al. 2002; Zalot et al. 2007).

Three studies to date have examined neighborhood context as a moderator of the link between HIA, or its components, and conduct problems. In their work with African American and European American boys, Lynam et al. (2000) found that the link between impulsivity and conduct problems was strongest among boys residing in neighborhoods characterized by the greatest risk (defined both by participant rating and census data). Zalot et al. (2007) study of African American girls and boys also found that more disadvantaged neighborhoods (i.e., those communities characterized by greater risks and fewer resources) exacerbated the association between HIA and conduct problems, but only for girls. Taken together, the findings of the two studies are consistent with a bioecological model of human development (e.g., Bronfenbrenner and Ceci 1994; Bronfenbrenner and Morris 1998), which suggests that

the degree to which heritability and individual differences in child development are manifested depends in part on the characteristics of the environmental context(s). With regard to maladaptive outcomes, the bioecological model posits that impoverished contexts (i.e., disadvantaged neighborhoods), together with individual risk factors (i.e., HIA), represent an accumulation of risk, increasing the likelihood of maladaptive outcomes (i.e., conduct problems).

In contrast to a bioecological model, a social psychophysiological framework (Raine 1988), suggests that advantaged, rather than disadvantaged, neighborhoods may allow for heightened influence of HIA (Rowe et al. 1999). Specifically, social psychophysiological theory suggests that environments with greater resources readily allow for the heightened influence of individual differences because contextual pressures do not dictate behaviors as strongly as they do in environments with elevated risks. According to this perspective, advantaged neighborhoods can be considered “weak” situations that do not strongly influence youth toward specific outcomes and allow for more variability due to individual differences (Lynam et al. 2000; Mischel 1977; Raine 1988). Therefore, a greater propensity for conduct problems may be necessary for its emergence in advantaged neighborhoods because the social propulsion toward such an outcome is minimized (Raine 1988). In contrast, disadvantaged neighborhoods are considered “strong” environments that exert powerful social pressure and constraints on an individual's development (Lynam et al. 2000; Mischel 1977; Raine 1988). In turn, better neighborhoods may allow for more variability due to individual differences such as HIA, whereas individual differences may make little contribution to youth outcomes in worse neighborhoods (Lynam et al. 2000; Mischel 1977; Raine 1988; Rowe et al. 1999.). Consistent with the social psychophysiological perspective, Beyers et al. (2001) found that the link between HIA and aggression was more robust among African American and European American boys residing in less, rather than more, disadvantaged (as rated by participants) communities. They did not include girls.

Consistent with the concept of equifinality (i.e., different pathways may lead to a similar developmental outcome), both the aforementioned theories and research conducted to date suggest that both better and worse neighborhoods can contribute to the expression of conduct problems in youth with HIA problems, but for different reasons. Thus, both theoretical perspectives point to the moderating role of neighborhood context but emphasize opposing ends of the neighborhood continuum. Whereas living in disadvantaged neighborhoods may heighten the risk for conduct problem among youth with HIA due to an accumulation of risk, living in advantaged neighborhoods may heighten the risk of conduct problems by creating an environment ideal for the expression of individual differences, including HIA. Caution

in such an interpretation is also warranted, however, given the methodological inconsistencies across the three prior studies. As noted, neither Beyers et al. (2001) nor Lynam et al. (2000) included girls in their sample, precluding further investigation of important gender differences that were noted by Zalot et al. (2007). Furthermore, both Beyers et al. (2001) and Zalot et al. (2007) used only a subjective index of neighborhood context (e.g., maternal ratings of presence or absence of range of neighborhood resources, such as library, etc.), precluding comparisons between different forms of neighborhood assessment. Although Lynam et al. included both subjective and objective indicators of neighborhood context in their investigation, they did so with different subsets of their sample and included only males.

Importantly, prior research suggests that the objective components (i.e., demographic and economic correlates that comprise SES) and subjective characteristics of neighborhood context are associated (Brody et al. 2001; Ceballo et al. 2004; Herrenkohl et al. 2002; O'Neil et al. 2001). The magnitude of the correlation, usually ranging between $r=0.27$ and $r=0.62$ (e.g., Martinez et al. 2002; Simons et al. 2004), however, suggests that each type of measurement may be assessing different, yet overlapping, constructs, which may, in turn, relate differently to conduct problems. Notably, objectively-defined risks within a community do not necessarily co-occur with experiential risks (Wilson 1996), and some neighborhoods may appear more or less disadvantaged depending on the method of assessment utilized, with the two types of measurement having different implications for different types of youth (e.g., boys versus girls; Kroneman et al. 2004; Seidman et al. 1998). More comprehensive assessments (i.e., multi-method) of neighborhood context are, therefore, necessary in order to more fully understand the various ways in which neighborhoods may potentially exacerbate and/or ameliorate individual risk factors for children (e.g., Leventhal and Brooks-Gunn 2000; Lynam et al. 2000). The current study aimed to examine both objective and subjective markers of neighborhood context as moderators of the association between HIA and conduct problems among African American youth.

Building upon the strengths of prior work conducted by Lynam et al., Zalot et al., and Beyers et al., the current study replicated and extended the extant literature by examining *both* objective and subjective indices of neighborhood context as a moderator of the association between HIA and conduct problems among African American boys *and* girls during adolescence, a developmental period when youth are at heightened risk for both aggression and rule-breaking behaviors (e.g., Lahey et al. 2000; Offord et al. 1987; Stanger et al. 1997). Consistent with prior work, it was predicted that higher levels of HIA and a more disadvantaged neighborhood context would each be associated with greater conduct problems among youth in the

sample. In addition, it was hypothesized that neighborhood context would moderate the link between HIA and conduct problems; however, the specific nature of the moderating role was considered exploratory given the two previously mentioned theories. Building upon the bioecological model (e.g., Bronfenbrenner & Ceci 1994; Bronfenbrenner and Morris 1998), more disadvantaged neighborhoods may exacerbate the link between HIA and conduct problems due to an accumulation of risk (i.e., youth with higher HIA are more likely to evidence aggression and rule-breaking in more, rather than less, disadvantaged neighborhoods) (Lynam et al. 2000; Zalot et al. 2007). Alternatively, the social psychophysiological theory suggests that youth with higher levels of HIA in the context of more, rather than less, advantaged neighborhoods may be more likely to evidence aggression and rule-breaking due to the potential for heightened expression of individual differences in a more stable context (Beyers et al. 2001; Raine 1988).

Finally, it was expected that there would be a three-way interaction of HIA X neighborhood context X child gender. Although girls have been relatively excluded from most research on neighborhoods and conduct problems until recently (Ingoldsby and Shaw 2002), growing epidemiological, theoretical, and empirical evidence suggests that aggression and rule-breaking are an increasing problem in this group (Silverthorn and Frick 1999; U.S. Department of Justice 2003) and that neighborhoods likely play a role (see Kroneman et al. 2004 for a review). While some evidence suggests that neighborhood context, typically measured by census data, may be a more robust correlate of boys' behaviors than girls' (Kroneman et al. 2004; Leventhal & Brooks-Gunn, 2000; Silverthorn et al., 2001), other findings suggest that the influence on girls may depend on the way neighborhood context is measured (Ceballo et al. 2004; see Kroneman et al. 2004 for a review; Zalot et al. 2007). Moreover, preliminary evidence seems to suggest that boys and girls may be differently affected by their communities (Greenberg et al. 1999; Simons et al. 1996), depending on the particular neighborhood factors and youth outcomes under consideration (Ceballo et al. 2004; see Kroneman et al. 2004 for a review; Zalot et al. 2007). Most notably, girls may be more influenced by neighborhood characteristics that tend to impact parenting practices (e.g., social support; see Kroneman et al. 2004 for a review), which is more likely to be captured by subjective measures of neighborhood context, but less likely to be assessed using objective indicators (e.g., census data). Building upon these findings, it was expected that census data (i.e., objective) would be a stronger moderator of the relation between HIA and conduct problems for boys, while maternal reports of neighborhood context (i.e., subjective) would be a stronger moderator of the link between HIA and conduct problems for girls.

Method

Overview

The current analyses were conducted using data from the African American Families and Children Together (AAFACT) Project, which aims to examine the role of extended family members in the health and well-being of African American youth from single mother homes. African American single mother-headed families with an 11- to 16-year-old adolescent were recruited from counties across central North Carolina. Recruitment was conducted through community agencies (e.g., health departments, YMCAs, churches), public events (e.g., health fairs), local advertisements (e.g., university-wide informational emails, bus displays, brochures), and word-of-mouth (e.g., participants telling other families about the project). Two hundred and forty-one African American single mother families meeting eligibility criteria contacted project investigators to learn more about participation. Of these, 80% ($n=193$) scheduled and completed all study procedures.

Participants

The 193 African American mother-child dyads who participated in the AAFACT investigation are the focus of the current study. Demographic information for these families is presented in Table 1. Adolescents were 13 years old on average ($SD=1.59$; range=11–16 years), with gender fairly evenly split (55% girls). On average, mothers were 38 years old ($SD=6.67$; range=26–64 years), and

most (86%) had completed at least some college or vocational education. The majority (82.4%) of mothers were employed, and annual household incomes averaged \$29,734 ($SD=\$17,456$).

Procedure

Assessments were conducted either at a conveniently-located community site or in the family's place of residence, depending on the needs of each family. Childcare was provided on an as-needed basis. During each interview, informed consent was obtained from the mother for her and the adolescent's participation, and the adolescent gave assent for participation. In order to maximize confidentiality and reduce the potential for biased responses, data from each family member was collected separately on laptop computers using Audio Computer-Assisted Self-Interviewing (ACASI) software, and participants' answers were linked to an assigned number rather than to any form of identity. The mother and adolescent self-report questionnaires assessed a variety of psychosocial variables, including the independent, dependent, and moderator variables for the current study. The interviews took approximately 60–90 min for mother-child dyads to complete, and they were compensated \$25 for their participation.

Measures

In order to decrease common-method variance, this study utilized different reporters for each construct: a) mother-report of HIA, b) adolescent-report of aggression and rule-

Table 1 Demographic Characteristics of Study Participants ($N=193$) and their Correlations with Outcome Variables

Variable	%	M (SD)	Correlations	
			YSR Aggression	YSR Rule-Breaking
Adolescent Age (years)		13.39 (1.59)	0.05	0.026**
Adolescent Gender ¹			-0.03	-0.010
Female	54.9			
Male	45.1			
Mother Age (years)		38.05 (6.67)	-0.12	0.001
Annual Household Income		29733.96 (17456.49)	0.05	0.020**
Mother Marital Status				
Never Married	50.8			
Formerly Married	49.2			
Mother Education Level			-0.05	-0.005
< HS Diploma	5.7			
HS Diploma or GED	8.3			
Some College	51.3			
College Degree	20.2			
Some Grad/Professional	6.2			
Grad/Professional Degree	8.3			
Mother Employment Status				
Employed Full Time	71.5			
Employed Part Time	10.9			
Unemployed	17.0			

¹ Male=1, Female=2

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

breaking, and c) mother-report of neighborhood qualities or census-report of neighborhood SES.

Demographic Information Mothers completed a demographic measure, which provided information about themselves (e.g., maternal age, education), their children (e.g., child age), and their families (e.g., physical address, family income).

Adolescent Hyperactivity, Impulsivity, and Attention (HIA) Problems Mother- and adolescent-reported HIA, the independent variable in the current study, were assessed by the 12-item Attention Deficit/Hyperactivity Disorder (ADHD) Index of the Conners' Ratings Scales—Revised (CRS-R; Conners 2001). The CRS-R is often used as a screener for ADHD in clinical settings but also affords the opportunity to examine variability on a continuum of symptoms, which is critical in community samples (Waschbusch 2002; Wikstrom and Loeber 2000). In addition, a ratings index of HIA has proven superior to behavioral performance measures in discriminating HIA from other problems (Barkley 1991; Waschbusch, 2002). The normative sample for the CRS-R included African American parents and children (4.3%; Conners, 2001), and extensive research has demonstrated adequate psychometric properties (Conners, 2001). Responses are rated on a four-point Likert-type scale (0 = *Not True at All* to 3 = *Very Much True*), with higher scores indicating greater levels of HIA problems. For the current sample, the coefficient alpha was 0.94 for the mother-report version and 0.71 for the adolescent-report.

Neighborhood Context In order to assess subjective perceptions of neighborhood quality, maternal responses, rather than adolescent responses, to the Perceived Neighborhood Scale (PNS; Martinez, 2000) were used, as youth may be less knowledgeable than their mothers about the presence or absence of risks and resources in their community (Simons et al., 2004). The PNS is a 34-item theoretically-derived self-report measure that assesses four dimensions of neighborhoods: 1) social embeddedness, which includes the social support bonds that families develop within their communities and the frequency with which families interact with neighbors; 2) sense of community, which includes feelings of belongingness, trust, and socioemotional ties with other community members; 3) satisfaction with neighborhood, which includes the quality of a community with respect to the availability of resources to families; and 4) perceived crime, which includes the risk and actual occurrence of criminal activities in the neighborhood. Responses were scored on a five-point Likert-type scale, and item responses were recoded so that higher scores indicated a more positive neighborhood context. Prior research with African American mothers has docu-

mented the applicability of the measure, evidence for the scale's concurrent and convergent validity, and very good reliability estimates (Martinez 2000; Martinez et al. 2002). The alpha for the PNS Full Scale in the current study is .90. Of note, the PNS Full Scale was used because it had higher reliability than the subscales and because the study hypotheses did not address individual dimensions of neighborhood.

An objective indicator of neighborhood SES was obtained by utilizing information from census tract data. Each participating family provided a residential address, which was then geocoded for its census tract using *Maptitude* geocoding software (Caliper Corporation 2006). As per prior research using census tract data (e.g., Brody et al. 2001; Caughy et al. 2006; Simons et al. 2004), a Neighborhood SES index was then established within each census tract by first standardizing and then averaging five variables: 1) average family per capita income, 2) proportion of female-headed families, 3) proportion of residents receiving public assistance, 4) proportion of households below the poverty line, and 5) proportion of unemployed residents. Higher scores mean greater socioeconomic disadvantage. The coefficient alpha for the current sample was 0.93.

Adolescent Conduct Problems Adolescent conduct problems, the proposed dependent variable in this study, were assessed using the Aggression (18 items) and Rule-Breaking (17 items) subscales of the Youth Self-Report (YSR) form of the Child Behavior Checklist (CBCL; Achenbach 1991). Adolescent-report, as opposed to maternal report, was used both to reduce common-method variance and because mothers are less aware of adolescent conduct problems. Items are rated on a 3-point scale: 0 (not true), 1 (sometimes or somewhat true), and 2 (very or often true). These subscales, selected because they assess the types of aggression and conduct problems typically displayed by children in the age range included in this study, have acceptable reliability and validity data (Achenbach 1991). Prior research has demonstrated that the YSR is a reliable instrument for African American samples in the current age range (e.g., Forehand et al. 2002; Jones et al. 2002; Zalot et al. 2007). Higher scores indicate more aggression and rule-breaking (Achenbach 1991). For the current sample, the alphas were 0.77 and 0.80 for the Rule-Breaking and Aggression subscales, respectively.

Results

Preliminary Analyses

Bivariate correlations between sociodemographic variables and outcome measures are presented in Table 1. Adolescent age ($r=0.26$, $p<0.01$) and mother's income ($r=0.20$, $p<$

0.01) were each associated with rule-breaking, such that older youth as well as youth from higher-income families engaged in more rule-breaking behaviors. Therefore, both were statistically controlled in analyses examining rule-breaking as the outcome of interest. No other demographic variables were associated with rule-breaking, and none of the demographics were associated with aggression.

All major study measures were normally distributed and conformed to acceptable standards of skew and kurtosis. Means and standard deviations and correlations among major study variables are presented in Table 2. Consistent with the proposed hypotheses, mother-report of adolescent's HIA correlated significantly with adolescent-report of aggression ($r=0.22$, $p<0.01$) and rule-breaking ($r=0.17$, $p<0.05$). Mothers who reported higher levels of HIA had children who reported more aggression and rule-breaking behavior. In addition, mother-report of subjective neighborhood qualities correlated significantly with adolescent-reported aggression ($r=-0.18$, $p<0.05$) as predicted, but not with rule-breaking ($r=-0.13$, *ns*). Mothers who perceived more positive neighborhood qualities had children who reported less aggression. Contrary to the hypotheses, the census-defined Neighborhood SES index was not correlated significantly with aggression ($r=0.11$, *ns*) or rule-breaking ($r=0.04$, *ns*).

Primary Analyses

Although the subjective and objective indices were not perfectly correlated ($r=-0.39$), the covariance in the two measures, as well as limitations in statistical power to detect multiple 2- and 3-way interactions, preclude entering both indices in the same model. Therefore, hierarchical regression analyses were conducted first for subjective neighborhood index, then for objective neighborhood index.¹ Consistent with the proposed theoretical model, variables were entered in the following order: 1. Sociodemographic variables (e.g., gender, age) associated with the outcome variable were entered in the first block. 2. In order to

¹ Given that participants living within the same census tract may have been influenced by a common neighborhood environment, nesting among observations was examined to determine if hierarchical linear modeling (HLM) was necessary (Raudenbush and Bryk 2002). The following results supported the use of regression rather than HLM: a. the study sample resided within a total of 99 census tracts, 50 of the tracts contained only one participating family, and the maximum number of families residing within a single tract was seven; b. the ICCs for YSR conduct problems indicated that less than 1% (0.59%) of the variance in conduct problems was due to between-tract differences, and the remaining variance (99.41%) was due to differences among participants within tracts (i.e., sample not nested); c. comparisons of HLM, SUDAN, and OLS resulted in virtually identical parameter estimates and standard errors; d. only the simplest of models was estimable when using an HLM framework (i.e., gender as the only predictor), which typically degenerated to an OLS regression model due to the lack of a nested structure.

investigate main effects, HIA and neighborhood context were entered in the second block. 3. Although we were only interested in a subset of the two-way interactions, it was statistically necessary to include all possible two-way interaction terms between gender, HIA, and neighborhood context in the third block given our interest in the 3-way interaction (Aiken and West 1991). The two-way interaction term, HIA X neighborhood, was used to determine whether neighborhood context moderated the relation between HIA difficulties and conduct problems. 4. The three-way interaction (HIA X neighborhood X gender) was entered in the fourth block to determine whether the relation among HIA difficulties, neighborhood, and conduct problems changed as a function of adolescent gender. All continuous variables were centered in order to reduce multicollinearity prior to conducting the hierarchical regression analyses (Baron and Kenny 1986). Findings of the regression analyses are reported in Table 3 and were repeated for aggression and rule-breaking as the outcomes of interest.²

Subjective Neighborhood Context When examining the YSR Aggression subscale, adolescent gender was not significantly associated with aggressive behaviors, $\beta=-0.03$, *ns*, in the first block. In the second block, there was a significant main effect for mother-reported HIA, $\beta=0.21$, $p<0.01$, but not the subjective neighborhood index, $\beta=-0.11$, *ns*. The presence of more mother-reported HIA difficulties was associated with higher levels of adolescent-reported aggressive behavior. Contrary to the hypothesis, the interaction of mother-reported HIA and the subjective neighborhood index was not associated with adolescent-reported aggression, $\beta=0.07$, *ns*, in the third block. Moreover, neither HIA difficulties, $\beta=0.09$, *ns*, nor the subjective neighborhood index, $\beta=0.05$, *ns*, interacted with adolescent gender. Finally, in the fourth block, the interaction of HIA difficulties, subjective neighborhood quality, and adolescent gender was significantly associated with aggression, $\beta=0.24$, $p<0.05$, indicating that the slopes of the regression lines differed from each other.³

When examining the YSR Rule-breaking subscale, adolescent gender was not significantly associated with rule-breaking behaviors, $\beta=-0.11$, *ns*, in the first block. Both adolescent age, $\beta=0.24$, $p<0.01$, and mother's income, $\beta=0.18$, $p<0.01$, were significantly associated with rule-breaking behavior,

² This pattern of findings remained when adding age as a potential moderator and including all additional two-, three-, and four-way interactions (all *ns*) in their respective blocks.

³ Exploratory analyses revealed that this 3-way interaction was also obtained for two subscales of the PNS, Neighborhood Satisfaction, $\beta=0.27$, $p<0.01$, and, Perceived Crime, $\beta=0.20$, $p<0.05$. Moreover, this 3-way interaction was maintained for both Neighborhood Satisfaction, $\beta=0.27$, $p<0.001$, and Perceived Crime, $\beta=0.20$, $p<0.05$, when examining the YSR full scale as well. Explication revealed the same pattern as Figs. 1 and 2.

Table 2 Means, Standard Deviations, and Correlations Among Primary Study Variables

Variable	Mean	SD	1	2	3	4	5
1. HIA Scale	9.76	7.32	–				
2. Perceived Neighborhood Scale (PNS)	121.57	20.15	–0.30**	–			
3. Neighborhood SES Scale	0.00	0.88	0.07	–0.39**	–		
4. YSR Aggression Scale	6.78	4.65	0.22**	–0.18*	0.11	–	
5. YSR Rule-Breaking Scale	4.05	3.44	0.17*	–0.13	0.04	0.65**	–

* $p < .05$; ** $p < .01$, The PNS and SES scales do *not* significantly differ depending on adolescent gender.

which is consistent with correlation analyses. Thus, older youth reported higher levels of rule-breaking behavior, as did youth from families with higher incomes. In the second block, there was a significant main effect for mother-reported HIA, $\beta = 0.18$, $p < 0.01$, and for the subjective neighborhood index, $\beta = -0.17$, $p < 0.05$. The presence of more mother-reported HIA difficulties was associated with higher levels of adolescent-reported rule-breaking behavior. In addition, worse neighborhoods, as perceived by mothers, were also associated with higher rule-breaking behaviors. Contrary to the proposed hypothesis, the interaction of mother-reported HIA and the subjective neighborhood index was not associated with adolescent-reported rule-breaking behavior, $\beta = 0.06$, *ns*, in the third block. Moreover, neither HIA difficulties, $\beta = 0.10$, *ns*, nor the subjective neighborhood index, $\beta = -0.06$, *ns*, interacted with adolescent gender. Finally, in the fourth block, the interaction of HIA difficulties, subjective neighborhood quality, and adolescent gender was not significantly associated with rule-breaking behavior, $\beta = 0.11$, *ns*.

The significant three-way interaction of HIA X subjective neighborhood index X gender for YSR Aggression was explicated according to the recommendations of Aiken and West (1991) and using Preacher’s (Preacher et al. 2006) web-based program for probing significant interactions. As demonstrated in Fig. 1, the non-significant slopes of the regression lines for better and worse neighborhoods suggest that there was a similar relation between HIA and aggression for boys regardless of subjective neighborhood quality. In contrast, neighborhood context moderated the association between HIA and aggression for girls (see Fig. 2). Girls with higher levels of HIA difficulties were more likely to evidence aggression, but only in neighborhoods where mothers reported more positive qualities for their neighborhoods.^{4,5}

⁴ Exploratory analyses revealed that this 3-way interaction was also obtained for two subscales of the PNS, Neighborhood Satisfaction, $\beta = 0.27$, $p < 0.01$, and, Perceived Crime, $\beta = 0.20$, $p < 0.05$. Moreover, this 3-way interaction was maintained for both Neighborhood Satisfaction, $\beta = 0.27$, $p < 0.01$, and Perceived Crime, $\beta = 0.20$, $p < 0.05$, when examining the YSR full scale as well. Explication revealed the same pattern as Figs. 1 and 2.

⁵ Exploratory analyses examining subscales of the PNS, the YSR Rule-Breaking Subscale, or the YSR Full Scale yielded no significant interactions.

Objective Neighborhood Context Variables were entered in the same order reported for subjective neighborhood context.⁶ Adolescent gender was not significantly associated with YSR Aggression, $\beta = -0.03$, *ns*, in the first block. In the second block, there was a significant main effect for mother-reported HIA, $\beta = 0.22$, $p < 0.01$, but not for neighborhood SES, $\beta = 0.10$, *ns*. Again, the presence of more HIA difficulties was associated with higher scores on the YSR Aggression Subscale. Contrary to the proposed hypothesis, mother-reported HIA and neighborhood SES did not interact to predict YSR Aggression, $\beta = 0.06$, *ns*, in the third block. Moreover, neither HIA difficulties, $\beta = 0.07$, *ns*, nor neighborhood SES, $\beta = -0.18$, *ns*, interacted with adolescent gender. Finally, in the fourth block, the interaction of HIA difficulties, neighborhood SES, and adolescent gender was not significantly associated with YSR Aggression, $\beta = -0.05$, *ns*.

Adolescent gender was also not significantly associated with YSR Rule-breaking behaviors, $\beta = -0.12$, *ns*, in the first block. Both adolescent age, $\beta = 0.25$, $p < 0.01$, and mother’s income, $\beta = 0.17$, $p < 0.05$, were significantly associated with rule-breaking behavior, which is consistent with correlation analyses. Older youth reported higher levels of rule-breaking behavior, as did youth from higher-income families. In the second block, there was a significant main effect for mother-reported HIA, $\beta = 0.21$, $p < 0.01$, but not for neighborhood SES, $\beta = 0.09$, *ns*. Again, the presence of more HIA difficulties was associated with higher scores on the YSR Rule-Breaking Subscale. Contrary to the hypothesis, mother-reported HIA and neighborhood SES did not interact to predict YSR Rule-breaking, $\beta = 0.11$, *ns*, in the third block. Moreover, neither HIA difficulties, $\beta = 0.13$, *ns*, nor neighborhood SES, $\beta = -0.06$, *ns*, interacted with gender. Finally, in the fourth block, the interaction of HIA difficulties, neighborhood SES, and gender was not significantly associated with YSR Rule-breaking, $\beta = 0.07$, *ns*.

Exploratory Analyses Given the stringency of the models utilizing the neighborhood SES index (i.e., different

⁶ This pattern of findings remained when adding age as a potential moderator and including all additional two-, three-, and four-way interactions (all *ns*) in their respective blocks.

Table 3 Hierarchical Regression Analyses Predicting Adolescent Conduct Problems

Variable	<i>F</i>	<i>R</i> ² Δ	<i>B</i>	<i>SE B</i>	β	<i>t</i>
Proposed Analyses						
Dependent Variable: YSR Aggression						
Block 1: Demographic Variables	0.12					
Adolescent Gender			−0.23	0.67	−0.03	−0.35
Block 2: Main Effects	4.61**	0.07				
HIA Problems			0.13	0.05	0.21	2.75**
Subjective Neighborhood			−0.03	0.02	−0.11	−1.55
Block 3: Two-Way Interactions	2.53*	0.01				
HIA Problems X Subjective Neighborhood			0.00	0.00	0.07	0.91
HIA Problems X Gender			0.09	0.10	0.09	0.92
Subjective Neighborhood X Gender			0.02	0.04	0.05	0.46
Block 4: Three-Way Interaction	2.86**	0.02				
HIA Problems X Subjective Neighborhood X Gender			0.01	0.01	0.24	2.14*
Dependent Variable: YSR Rule-Breaking						
Block 1: Demographic Variables	7.59**					
Adolescent Gender			−0.76	0.47	−0.11	−1.61
Adolescent Age			0.51	0.15	0.24	3.43**
Mother's Income			0.00	0.00	0.18	2.57**
Block 2: Main Effects	8.14**	0.7				
HIA Problems			0.9	0.3	0.18	2.53**
Subjective Neighborhood			−0.03	0.1	−0.17	−2.39*
Block 3: Two-Way Interactions	5.41**	0.01				
HIA Problems X Subjective Neighborhood			0.00	0.00	0.06	0.82
HIA Problems X Gender			0.07	0.07	0.10	1.06
Subjective Neighborhood X Gender			−0.01	0.03	−0.06	−0.51
Block 4: Three-Way Interaction	4.92**	0.00				
HIA Problems X Subjective Neighborhood X Gender			0.00	0.00	0.11	0.97
Dependent Variable: YSR Aggression Subscale						
Block 1: Demographic Variables	0.19					
Adolescent Gender			−0.30	0.67	−0.03	−0.44
Block 2: Main Effects	3.94**	0.06				
HIA Problems			0.14	0.05	0.22	3.03**
Neighborhood SES			0.51	0.37	0.10	1.36
Block 3: Two-Way Interactions	2.83**	0.03				
HIA Problems X Neighborhood SES			0.05	0.06	0.06	0.86
HIA Problems X Gender			0.07	0.09	0.07	0.76
Neighborhood SES X Gender			−1.41	0.75	−0.81	−1.87
Block 4: Three-Way Interaction	2.45**	0.00				
HIA Problems X Neighborhood SES X Gender			−0.06	0.12	−0.05	−0.50
Dependent Variable: YSR Rule-Breaking						
Block 1: Demographic Variables	7.65**					
Adolescent Gender			−0.80	0.47	−0.12	−1.69
Adolescent Age			0.53	0.15	0.25	3.52**
Mother's Income			0.00	0.00	0.17	2.46*
Block 2: Main Effects	6.92**	0.05				
HIA Problems			0.10	0.03	0.21	2.99**
Neighborhood SES			0.36	0.28	0.09	1.31
Block 3: Two-Way Interactions	5.01**	0.02				
HIA Problems X Neighborhood SES			0.07	0.05	0.11	1.59
HIA Problems X Gender			0.09	0.07	0.13	1.37
Neighborhood SES X Gender			−0.38	0.56	−0.06	−0.68
Block 4: Three-Way Interaction	4.5**	0.00				
HIA Problems X Neighborhood SES X Gender			0.07	0.09	0.07	0.76

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

Boys: HIA (mother-report) X PNS Full Scale X Gender

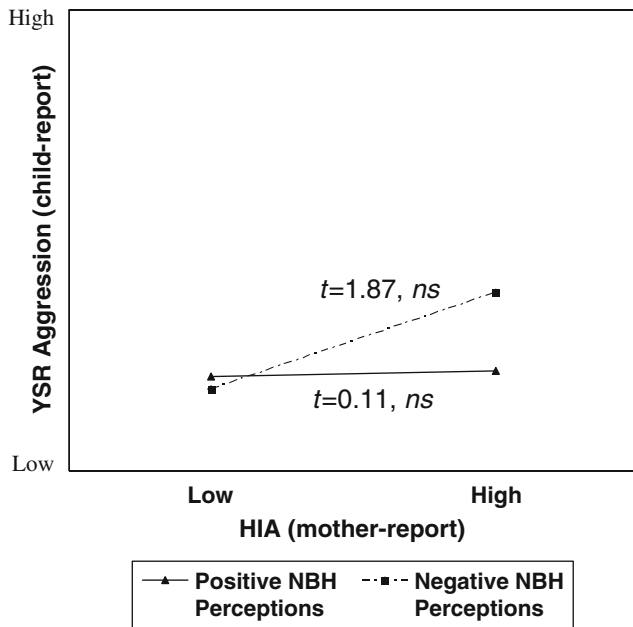


Fig. 1 Boys: 3-way interaction for mother-reported HIA X PNS Full Scale X Gender, predicting aggression

reporters/methods for each variable in the model), exploratory analyses were conducted to examine adolescent-report of HIA (rather than mother-report), neighborhood SES, and adolescent-report of aggression and rule-breaking

Girls: HIA (mother-report) X PNS Full Scale X Gender

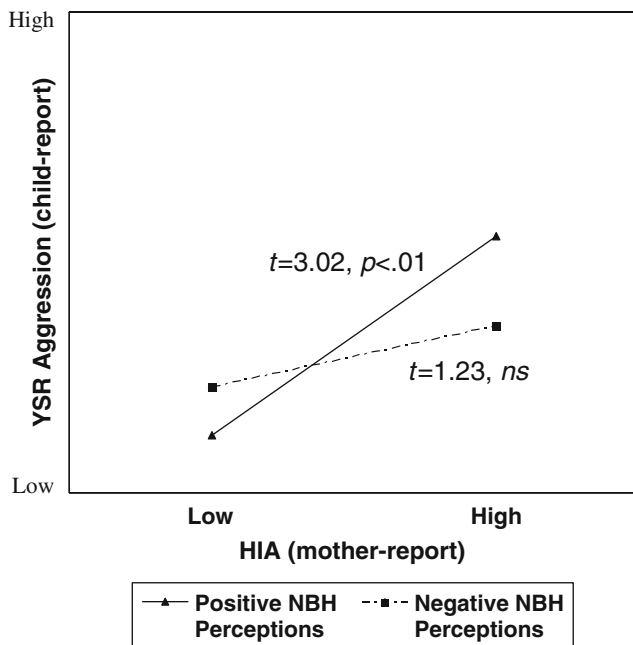


Fig. 2 Girls: 3-way interaction for mother-reported HIA X PNS Full Scale X Gender, predicting aggression

behavior. It is important to note, however, that the adolescent-report of the CRS-R is considered to have less sensitivity and specificity than the maternal version (Collett et al. 2003), is only moderately correlated with the mother-report, $r=0.17, p<0.05$, in this sample, and has a less robust coefficient alpha, $\alpha=0.71$, when compared to the maternal version, $\alpha=0.94$, in the current study. With regard to major study variables, HIA difficulties, $\beta=0.59, p<0.001$, but not neighborhood SES, $\beta=0.06, ns$, were significantly associated with the YSR Aggression scale. Higher levels of HIA difficulties were associated with more aggression. In the third block, HIA difficulties and neighborhood SES interacted significantly to predict YSR Aggression, $\beta=0.16, p<0.05$, indicating that the slopes of the regression lines differ from each other. Additionally, HIA difficulties interacted with gender, $\beta=0.21, p<0.05$, but neighborhood SES X gender was not significant, $\beta=-0.03, ns$. Finally, in the fourth block, HIA difficulties, neighborhood SES, and gender did not interact to predict YSR Aggression, $\beta=-0.04, ns$.

The two-way interactions (HIA x neighborhood and HIA x gender) were explicated utilizing Preacher’s (Preacher et al. 2006; Preacher and Leonardelli 2007) web-based program. As depicted in Fig. 3, adolescents with higher levels of HIA difficulties were more likely to evidence aggression, but the relation was more pronounced in socioeconomically disadvantaged neighborhoods. Moreover, the association is more pronounced in girls than it is

HIA (child-report) X SES Index

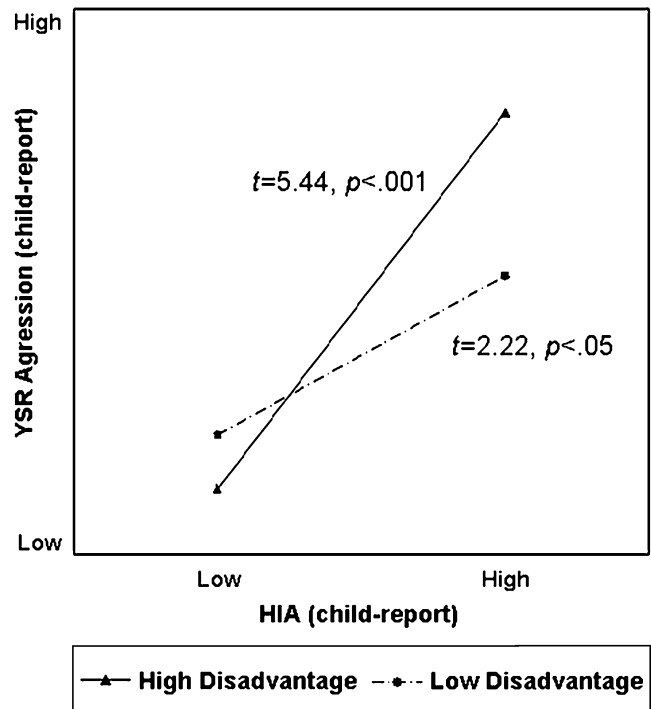


Fig. 3 SES Index: 2-way interaction for adolescent-reported HIA X Neighborhood SES, predicting aggression

in boys (see Fig. 4). The significant two-way interaction was not replicated for the Rule-Breaking Subscale.

Discussion

The primary purpose of the current study was to replicate and extend prior research by examining neighborhood context and adolescent gender as moderators of the association between HIA and conduct problems among African American youth from single mother homes. Results provided partial support for hypotheses. Findings revealed that both subjective (mother-report) and objective (census-tract) indices of neighborhood context moderated the relation between HIA and conduct problems, but the pattern of moderation differed depending on the index and combination of reporters.

Although not a specific focus of the study, it should be noted that adolescent age was consistently associated with conduct problems across analyses. Consistent with prior studies (e.g., Seidman et al. 1998), older youth engaged in significantly higher levels of aggression and rule-breaking behaviors than younger youth. However, adolescent age did not qualify the interactions of HIA X neighborhood or HIA X neighborhood X gender; therefore, the results were not reported.⁷

Consistent with prior work (e.g., Hawkins et al. 1998; Silverthorn et al. 2001; Waschbusch 2002), youth with higher levels of mother-reported HIA problems reported engaging in significantly more conduct problems than youth with lower levels of HIA. The main effect of mother-reported HIA was qualified by the obtained interactions, however, which are discussed in more detail below. Because youth who exhibit this combination of self-regulatory difficulties and conduct problems are at the greatest risk for maintaining antisocial lifestyles (Lynam 1996), research such as the current study contributes to understanding the unique conditions under which the relation between HIA and conduct problems may be exacerbated or ameliorated.

Contrary to our hypothesis, the two-way interaction between mother-reported HIA difficulties and subjective neighborhood context was not associated with conduct problems; however, a significant three-way interaction emerged among mother-reported HIA X Subjective Neighborhood Context X Gender for the YSR Aggression subscale. Importantly, the relation between girls', but not boys', level of mother-reported HIA, and conduct problems was moderated by subjective neighborhood context. That

⁷ This pattern of findings remained when adding age as a potential moderator and including all additional two-, three-, and four-way interactions (all *ns*) in their respective blocks.

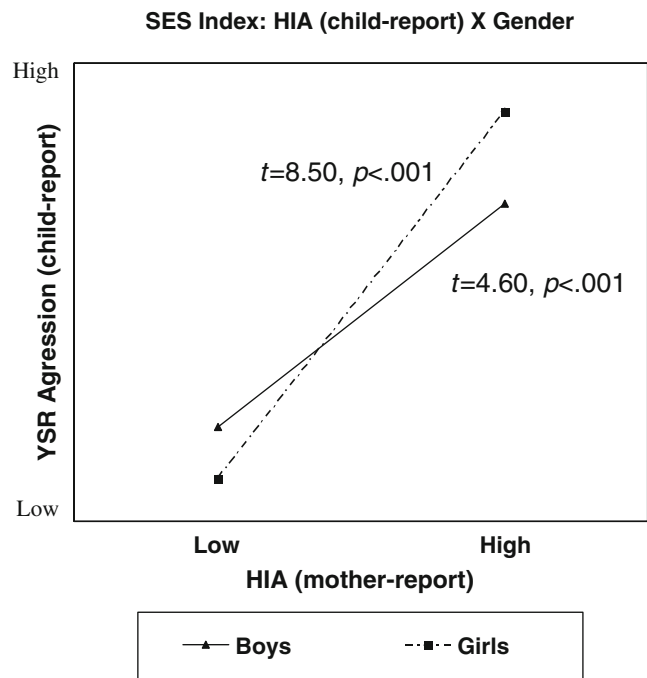


Fig. 4 SES Index: 2-way interaction for adolescent-reported HIA X Gender, predicting aggression

is, there was a similar association between mother-reported HIA and aggression and rule-breaking for boys, regardless of subjective neighborhood quality. Taking into account the literature suggesting that neighborhood context is an important correlate of boys' behaviors (e.g., Kroneman et al. 2004; Silverthorn et al. 2001), the current findings suggest that other variables may be more important moderators of the link between boys' HIA and conduct problems, at least for African American adolescent boys from single mother homes. For example, boys are more likely to affiliate with deviant peers than are girls, and the opportunity to affiliate with deviant peers is greater in low-income neighborhoods (e.g., Brody et al. 2001). Although beyond the scope of this study, it will be important for future research with similar samples to examine the moderating role of neighborhood context using measures that do include examination of deviant peer affiliations as a potential moderator (Beyers et al. 2003). Although this study examined a more heterogeneous sample than prior studies (Zalot et al. 2007), it is plausible that even wider variability among neighborhoods may be needed to reach the threshold necessary to moderate the association between mother-reported HIA and boys' conduct problems (Kroneman et al. 2004).

In contrast to boys, perceptions of neighborhood quality moderated the relation between mother-reported HIA and conduct problems for girls. Girls with higher levels of mother-reported HIA were more likely to report engaging in aggressive behaviors, but only in neighborhoods where

mothers reported more positive qualities. In contrast, girls residing in neighborhoods perceived by mothers as having more negative qualities reported engaging in similar levels of aggressive behaviors, regardless of mother-reported HIA levels. As discussed previously, this pattern of findings is consistent with the social psychophysiological perspective (Raine 1988), which proposes that advantaged communities more readily allow for the heightened influence of individual differences, such as HIA, because pressures in the environment do not dictate behaviors as strongly as they do in disadvantaged communities (e.g., Beyers et al. 2001). Importantly, utilizing a more socioeconomically representative sample of African American single mother families than has been afforded by the literature to date offered a unique opportunity in the current study to examine a wider range of variability in African American neighborhoods than in prior research (Zalot et al. 2007).

The significant three-way interaction may have resulted for the Aggression subscale and not the Rule-Breaking subscale due to gender differences in conduct problems. Girls may be more likely to engage in lower-level oppositional and aggressive behaviors, rather than the more typical overt delinquency evidenced by boys (Crick and Grotpeter 1995; Lahey et al. 2000; Tiet et al. 2001). Thus, the aggression outcome may be more relevant to the types of conduct problems displayed by girls, as opposed to the rule-breaking outcome.

Importantly, results utilizing the objective marker of neighborhood context, neighborhood SES, offered a different pattern of findings. Although the three-way interaction of adolescent-reported HIA x Neighborhood Context x Gender was not obtained using the census-tract data, the predicted 2-way interactions were obtained. That is, findings indicated that neighborhood SES moderated the association between adolescent-reported HIA and aggression. Adolescents with higher levels of HIA were significantly more likely to evidence aggression than adolescents with low levels of HIA, but the relation was significantly more pronounced in socioeconomically disadvantaged neighborhoods (see Fig. 3). In addition, the association was more pronounced in girls than it was in boys, evidenced by the interaction between Neighborhood SES X Gender (see Fig. 4). In contrast to the aforementioned results on subjective measures of neighborhood, the findings on the objective index of neighborhood SES are consistent with research that supports a contextual amplification hypothesis (Brody et al. 2003; Ge et al. 2002) of the bioecological model. The highest level of conduct problems was associated with exhibiting high HIA problems in the context of socioeconomically disadvantaged communities. Consistent with the subjective neighborhood measure, findings continued to support the importance of neighborhood context for girls. As discussed, it is not

necessarily surprising that the pattern of findings changes across the forms of neighborhood assessment, given that the objective and subjective indicators measure different community characteristics that do not fully overlap.

Although there is a small-to-moderate correlation between subjective and objective measures of neighborhood context in prior research (Brody et al. 2001; Ceballo et al. 2004; Herrenkohl et al. 2002; O'Neil Parke and McDowell 2001), there is not a perfect convergence between census-defined and self-reported neighborhood characteristics, suggesting that each type of measurement may be assessing different aspects of community (e.g., neighborhood SES versus perceived community relationships), which may, in turn, relate differently to conduct problems. It is also important to note that objectively-defined risks within a community do not necessarily co-occur with experiential risks (Wilson 1996), and some neighborhoods may appear more or less disadvantaged depending on the method of assessment utilized, with the two types of measurement having different implications for different types of youth (e.g., boys versus girls; Kroneman et al 2004; Seidman et al. 1998). More comprehensive assessments (i.e., multi-method) of neighborhood context are, therefore, necessary in order to more fully understand the various ways in which neighborhood may potentially exacerbate and/or ameliorate individual risk factors for children (e.g., Leventhal & Brooks-Gunn 2000; Lynam et al. 2000).

As with all research, the findings of this study must be considered within the context of its limitations. First, the current study did not include a neighborhood-based design, i.e., one in which neighborhoods are initially selected in order to maximize the representative nature of the sample, with an established number of families randomly recruited from each neighborhood. As with many other neighborhood studies (e.g., Seidman et al. 1998), there were not enough youth within census tracts to warrant the use of Hierarchical Linear Modeling. With larger studies that include neighborhood-based designs, it may be possible to more fully examine within- & between-neighborhood effects. Second, because the current study was limited to recruiting families from central North Carolina, rather than spanning multiple sites across many U.S. regions, the range in potential variability among families was restricted. Although adequate representation of all neighborhoods and families is not ensured (Leventhal and Brooks-Gunn 2000), this project included a much wider distribution of African American single mother families than is typically represented in the literature. Third, additional data sources on community organization should be incorporated in future investigations. Inclusion of subjective reports from neighborhood residents who are not a part of the study sample is a neglected research area and offers a way to assess for subjective appraisals without increasing correla-

tion errors (Leventhal and Brooks-Gunn 2000). Fourth, the cross-sectional nature of the study precludes defining causality, as well as considering the bidirectionality of effects. Given that ecological systems theory highlights the bidirectionality of influences between children and the environment, future research should consider the impact of children's HIA on neighborhoods and, in turn, the subsequent influence of neighborhood on delinquency.

Despite the aforementioned limitations, this study has significant strengths and contributes to the literature in important ways. Notably, African American youth have been the focus of relatively little research in the child and family literatures. Given the statistics suggesting that African American children from single mother homes are at heightened risk for problem behaviors (e.g., Ackerman et al. 2001; Jenkins and Bell 1994), studies such as this one that identify the circumstances that exacerbate the risk for problem behaviors among these youth are critical for the development and implementation of successful prevention efforts. Additionally, unlike studies that have examined youth adjustment as a function of objectively-defined neighborhood context only (e.g., Beyers et al. 2001), the present study additionally investigated variations in subjective evaluations of neighborhood quality. Ignoring such variations within subjective and objective forms of neighborhood assessment may hinder progression toward a complete understanding of the correlates of and pathways to conduct problems. This project also included a broader socioeconomic distribution of African American single mother families than is typically recruited in research, representing an important contribution in the field by providing an initial opportunity to begin to disentangle the effects of race and income in studies of African American youth.

Fourth, the current study included both boys and girls, whereas other delinquency-related research has tended to focus on boys (e.g., Beyers et al. 2001; Lynam et al. 2000). Few studies of neighborhood context have included girls or examined the role of child gender (see Greenberg et al. 1999; Simons et al. 1996; Zalot et al. 2007, for notable exceptions). Studies that exclude girls may offer limited information to the clinicians treating the growing number of girls engaging in aggressive and delinquent behaviors (U.S. Department of Justice 2003). Similarly, studies of African American families that exclude girls may underestimate the role of contextual variables, such as neighborhoods, on youth adjustment. Although replication is necessary before clinical recommendations can be made, the current findings suggest that attention to neighborhood context and HIA problems may help to identify which African American girls are at greatest risk for engaging in aggressive and conduct-disordered behaviors. More specifically, as suggested by the scales comprising the subjective index in this

study, social embeddedness, sense of community, neighborhood satisfaction, and perceived crime may be especially worth of consideration. Finally, the current findings also contribute to a growing body of literature that suggests the relevance of studies that examine multi-level prevention and intervention efforts, including neighborhood-based programming (see Salzinger et al. 2002, for a review).

In summary, the current study offers several general conclusions that contribute to the literature in important ways. Maternal perceptions of neighborhood context appear to be a particularly important consideration for African American girls' adjustment. Better neighborhoods did not protect girls with HIA difficulties from exhibiting aggressive and conduct-disordered behaviors; on the contrary, positively-perceived neighborhoods were associated with worse outcomes than negatively-perceived neighborhoods. This study emphasizes the importance of considering interactive associations because important findings would not have been revealed otherwise. Focusing primarily on main effects may lead to erroneous assumptions about the roles that HIA, neighborhood, and gender play in youth adjustment.

Objective markers of neighborhood are also an important consideration for African American youth and seem to exert a similar influence on both girls and boys. However, the pattern of findings differs across subjective and objective neighborhood assessment, suggesting that the two forms of assessment measure different aspects of community that have unique implications for different youth. Because different patterns emerged depending upon reporters and assessment methods, further research is warranted before definitive conclusions can be drawn. Research should continue to examine gender differences in the interplay between HIA and neighborhood, as well as potential explanations. Additionally, integrating the literature on subjective and objective measures of neighborhood context remains an important goal. Because the patterns were not replicated across subjective and objective indices in this study, direct comparisons cannot be made in order to address the relative influence of each assessment tool. However, this study emphasizes the important information that can be gleaned from both forms of assessment.

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