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The Impact of Neighborhood, Family, and Individual Risk Factors on Toddlers' Disruptive Behavior

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Abstract

Disadvantaged neighborhoods confer risk for behavior problems in school aged children but their impact in toddlerhood is unknown. Relations between toddlers' disruptive behavior and neighborhood disadvantage, family disadvantage, violence or conflict exposure, parent depressive symptoms, and parenting behavior were examined using multilevel, multi-group (girl/boy) models. Participants were 1204 families (mean child age = 24.7 months). Unique associations between disruptive behavior and all risk factors were observed, but the effect of neighborhood disadvantage was negligible when all of the more proximal factors were accounted for. The results suggest both that children in disadvantaged neighborhoods are at greater risk of behavior problems than children in non-disadvantaged neighborhoods and that optimal prevention/intervention work with these children will attend to proximal risk factors.

An ecologically valid approach to studying risk factors for early emerging disruptive behaviors should include a focus on community as well as family and individual risk and protective factors (Bronfenbrenner, 1997; Cicchetti & Lynch, 1993). Some have argued that community factors may not influence children until they reach pre-school or Kindergarten and begin to interact with their communities somewhat independently (e.g., Winslow & Shaw, 2007). A competing hypothesis is that the characteristics of the broader community and the quality of the family's physical and social environments may begin to influence behavior as early as toddlerhood, either directly, or by influencing caregivers' well being.

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The current study is based upon further analyses of the findings in the dissertation work of Yolanda M. Thomas, Ph.D.

This study examined whether there are differences between neighborhoods in toddler risk for disruptive behavior and whether neighborhood social disadvantage, a community-level factor that has been shown to predict behavior problems in older children, partially explains such between-neighborhood differences over and above family-level risk factors.

Disruptive behaviors can be reliably assessed in children as young as one-to-two years of age (Carter, Briggs-Gowan, & Davis, 2004) using parent-report measures such as the Infant Toddler Social Emotional Assessment (ITSEA) (Carter, Briggs-Gowan, Jones, & Little, 2003) and the Child Behavior Checklist (CBCL) (Achenbach & Rescorla, 2001). Further, clinical disorders characterized by frequent and pervasive disruptive behaviors can be reliably diagnosed in children as young as two years old (Egger et al., 2006; Keenan & Wakschlag, 2000). Disruptive behavior problems in toddlerhood are associated with continuing behavior problems (Baillargeon et al., 2007; Briggs-Gowan, Carter, Bosson-Heenan, Guyer, & Horwitz, 2006; Mesman, Bongers, & Koot, 2001; Owens & Shaw, 2003) as well as low social status (Keane & Calkins, 2004), lower academic achievement (Brennan, Shaw, Dishion, & Wilson, 2012) and elevated internalizing symptoms (Mesman et al., 2001) later in childhood. Beyond predicting later functioning, disruptive behavior problems are distressing for families at the time they occur.

In recent decades, social scientists have become increasingly interested in the effects of disadvantaged neighborhoods on children's psychological functioning (Sampson, Morenoff, & Gannon-Rowley, 2002). This scientific interest in neighborhoods appears to have developed in part as a result of economic restructuring and residential segregation in the 1970's and 1980's (Anderson, 1990; Massey, 1990; Wilson, 1987). These shifts resulted in many economically disadvantaged individuals—primarily from racial minority backgrounds—residing in concentrated areas of urban poverty while more affluent, White families moved to outer-city and suburban areas (Duncan & Aber, 2000; Leventhal & Brooks-Gunn, 2000; McLoyd, 1998). These changes opened the door to questions about how the distinct socio-economic characteristics of different neighborhoods impact their residents.

The term neighborhood social disadvantage is used to identify those geographic areas most likely to confer psychological risk to residents due to the overall lack of social and material resources in the neighborhood. A subset of low-income neighborhoods are characterized by unusually high rates of unemployment, single parenthood, residents living below the poverty line, and other indicators of individual and familial disadvantage; such disadvantaged neighborhoods have been referred to in the sociological literature as “underclass” or “ghetto” neighborhoods (Ricketts & Sawhill, 1988; Wilson, 1987). Residence in a disadvantaged neighborhood has small but consistent effects on behavior problems in school-age children (Duncan, Brooks-Gunn, & Klebanov, 1994; Ingoldsby et al., 2006; Winslow & Shaw, 2007) and adolescents (Mrug & Windle, 2009). However, relatively little attention has been paid to the potential impact of neighborhood disadvantage on toddlers' behavior. In addition, few studies have systematically disentangled the effects of neighborhood disadvantage from familial disadvantage or from other more proximal risk factors such as violence exposure and parent characteristics. In this study, we aim to address some of these gaps in the literature.

How Neighborhoods Influence Child Behavior

Proximal Factors

Family disadvantage and violence or conflict exposure—Acts of violence are considerably more likely to occur in poverty-ridden areas (Friday, 1995; Sampson et al., 1997). Neighborhood desirability (based on parent reports of neighborhood safety, cohesion, and related markers) also predicts family conflict (Duncan, Strycker, Duncan, & Okut, 2002). Rates of violence exposure in young children, particularly disadvantaged children, are high; in the current sample, Briggs-Gowan et al. (2010) reported rates of exposure to family and neighborhood violence of 18.6% among poor 18–36-month olds, compared to 5.9% of non-poor children in the same age group; rates of exposure to angry verbal conflict are even higher (McDonald, Jouriles, Briggs-Gowan, Rosenfield, & Carter, 2007). Others report rates of community violence exposure in high-risk urban areas between 42 and 78% (Schechter, Willheim, & Zeanah, 2009). Exposure to family and neighborhood violence (Briggs-Gowan, Carter, et al., 2010; Osofsky, 1999) and verbal conflict (Briggs-Gowan, Carter, & Ford, 2012; McDonald et al., 2007) have been shown to increase children's risk for behavior problems. Thus, the effects of violence or conflict exposure are relevant to questions about the effects of neighborhoods on toddlers' disruptive behavior.

Developmental differences between toddlers and older children may make toddlers vulnerable to the influence of violence or conflict in ways that differ from older children (Margolin & Gordis, 2000; Scheeringa & Zeanah, 1995). Toddlers are limited in their capacity to process exposures, lacking the cognitive and linguistic ability to comprehend or seek help with their experiences. Violence or conflict exposure may interfere with the developmental tasks of infancy and toddlerhood, including attachment formation and emotion regulation, leading to concurrent as well as long-term problems in social-emotional functioning. Evidence derived primarily from clinical case studies shows that violence exposure in infants and toddlers is associated with excessive irritability, sleep problems, attention problems, and other behavioral challenges (Briggs-Gowan et al., 2010; Osofsky, 1995, 1999; Schechter et al., 2009). And while long-term effects of violence exposure during toddlerhood are understudied, longitudinal studies in the current study sample show lasting effects of early violence or conflict exposure on school-age externalizing symptoms (Briggs-Gowan, Carter, & Ford, 2012). In this study, we examined the association between toddlers' exposure to violence or conflict in their families and communities and their disruptive behavior. We hypothesized that exposure to violence or conflict would have a significant negative effect on behavior, with children exposed to greater amounts of violence or conflict demonstrating more behavior problems than children with less exposure.

In addition, we examined the effects of parent-reported family disadvantage using a dichotomous indicator that incorporated approximately the same four elements as our census-based neighborhood disadvantage measure. Consistent with Ackerman and Brown (2006), who argue that social-emotional problems associated with poverty are primarily attributable to poverty co-factors—e.g., residential instability, harsh parenting, etc.—rather than to income poverty itself, our measure of family disadvantage was designed to capture families who are at the greatest risk based on several demographic characteristics associated

with income poverty. In addition, family economic disadvantage is associated with children's behavior problems (Brooks-Gunn & Duncan, 1997; McLoyd, 1998) as well as with parental psychological distress (McLoyd, 1990), low social support (Thompson, Flood, & Goodvin, 2006), and less optimal parenting (McLoyd, 1990), all of which confer risk for behavior problems. Thus, we hypothesized that toddlers in disadvantaged families would have higher levels of behavior problems than toddlers in non-disadvantaged families.

Parenting behavior and parent depressive symptoms—Many researchers taking an ecological approach to the study of neighborhoods argue that neighborhood effects are likely to operate through the proximal influence of parenting behavior (Kennedy, 2008; Leventhal et al., 2000; Lynch & Cicchetti, 2004; Malik, 2008; Mrug, Loosier, & Windle, 2010; Oravec, Koblinsky, & Randolph, 2008). Adults living in disadvantaged neighborhoods are exposed to substantial amounts of stress—including, but not limited to, worries about community safety and a lack of social support (Sampson et al., 2002)—and it is therefore unsurprising that they exhibit parenting behaviors that are harsher and less warm (Leventhal et al., 2000) than their peers in more privileged neighborhoods. And indeed, parenting behaviors characterized as harsh (Hughes & Ensor, 2006), and low on responsiveness (Shaw, Keenan, & Vondra, 1994) are associated with toddlers' disruptive behavior problems, though several studies (e.g., Shaw et al., 1998) report that effects of parenting are stronger for boys than for girls. Adults in disadvantaged neighborhoods also exhibit high rates of depression (Ross, 2000), which is associated with toddlers' problem behavior (Leckman-Westin, Cohen, & Stueve, 2009), though this relation appears to be driven by the risk conferred when depression presents in the context of other risk factors (e.g., stress) (Carter, Garrity-Rokous, Chazan-Cohen, Little, & Briggs-Gowan, 2001; Cicchetti, Rogosch, & Toth, 1998). Parenting factors may be particularly relevant for toddlers as they are highly dependent on their parents for basic needs, less likely than older children to benefit from the protective influence of non-parental role models, less capable than older children of limiting their own exposure to parental harshness (by, for example, going to a different room to play), and less likely than older children to have developed the capacity to deploy emotion-regulation or other healthy coping skills in response to harsh or disengaged parenting. Thus, to account for the salience of parenting factors as predictors of toddlers' functioning, measures of parental depressive symptoms as well as of harsh and disengaged parenting were included. We hypothesized that there would be more behavior problems among toddlers whose parents reported higher levels of overreactivity, laxness, or depressive symptoms.

Finally, sex differences in disruptive behavior have been found, with boys demonstrating more problems, on average, than girls (Baillargeon et al., 2007; Rubin, Burgess, Dwyer, & Hastings, 2003). In some samples, boys have demonstrated greater susceptibility than girls to parenting behavior (Kerr, Lopez, Olson, & Sameroff, 2004; Shaw et al., 1998) and maternal depression (Carter et al., 2001) as risk factors for behavior problems. Given the presence of sex differences in some proximal risk factors for disruptive behaviors, we considered it prudent to assess whether the effects of violence or conflict, family disadvantage, parent depressive symptoms, and parenting behavior differ based on the sex of the child. However, as some studies (Combs-Ronto, Olson, Lunkenheimer, & Sameroff,

2009; O’Leary, Slep, & Reid, 1999) have failed to replicate observed sex differences in the magnitude of effects of parenting and maternal depression on young children’s disruptive behavior and as the literature on sex differences in the effects of violence or conflict exposure and family disadvantage on toddlers’ behavior is negligible, we considered these moderation analyses to be exploratory, and did not put forward specific directional hypotheses regarding sex differences.

Neighborhood Processes

Much of the research on older children has focused on affiliation with deviant peers and exposure to antisocial behavior in other youths as a mechanism explaining neighborhood effects on behavior (e.g., Brody et al., 2001; Ingoldsby et al., 2006). While peer socialization appears to be central in the literature on neighborhood effects on older children and adolescents, peer relationships are unlikely to be responsible for neighborhood effects on very young children’s problem behaviors. However, just as neighborhood disadvantage impacts peer socialization and peer group behaviors in a manner central to the daily experiences of older children and adolescents, neighborhood influences on parent socialization and behaviors as well as on the physical environment will likely impact toddlers in disadvantaged neighborhoods in a manner that causes their daily experiences to differ from toddlers in non-disadvantaged neighborhoods.

For example, Evans (2004) notes that disadvantaged neighborhoods have less green space, more hazardous playgrounds, and poorer quality housing stock than wealthier neighborhoods. Toddlers with limited access to safe playgrounds may have fewer opportunities for socialization and active play compared to toddlers with safe playgrounds in their communities. Further, toddlers whose own residences are dilapidated and dangerous may have more limited opportunities than toddlers with safer housing to engage in exploratory, self-guided play at home due to parents’ need to keep them away from harm (e.g., faulty wiring, exposed pipes, unstable flooring). Though others (e.g., Winslow & Shaw, 2007) have argued that community-level factors may not exert significant influence on children’s disruptive behaviors until children reach pre-school or Kindergarten and begin to interact with their communities somewhat independently, we hypothesize that toddlers may actually experience more concentrated exposure and therefore greater risk in relation to these physical aspects of neighborhood disadvantage, as they may be less likely than older children to spend substantial amounts of time outside their neighborhoods.

It has also been argued that neighborhoods with high levels of disadvantage promote a sense of estrangement from society (Brooks-Gunn et al., 1993; Wilson, 1987) and that residents of these neighborhoods lack the mutual trust, power, and efficacy necessary to motivate actions to promote the collective good (Sampson, Raudenbush, & Earls, 1997). In support of this theory, collective efficacy has been found to be low in disadvantaged neighborhoods and to mediate the relation between neighborhood disadvantage and violence (Sampson et al., 1997). Beyond the effect of collective efficacy on their parents’ behavior, toddlers living in neighborhoods with low collective efficacy may be directly impacted by daily exposure to expressions of hopelessness and negative, depressive, and hostile affect from adults—

including their parents' friends, family members, and others encountered in community public spaces—in their neighborhoods.

Although neighborhood processes were not measured in this study, these processes are relevant to the question of whether toddlers in disadvantaged neighborhoods experience increased risk for behavior problems over and above the effects of proximal risk factors to which they are exposed—in this study, family disadvantage, violence exposure, overreactive and lax parenting behavior, and parent depressive symptoms. The literature on the processes described above suggests that residence in a disadvantaged neighborhood may confer unique negative risks to young children's development; thus, in this study, we hypothesized that an incremental negative effect of neighborhood disadvantage would be found even when accounting for multiple proximal sources of risk.

The Current Study

This study focused on census derived neighborhood disadvantage as a risk factor for toddlers' disruptive behavior problems. We also incorporated constructs known to be associated with neighborhood disadvantage—parent depressive symptoms, parenting behavior, violence or conflict exposure, and family disadvantage—in our models. We tested the following hypotheses:

1. Neighborhood disadvantage will have a negative impact on children's disruptive behavior, even accounting for the effects of family disadvantage, violence or conflict exposure, parent depressive symptoms, and overreactive or lax parenting behavior.
2. Family disadvantage, violence or conflict exposure, parent depressive symptoms, lax parenting, and overreactive parenting will each have negative effects on toddlers' behavior.
3. The effects of violence or conflict exposure, family disadvantage, parent depressive symptoms, and parenting behavior on child behavior will differ in magnitude depending on the child's sex.

Method

Participants

The initial pool of families was ascertained from birth records provided by the State of Connecticut for children born between July 1995 and September 1997, living in the 15 towns and cities that comprise the New Haven-Meriden Standard Metropolitan Statistical Area (SMSA) ($N = 8,404$). Because the original sample was recruited with the goal of refining a new measure of social-emotional adjustment in healthy children, 675 potential participants were excluded due to premature birth (< 36 weeks) or significant health problems (birth weight less than 2,200 grams, 1-and 5 minute Apgar scores below 5, chromosomal anomalies, severe anoxia at birth). Children were also excluded from sampling due to death ($n = 14$) and adoption ($n = 4$). Because only one child per family was eligible to participate, 277 siblings were excluded from sampling. Finally, an investigator's child was excluded from sampling.

From the remaining pool of potential subjects an age- and sex-stratified sample of children born at Yale-New Haven Hospital was randomly selected for sampling ($n = 1,788$) and 1,491 of these families met study eligibility criteria. Of the eligible families, 1,278 families (85.7% response rate) completed the initial survey. One family was later dropped from analyses due to unreliable reporting and 17 families were excluded from the study sample based on the identification of a genetic or autism spectrum disorder after participation. The final study sample was similar to the original pool in terms of race, ethnicity, gender, and other demographic and health-related variables (For additional details see Briggs-Gowan, Carter, Skuban, & Horwitz, 2001). Forty-five families were excluded from the current analysis because they were the only family residing in their census tract, and 11 families were excluded because the address they reported could not be geocoded. Thus, the final sample in this study included 1,204 families.

Children in the study ranged in age from 12 to 42 months old (mean age = 24.7 months). Approximately half of the children (50.9%) were boys. 94.4% of respondents were biological mothers. Only 5.1% of the sample lived in a neighborhood categorized as disadvantaged, and 4.8% of the sample met criteria for social disadvantage at the family level.

Procedure

From June to September 1998, parents were mailed a letter describing the study, followed by a questionnaire and children's book 1 week later. Parents who did not complete the questionnaire after 1 month were mailed an additional questionnaire and received phone calls or in-person visits to offer assistance with participation. Informed consent procedures were followed and parents received \$25 for completing the questionnaire (Briggs-Gowan et al., 2001).

Measures

Child disruptive behavior—Disruptive behavior was measured using the Infant-Toddler Social and Emotional Assessment (ITSEA) Externalizing Domain. The ITSEA is a 166-item parent report measure that assesses social-emotional competencies and problems in infants and toddlers. The measure has been shown to have high test-retest reliability and validity. The ITSEA Externalizing Domain, used as a measure of disruptive behavior problems in this study, includes 24 items (e.g., “hits, bites, or kicks you” and “is restless and can't sit still”). The intra-class correlation (ICC) for the externalizing domain is .82 (Carter, Briggs-Gowan, Jones, & Little, 2003; Carter & Briggs-Gowan, 2006).

Neighborhood-level social disadvantage—A composite modeled after the Sawhill Index was created using census data for the State of Connecticut to measure neighborhood social disadvantage. Census Tracts were used as a proxy for neighborhoods in the study. Tracts are relatively permanent zones usually having between 2,500 and 8,000 residents (United States Census Bureau, 2000). At the point that they are defined, tracts are intended to have a relatively homogeneous population in terms of economic status, and living conditions. Families' addresses at the time of study participation were geocoded based on the 2000 Census.

The Sawhill Index was chosen because it emphasizes behavior and because it results in a dichotomous measure of disadvantage. A disadvantaged (“underclass”) area is defined as a neighborhood that is one or more standard deviations above the national mean on the following four indicators of socioeconomic distress: (1) men not attached to the labor force, (2) high school drop-outs, (3) families, with children, headed by women, and (4) households dependent on public assistance (Ricketts & Sawhill, 1988). Further, the Sawhill Index was considered appropriate for the current sample because census data for the New Haven-Meriden Standard Metropolitan Area shows that rates of these four indicators have been similar to national percentages in recent years (15.2% vs. 18.1% nationally for men not attached to the labor force, 12.5% vs. 14.8% nationally for high school drop-outs, 8.4% vs. 7.4% nationally for families with children headed by women, 3.3% vs. 2.9% nationally for households dependent on public assistance (American Community Survey Office, 2009, 2011)

Family-level social disadvantage—A second composite, similar to the Sawhill Index, was created as a dichotomous index of family disadvantage and disadvantaged families met the following four self-reported criteria: 1) single parent head of household, 2) neither parent working (full or part-time), 3) maternal education maximum of high school, and 4) family receipt of public assistance or income below the poverty line.

Violence or conflict exposure—The Child Life Events Scale (Carter & Briggs-Gowan, 1998) is a parent-report measure on which parents are asked whether their child ever experienced 14 specific life events. In this report, violence or conflict exposure was measured by summing the following four violence-related items: “seen someone hit, push, or kick a family member,” “seen someone use a weapon to threaten/hurt a family member,” “seen or heard adult family members arguing very loudly,” and “seen violence in your neighborhood” (Briggs-Gowan et al., 2012).

Parent depressive symptoms—The Center for Epidemiological Studies Depression Inventory (CESD) (Radloff, 1977) is a 20-item self-report measure of depression symptoms; the total score was used to measure depression severity. Items are rated on a 0 (rarely or none of the time) to 3 (most or all of the time) scale. The CESD had high internal consistency (Cronbach’s $\alpha = .88$).

Parenting behavior—The O’Leary Parenting Scale (Arnold, O’Leary, Wolff & Acker, 1993) is a measure of dysfunctional discipline practices in parents of young children. In the current study, the following two scales were used: Laxness (e.g. “When I say my child can’t do something I let my child do it anyway”) and Over-reactivity (e.g. “When I’m upset/under stress, I am picky and on child’s back”). Both the Laxness (Cronbach’s $\alpha = .81$) and Over-reactivity (Cronbach’s $\alpha = .74$) scales had acceptable internal consistency in this sample.

Analyses

We used Hierarchical Linear Modeling (HLM) to test the unique contributions of individual, family, and neighborhood level factors to children’s disruptive behaviors. HLM allows data

to be nested and controls for the lack of independence of data within higher-level groups. In the two-level models that follow, multiple families are nested within each tract (neighborhood) and the non-independence of families living within the same tract is controlled for in the model. Because only one child per family was included in the sample, child factors (violence or conflict exposure), parent factors (depressive symptoms and parenting behavior), and family factors (social disadvantage) were considered to be at the same level (level-1). Neighborhood social disadvantage is classified as a level-2 variable.

Within the HLM models we used a multi-group technique to examine sex-specific effects (Wen & Shao, 2012). To provide separate effect estimates for boys and girls, each level-1 construct is represented twice (i.e. girls' violence or conflict exposure and boys' violence or conflict exposure). Children are coded with their actual score for the variable that matches their sex and with a score of zero for the variable that matches the opposite sex. The multi-group technique produces sex-separated estimates for each level-1 variable as well as contrast tests of sex differences for each model parameter.

The following models were tested: first, an unconditional model, with no predictors specified at level 1 or level 2, was examined to determine whether there was sufficient variation in toddler disruptive behaviors for building subsequent models. Next, neighborhood social disadvantage was added at level 2 to examine the predictive power of this variable in the absence of more proximal factors. In the next step, a model with only level 1 predictors was used to test the effects of family social disadvantage, violence or conflict exposure, parent depressive symptoms, lax parenting, and overreactive parenting. Child age was assessed as a covariate. Other common demographic covariates (parent education, income, etc.) were not tested, as these were incorporated in the disadvantage variable. Finally, neighborhood social disadvantage was added back to the final level-1 model as a level-2 predictor to determine if an effect of neighborhood disadvantage remained when accounting for more proximal factors.

Results

Descriptive Analyses

Descriptive analyses were conducted to examine variation in each of the independent variables and the outcome variable (see Tables 1 and 2). In addition, the association between family-level and neighborhood-level social disadvantage was examined. Approximately 5% of the sample met criteria for each of the two social disadvantage categories: family-level ($n = 59$, classified based on self-report data) and neighborhood-level ($n = 62$, classified based on census data for the participant's neighborhood tract).

Although the association between family-level and neighborhood-level social disadvantage was significant ($OR = 5.08$, $CI = 2.48$ to 10.42 , $\phi = .143$, $p < .001$), there was not a high degree of overlap across these classifications. Only 0.9% of the entire sample ($n = 11$) was classified as socially disadvantaged at both the family-level and the neighborhood-level, whereas 8.2% ($n = 110$) was classified as socially disadvantaged at either the family-level or the neighborhood-level. Within the group classified as socially disadvantaged at the neighborhood level, 17.7% ($n = 11$) were also classified as disadvantaged at the family level.

The remaining 51 families (4.2% of the entire sample) did not meet criteria for family-level disadvantage. Table 3 shows demographic characteristics for the full sample as well as for each neighborhood group (disadvantaged vs. non-disadvantaged). As shown in Table 3, families living in disadvantaged neighborhoods had younger mothers ($F = 47.67, p < .001$) and less formal education ($\chi^2 = 54.9, p < .001$), and were more likely to have single parents ($\chi^2 = 63.15, p < .001$) and be living in poverty or borderline poverty ($\chi^2 = 109.25, p < .001$). Families in disadvantaged neighborhoods also had a different racial and ethnic profile ($\chi^2 = 114.26, p < .001$) than families living in non-disadvantaged neighborhoods.

Only a small amount (< 5%) of data was missing for neighborhood disadvantage, family disadvantage, violence exposure, and parent depressive symptoms. However, because the O'Leary Parenting Scales were administered only to parents of toddlers older than 18 months of age, a larger proportion (26%) of data on parenting behavior was missing. To minimize the bias associated with this relatively large amount of missing data, single imputation with the EM algorithm was used to estimate the missing values for the Laxness and Overreactivity scales from a large set of demographic, behavioral, and psychological data. Table 4 shows the correlations between all Level 1 variables for boys and girls.

Baseline Models

The initial unconditional model demonstrated that there was sufficient variability in toddler disruptive behaviors within and between neighborhoods to warrant subsequent model testing, as there was unexplained variability at both level 1 ($r = 0.085$) and level 2 ($\mu_0 = 0.006, \chi^2 = 179.07, p < .001$). The initial model showed that 6.4% of the variance in disruptive behaviors was associated with the neighborhoods in which the children lived.

The equation for the initial unconditional model is presented below:

$$\text{ITSEA Externalizing} = B_0 + r$$

Next, a model testing the effects of neighborhood social disadvantage in the absence of covariates was tested. The equation for this model is below:

$$\text{Level 1: ITSEA Externalizing} = B_0 + r$$

$$\text{Level 2: } B_0 = \gamma_{00} + \gamma_{01} (\text{Neighborhood Social Disadvantage}) + u_0$$

Consistent with our hypothesis, neighborhood disadvantage was associated with toddlers' disruptive behavior ($\gamma_{01} = 0.189, p < .001$). The model with neighborhood disadvantage accounted for 26.66% of the between-neighborhood variance in disruptive behavior.

Family Social Disadvantage, Violence or conflict Exposure, Parent Depressive Symptoms and Parenting Behavior

The next model (Table 5) addressed whether family-level social disadvantage, child violence or conflict exposure, parent depressive symptoms, overreactivity, and laxness predict toddler boys' and girls' disruptive symptoms. As none of the predictors showed significant variation in slope across neighborhoods when they were added to the level 1

equation (all $p > .10$), all were entered as fixed variables in the models that follow, meaning that the slope of these predictors was held constant across neighborhoods.

The equation for the model with all level 1 predictors is as follows:

$$\begin{aligned} \text{ITSEA Externalizing} = & B_0 + B_1 (\text{Girls' Exposure}) \\ & + B_2 (\text{Boys' Exposure}) \\ & + B_3 (\text{Girls' Social Disadvantage}) \\ & + B_4 (\text{Boys' Social Disadvantage}) \\ & + B_5 (\text{Girls' Parent Depressive Symptoms}) + B_6 (\text{Boys' Parent Depressive Symptoms}) \\ & + B_7 (\text{Girls' Parent Laxness}) \\ & + B_8 (\text{Boys' Parent Laxness}) \\ & + B_9 (\text{Girls' Parent Overreactivity}) + B_{10} (\text{Boys' Parent Overreactivity}) + r \end{aligned}$$

The model with all Level 1 predictors had improved fit in comparison to the model with only neighborhood disadvantage ($\chi^2 = 155.40$, $p < .001$). Violence exposure was significantly and positively associated with disruptive behavior for boys ($B_2 = 0.082$, $p < .001$) in this model but was not a significant predictor for girls ($B_1 = 0.017$, $p > .10$); the coefficients for boys and girls were significantly different from one another ($\chi^2 = 5.73$, $p < .05$). Because violence exposure was not a significant predictor for girls, it was dropped from the subsequent model (for girls only). Family disadvantage was significantly associated with disruptive behavior for boys ($B_4 = 0.164$, $p < .01$) and girls ($B_3 = 0.201$, $p < .001$), indicating that boys and girls from disadvantaged families had more disruptive behaviors than boys and girls from non-disadvantaged families. In addition, parent depressive symptoms significantly predicted disruptive behavior for boys ($B_6 = 0.004$, $p < .05$) and girls ($B_5 = 0.007$, $p < .001$). Parent laxness was also significant for boys ($B_8 = 0.008$, $p < .001$) and girls ($B_7 = 0.007$, $p < .001$), as was parent overreactivity (boys $B_{10} = 0.009$, $p < .001$; girls $B_9 = 0.009$, $p < .01$). These results indicate that disruptive behavior problems increased for boys and girls as depressive symptoms, parent laxness, and parent overreactivity increased. There were no differences between boys and girls in the magnitude of the relation between disruptive behavior and family disadvantage, depression symptoms, laxness, or overreactivity.

Child age was examined at level 1 as a potential covariate but was not significantly associated with disruptive behaviors for girls ($B_1 = 0.001$, $p > .10$) or boys ($B_2 = -0.000$, $p > .10$). Child age was therefore dropped from all subsequent models and is not reported in Table 5. Full model parameters are available from the first author by request.

After the final Level 1 model was analyzed, the variance in disruptive behavior between neighborhoods was no longer significant, indicating that, when family disadvantage, violence exposure, parent depressive symptoms, and parenting behavior were accounted for in the model, there was no longer a significant amount of between-neighborhood variation in disruptive behavior. Accordingly, the final level-1 model accounted for nearly 81% of the variance in disruptive behavior between neighborhoods, and for nearly 14% of the variance within neighborhoods. However, we proceeded with modeling the effects of neighborhood

disadvantage in the fully controlled model to determine whether neighborhood disadvantage accounted for any of the small amount of remaining between-neighborhood variance.

Violence or conflict Exposure, Family Social Disadvantage, Parent Depressive Symptoms, Parenting Behavior, and Neighborhood Disadvantage

The final model tested whether neighborhood disadvantage was associated with disruptive behaviors when accounting for all level-1 predictors. The equations for the final multi-level model with neighborhood social disadvantage is shown below:

Level 1:

$$\begin{aligned} \text{ITSEA Externalizing} = & B_0 + B_1 (\text{Girls' Exposure}) \\ & + B_2 (\text{Boys' Exposure}) \\ & + B_3 (\text{Girls' Social Disadvantage}) \\ & + B_4 (\text{Boys' Social Disadvantage}) \\ & + B_5 (\text{Girls' Parent Depressive Symptoms}) + B_6 (\text{Boys' Parent Depressive Symptoms}) \\ & + B_7 (\text{Girls' Parent Laxness}) \\ & + B_8 (\text{Boys' Parent Laxness}) \\ & + B_9 (\text{Girls' Parent Overreactivity}) + B_{10} (\text{Boys' Parent Overreactivity}) + r \end{aligned}$$

$$\text{Level 2: } B_0 = \gamma_{00} + \gamma_{01} (\text{Neighborhood Social Disadvantage}) + u_0.$$

In this model, neighborhood social disadvantage did predict unique variance in children's disruptive behavior problems ($\gamma_{01} = 0.118, p < .001$). Children in disadvantaged neighborhoods had significantly higher levels of disruptive behavior problems than children in non-disadvantaged neighborhoods. The model with neighborhood disadvantage accounted for 85% of between-neighborhood variance in disruptive behavior, 4% more than the model with only level 1 predictors. Further, the addition of neighborhood social disadvantage improved model fit in comparison to the final model with no level-2 predictors ($\chi^2 = 7.90, p < .01$). In this final model, there was no change in the contribution of level-1 variables for boys or girls in comparison to the final level-1 model.

Discussion

In this study, we examined between-neighborhood differences in disruptive behavior problems, particularly the association between neighborhood social disadvantage and toddlers' disruptive behavior problems. Our primary findings with regard to neighborhood disadvantage were consistent with the literature on older children and neighborhoods (e.g., Ingoldsby et al., 2006; Winslow & Shaw, 2007), demonstrating a small association between a census-derived measure of neighborhood disadvantage and disruptive behavior problems. In our sample of toddlers, 6.4% of the total variance in disruptive behaviors was attributable to neighborhood residence, and approximately one quarter of between-neighborhood variance was associated with disadvantaged versus non-disadvantaged neighborhood status. The percent of variance in disruptive behavior attributable to neighborhood residence in this sample is within the five-to-ten percent range reported in the previous literature on older children and adolescents (Leventhal et al., 2000). The relation between neighborhood disadvantage and disruptive behavior persisted when parent-reported family disadvantage,

violence or conflict exposure, parent depressive symptoms, and parenting behavior were added to the model. However, after these proximal sources of risk were accounted for, the remaining variance between neighborhoods became very small, rendering the practical significance of neighborhood disadvantage as a predictor of disruptive behavior negligible. Taken together, our findings demonstrate that neighborhood residence is a meaningful predictor of disruptive behavior problems in very young children and that the differences in disruptive behavior across neighborhoods, while partially explained by disadvantaged versus non-disadvantaged neighborhood status, is better explained by the more proximal risk factors of violence exposure, family disadvantage, parent depressive symptoms, and parenting behavior.

Our models revealed a significant association between family social disadvantage and disruptive behavior that was comparable in magnitude for boys and girls. This finding is unsurprising given the established relations between various markers of disadvantage and toddlers' disruptive behavior (e.g., Briggs-Gowan et al., 2001). However, it is noteworthy that we found a very low percentage of overlap between our neighborhood social disadvantage variable and our family social disadvantage variable, indicating that the very most socially disadvantaged families are not uniformly living in the most disadvantaged neighborhoods.

Our finding of a positive association between violence or conflict exposure and behavior problems is consistent with the literature in older children (e.g., Henrich, Schwab-Stone, Fanti, Jones, & Ruchkin, 2004; Miller, Wasserman, Neugebauer, Gorman-Smith, & Kamboukos, 1999), clinical evidence from young children (Gaensbauer et al., 1995; Osofsky, Cohen, & Drell, 1995), and recent studies with young children (Briggs-Gowan et al., 2010; Martinez-Torteya, Anne Bogat, Von Eye, & Levendosky, 2009). However, this finding is somewhat more complex, as the association between violence or conflict exposure and disruptive behavior was significant only for boys and not for girls in our sample. It may be that other factors included in the model—including parent depressive symptoms and parenting behavior—account for the effects of violence or conflict exposure on young girls that have been reported elsewhere, rendering this variable non-significant in our models. In contrast, the processes responsible for the impacts of violence exposure on boys may go beyond the effects of violence exposure on parents' behavior and psychological functioning. The majority of violent crimes are committed by men (Maston & Klaus, 2010) and it is therefore possible that the effect of violence or conflict exposure on boys partly stems from boys' modeling of the behavior of adult men in their lives. Further, boys who have been exposed to violence/ conflict in the context of communities that parents' perceive as dangerous may be rewarded for their aggressive behaviors to prepare them to protect themselves later on (Duncan et al., 1994).

Our study had several strengths, including analysis with multi-group hierarchical linear modeling, focus on a relatively understudied age group, access to an epidemiological sample of children and families, and a systematic approach to analyzing the unique contributions of neighborhood disadvantage, family disadvantage, violence exposure, parent depressive symptoms, and parenting behavior. In addition, the fact that our measure of neighborhood disadvantage was independent of parents' reports is a strength, as is our use of parallel

measures of neighborhood and family disadvantage, which allowed us to examine the effects of similar constructs operating at different levels of the child's ecology. In addition, our final model captured fully 19% of the total variance in toddlers' disruptive behaviors, and 85% of the between-neighborhood variance in these behaviors. Our study also had several limitations, including the relatively small number of neighborhoods represented in our data set ($n = 92$), the cross-sectional nature of our data, and reliance on a single informant for child behavior. In addition, the data used in our study was collected between 1995 and 1997; having newer data would have been ideal. However, we would argue that the richness of the data (particularly, the fact that it includes high-quality measures of child behavior, parent mental health, and demographics in a relatively large epidemiological sample) greatly increases its value. There is no doubt that both the overall poverty rate and the child poverty rate have increased in the decade from 2000 to 2011 (Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation, 2012) and that, therefore, an epidemiological sample recruited today would likely look quite different from our 1998 sample. However, we think it unlikely that the mechanisms and processes described in our manuscript have changed dramatically since 1998, and we would argue that the importance of our findings is only heightened by the increase in adult and child poverty since the time our sample was recruited. Thus, despite the limitations noted here, this study offers several important contributions to the literature, establishing that between-neighborhood differences in disruptive behavior can be identified as early as toddlerhood, showing that neighborhood disadvantage is a risk factor for toddlers' behavior problems, and documenting that more proximal risk factors (violence exposure, social disadvantage, parent laxness, parent overreactivity, and parent depressive symptoms) are responsible for the majority of between-neighborhood variance in toddlers' disruptive behavior. In addition, this study demonstrates that there are sex differences in the magnitude of effect of violence or conflict exposure, with boys more severely impacted than girls.

Implications for Policy and Practice

Our results indicate that, for toddlers, living in a disadvantaged neighborhood is associated with an increased risk of disruptive behavior problems. However, our results also indicate that the differences between neighborhoods in toddlers' risk for disruptive behavior problems is best explained by risk factors that are proximal to the child, including overreactive and lax parenting behavior, and parent depressive symptoms. These findings imply that toddlers living in high-risk neighborhoods are most likely to benefit from interventions targeting the parent-child relationship, parenting, parent mental health, and personal socioeconomic risk. A popular proposal to address the risks associated with concentrated disadvantage has been to move families in disadvantaged neighborhoods to more affluent neighborhoods, as in the Moving to Opportunity (MTO) program (for relevant findings, see Kling, Liebman, & Katz, 2005 and Leventhal & Brooks-Gunn, 2003). However, to our knowledge, the effects of MTO or similar programs on toddlers' social emotional functioning have not yet been examined empirically.

Our findings affirm the importance of community-level prevention work designed to reduce violence and of interventions designed to help young children cope with the effects of violence or conflict exposure. Such interventions may be particularly important for toddler

boys, who appear to have a stronger behavioral response to violence or conflict than the girls in our sample. However, it is possible that girls are developing symptoms other than disruptive behavior (e.g., internalizing symptoms) in response to violence or conflict exposure at the young age studied in this sample. Thus, though most research on children's reactions to violence or conflict has focused on disruptive behavior, much as we have in this study, it is important for clinicians, researchers, and policy-makers to remain attuned to the possibility that children will present with non-externalizing symptoms in response to traumatic experiences.

Finally, our findings affirm the importance of socio-economic disadvantage as a risk factor for children's behavior problems, indicating potential advantages of policies designed to reduce inequality even for the youngest children. Clinically, our findings support the importance of an ecological approach to intervention and case conceptualization that includes consideration of family and community risk factors in work with young children.

Future Directions

Replication of our findings with longitudinal data and randomized intervention studies that target community-level risk and include measures of more proximal risk factors such as parenting would be valuable to confirm or disprove the directions of effect that we posit. In addition, like most neighborhood studies, we relied exclusively on census data to characterize the neighborhoods in our sample. Further study utilizing additional data sources—particularly those sources that address probable neighborhood-level mechanisms for neighborhood effects (e.g., residents' perceptions of neighborhood culture, actual level of institutional resources in a neighborhood)—is needed to more fully understand the means through which neighborhoods impact the social-emotional functioning of children and families. In addition, there is good reason to believe that neighborhood disadvantage may not represent the same phenomenon or have the same effects in Blacks versus other groups (Sampson, 2012). Studies with adequate representations of minority racial group members should evaluate the role of racial oppression in linking neighborhood disadvantage to child outcomes and should assess whether the effects of concentrated disadvantage differ for Blacks versus other groups. Finally, based on our findings, existing research programs testing neighborhood-level interventions should explore the effects of these interventions on toddlers.

Our results affirm the importance of violence or conflict exposure, familial disadvantage, parent depressive symptoms, and sub-optimal parenting behavior as risk factors for toddlers' disruptive behaviors. Further, our findings demonstrate additional support for the general finding of sex differences in the factors that enhance risk for disruptive behavior problems. Further research on the mechanism(s) through which violence or conflict exposure leads to disruptive behaviors in boys and girls and on the source of the sex differences identified in our analyses would be valuable.

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Table 1

Descriptive Statistics for Independent and Dependent Variables in Girls and Boys

Variable	Girls n=622	Boys n=582	Sig.
Child Age (months)	24.76 ± 7.17	24.59 ± 7.27	F=0.16
Violence/conflict exposure (# of exposures)	0.34 ± 0.62	0.34 ± 0.61	F=0.00
Violence/conflict exposure, % with 1 exposure	127 (20.8%)	124 (21.5%)	$\chi^2=0.11$
Violence/conflict exposure, % with 2+ exposures	38 (6.1%)	35 (6.0%)	$\chi^2=0.01$
Family disadvantage, % meeting criteria	30 (4.8%)	29 (5.0%)	$\chi^2=0.00$
Neighborhood disadvantage, % meeting criteria	29 (4.7%)	33 (5.7%)	$\chi^2=0.63$
Parent depression symptoms (CESD)	8.81 ± 7.80	8.84 ± 7.65	F=0.00
Parent overreactivity (O'Leary)	16.40 ± 5.15	16.58 ± 5.09	F=0.38
Parent laxness (O'Leary)	20.49 ± 6.36	21.66 ± 6.32	F=10.20**
Disruptive Behaviors (ITSEA)	0.48 ± 0.29	0.52 ± 0.31	F=4.95*

*
p<.05,**
p<.01

Table 2

Descriptive Statistics for Independent and Dependent Variables by Neighborhood Group

	Non-Disadvantaged n=1142	Disadvantaged n=62	Sig.
Child Age (months)	25.43 ± 7.05	24.64 ± 7.23	F=0.71
Violence/conflict exposure (# of exposures)	0.34 ± 0.61	0.37 ± 0.66	F=0.11
Violence/conflict exposure, % with 1 exposure	238 (20.8%)	13 (21.0%)	$\chi^2=0.01$
Violence/conflict exposure, % with 2+ exposures	69 (6.0%)	4 (6.5%)	$\chi^2=0.03$
Family disadvantage, % meeting criteria	48 (4.2%)	11 (18.6%)	$\chi^2=23.94^{***}$
Parent depression symptoms (CESD)	8.60 ± 7.57	12.84 ± 9.42	F=17.33 ^{***}
Parent overreactivity (O'Leary)	16.38 ± 5.07	18.41 ± 5.62	F=9.27 ^{**}
Parent laxness (O'Leary)	20.87 ± 6.19	24.44 ± 8.25	F=18.77 ^{***}
Disruptive Behaviors (ITSEA)	0.49 ± 0.30	0.68 ± 0.31	F=22.83 ^{***}

*
p<.05,**
p<.01,***
p<.001

Table 3

Demographic Characteristics for Full Sample and Neighborhood Groups

	Full sample n = 1204	Disadvantaged Neighborhood n = 62	Non-Disadvantaged Neighborhood n = 1142	Sig.
Maternal Age (years)	32.3 ± 6.2	27.1 ± 7.2	32.6 ± 6.1	F=47.47***
Maternal race-ethnicity				$\chi^2=114.26$ ***
White, non-hispanic	789 (65.5%)	7 (11.3%)	782 (68.5%)	
Black or African American	200 (16.6%)	33 (53.2%)	167 (14.6%)	
Hispanic	69 (5.7%)	13 (21.0%)	56 (4.9%)	
Multiracial/Multiethnic	100 (8.3%)	9 (14.5%)	91 (8.0%)	
Asian	28 (2.3%)	0	28 (2.5%)	
Other	18 (1.5%)	0	18 (1.6%)	
Maternal Education				$\chi^2=54.90$ ***
< High School	103 (8.6%)	18 (29.0%)	85 (7.4%)	
High School Graduate	221 (18.4%)	20 (32.3%)	201 (17.6%)	
> High School	389 (32.3%)	17 (27.4%)	372 (32.6%)	
Bachelor's or greater	482 (40.0%)	6 (9.7%)	476 (41.7%)	
Partner Status				$\chi^2=63.15$ ***
Married/Partnerd	971 (80.6%)	26 (41.9%)	945 (82.7%)	
Single	232 (19.3%)	36 (58.1%)	196 (17.2%)	
Income				$\chi^2=109.25$ ***
< Poverty line	215 (17.9%)	39 (62.9%)	176 (15.4%)	
100–185% of poverty line	186 (15.4%)	15 (24.2%)	171 (15.0%)	
>185% of poverty line	778 (64.6%)	6 (9.7%)	772 (67.6%)	

Note: Mean ± standard deviation is reported for all continuous variables. For categorical variables number (percent) is reported. Percentages may not sum to 100 due to rounding. F-values and χ^2 values pertain to differences between disadvantaged and non-disadvantaged neighborhoods.

* p<.05,

** p<.01,

*** p<.001

Table 4

Correlations Between Level 1 Variables

	1	2	3	4	5
1 Vio	—	.00	.25**	.06	.26**
2 Dis.	-.03	—	.16**	.16**	.05
3 Dep. Sx.	.24**	.14**	—	.21**	.35**
4 Laxness	-.02	.13**	.23**	—	.21**
5 Overreact.	.25**	.00	.44**	.28**	—

Note: Correlations for boys are shown above the diagonal, correlations for girls appear below the diagonal. Vio.= violence/conflict exposure; Dis.= family social disadvantage; Dep. Sx = parent depression symptoms; Overreact.= parental overreactivity.

* p < .05,
** p < .01,
*** p < .001.

Table 5

Parameters of Models Predicting to Toddlers' Disruptive Behavior

	Model 1		Model 2		Model 3	
	Girls	Boys	Girls	Boys	Girls	Boys
<u>Fixed Effects</u>						
Intercept	0.50*** (0.01)	0.50*** (0.01)	0.50*** (0.01)	0.50*** (0.01)	0.50*** (0.01)	0.50*** (0.01)
Vio./ Con.			0.02 (0.02)	0.08*** (0.02)		0.08*** (0.02)
Social Dis.			0.20*** (0.05)	0.16*** (0.05)	0.19*** (0.05)	0.14*** (0.05)
Dep. Sx			0.01*** (0.00)	0.00*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
Laxness			0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
Overreact.			0.01** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.01** (0.00)
<u>Random Effects</u>						
Neighb. Dis.	0.19*** (0.02)	0.19*** (0.02)			0.12*** (0.02)	0.12*** (0.02)
<u>% Variance explained</u>						
Within Neighb.	0.00		14.27		14.59	
Between Neighb.	26.66		81.62		85.26	
Total	2.00		18.75		19.29	
Goodness of fit	487.15		346.22		338.32	

Note: In all models, intercept values and goodness of fit statistics apply to the full model and are not separated by sex. Vio./Con.= violence/conflict exposure; Social Dis. = family social disadvantage; Dep. Sx=parent depression symptoms; Overreact.=parental overreactivity; Neighb. Dis.=neighborhood social disadvantage.. Goodness of fit statistic = $-2 \times \log\text{likelihood}$. X2 statistic represents a test of sex differences in the magnitude of the effect of the independent variable on the dependent variable.

* p < .05,

** p < .01,

*** p < .001.