Physical environmental adversity and the protective role of maternal monitoring in relation to early child conduct problems

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Abstract

Research on the development of child externalizing behaviors has focused on child and parenting factors, particularly in early childhood. Fewer studies have investigated the effects of aversive features of the micro-level physical environment, such as overcrowding and chaos in the home, and the macro-level environment, such as neighborhood quality. The current study extends the research on physical environmental factors by examining their association with children’s early externalizing behaviors, and exploring how maternal monitoring may serve as a protective factor in such contexts. The sample included 120 male toddlers at high risk for developing early externalizing behaviors who were followed from ages 2 to 5. Direct longitudinal associations were found for micro-level environmental factors beginning at age 2 and for neighborhood risk beginning at age 3. In addition, maternal monitoring was found to serve as a protective factor for child externalizing behaviors in the context of neighborhood risk. Implications for prevention research and the development of early externalizing behaviors are discussed.

KEYWORDS: Externalizing behavior, Parental monitoring, Home environment, Neighborhood quality
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1. Introduction

Recent research indicates that early-starting trajectories of child externalizing behaviors can be identified beginning in early childhood (Aguilar, Sroufe, Egeland, & Carlson, 2000; Campbell, Shaw, & Gilliom, 2000; Moffitt, 1990; Shaw, Gilliom, Ingoldsby, & Nagin, 2003). Both epidemiological and developmental studies beginning as early as age 2 have found externalizing behavior to be highly stable, particularly among males (Cummings, Iannotti, & Zahn-Waxler, 1989; Olweus, 1979; Shaw, Gilliom, & Giovannelli, 2000). Similar to older children, behavior problems beginning in early childhood are associated with child characteristics (Calkins, 1999; Caspi, Moffit, Newman, & Silva, 1997; Raine, Reynolds, Venables, Mednick, & Farrington, 1998), parental psychopathology (Leadbeter & Bishop, 1994; Osofosky & Thompson, 2000; Pannacione & Wahler, 1986; Rose, Rose, & Feldman, 1989; Shaw & Vondra, 1995), parenting (Gardner, Sonuga-Barke, & Sayal, 1999; Shaw, Winslow, Owens, Vondra, Cohn, Bell., 1998; Shaw, Gilliom, Ingoldsby, Nagin; 2003), and distal, sociodemographic risk factors, such as parent education, marital status, childbearing age, and neighborhood violence (Chase-Lansdale, Gordon, Brooks-Gunn, & Klebanov, 1997; McLanahan, 1997; Nagin, Pagani, Temblay, & Vitaro, 2003; Wilkstrom & Loeber 1999); i.e. both micro (home & family) and macro (community) physical environment.

For the purposes of the current paper, the physical environment is defined as the material setting in which social transactions occur, including both the home environment (e.g. Matheny & Phillips, 2001; Wachs, 1989; Wohlwill & Heft, 1987) and the community (e.g. Evans & English, 2002; Evans, Lercher, Meis, Ising & Kofler, 2001). Thus, the social environment both occurs in and is influenced by the context of the physical environment (Wohlwill, 1983). Characteristics of the physical environment, including small enclosed physical spaces, have been shown to alter individual’s social behavior. For example, elevators have been found to
increase individuals’ tendency to withdraw from social interaction and overcrowded prisons have been associated with increases in aggression towards others (Burgess & Fordyce, 1989; Lawrence & Andrews, 2004; Regoeczi, 2003).

As multiple disciplines (e.g., business, sociology, community, ecology, epidemiology; Blalock, 1984; Bronfenbrenner, 1979; Kellam, Koretz, & Moscicki, 1999; Shinn & Rapkin, 2000; Spence, 1999) have studied these contexts, it should not be surprising that there is variability in how micro- and macro-environments have been defined. For the purposes of the current paper, we define the micro-level environment as the immediate or intimate settings such as the classroom, family, peer group, or work place (Brofenbrenner, 1979; Kellam et al., 1999) where children have daily contact with other children and/or adults. The macro-level environment encompasses a child’s broader context, including the neighborhood and surrounding community that forms a culture or subculture in which the child lives (Brofenbrenner, 1979; Kellam et al., 1999).

Though studies have examined many of these factors independently, few have examined how both micro-level family factors and macro-level community factors may be related to the development of early externalizing behaviors (Ackerman, Brown, & Izard, 2004; Ackerman, Kogos, Youngstrom, Schoff, & Izard, 1999; Keller, Spieker & Gilchrist, 2005; Shaw, Winslow, Owens, & Hood, 1998). In addition, there have been few studies examining potential protective factors that might buffer the negative effects of family and community environmental risk on the development of children’s early externalizing behaviors.

1.1. Environmental adversity: Chaotic, low structure environments

Research has found that lack of structure in both micro- (e.g., Dumas, Nissley, Nordstrom, Smith, Prinz, & Levin, 2005; Shaw, Criss, Schonberg & Beck, 2004; Shaw, Dishion, Supplee, Gardner & Arndt, 2006) and macro-level environments (e.g., Brody et al., 2001; Kohen, Brooks-Gunn, Leventhal, & Hertzman, 2002; Leventhal & Brooks-Gunn, 2000; Sampson, Raudenbush & Earls, 1997) is related to the development of behavior problems.
Wilson and Neckerman (1987) argue that the lack of routines and structure in the micro-environment (e.g. chaotic home) may simply mirror similar breakdowns in the macro-environment (e.g. low collective efficacy in the neighborhood). Homes characterized by high chaos and/or overcrowded conditions have elevated rates of conflict, competition for resources, and few routines and organization (Dumas, Nissley, Nordstrom, Phillips Smith, Prinz, & Levine, 2005; Evans, Lepore, Shejwal & Palsane, 1998; NICHD ECCRN, 2004; Regoeczi, 2003), all of which have been found to contribute to the development of children’s externalizing behaviors (e.g. Cox, Paulus, & McCain, 1984; Low & Stocker, 2005; Regoeczi, 2003; Shaw, Dishion, Supplee, Gardner, & Arnds, 2006; Webster-Stratton & Hammond, 1999).

Similarly, neighborhoods that are low in social structure (e.g., collective efficacy) have been found to have residents who demonstrate elevated rates of externalizing behaviors (Brody et al., 2001; Kohen, Brooks-Gunn, Leventhal, & Hertzman, 2002; Leventhal & Brooks-Gunn, 2000; Sampson, Raudenbush & Earls, 1997). Children living in neighborhoods low on social structure would be expected to more often witness peers or adults engaging in deviant behavior and similar to the home, having the externalizing behavior being condoned by omission.

1.2. Physical environmental contributions to child externalizing behaviors

Growing up in a low-socioeconomic (SES) environment has been identified as a risk factor for the development of child behavior problems (Chase-Lansdale & Gordon, 1996; Dodge, Pettit, Bates, 1994; Duncan, Brooks-Gunn, Klebanov, 1994; Leventhal & Brooks-Gunn, 2000) and the same low SES environments have been found to have a high number of physical environmental risk factors (e.g. overcrowding, poor neighborhood quality, chaos; Evans, 2004; Federman et al., 1996; Myers, Baer, & Choi, 1996). In turn, these risk factors place children at greater risk for the development of behavior problems.

1.3. Micro-Level Environmental Factors

1.3.1. Overcrowding.
Overcrowding in the home has been consistently found to be related to negative outcomes for humans and animals in multiple contexts (e.g., Cox, Paulus, & McCain, 1984; Maxwell, 2003; Ouagazzal, Moreau, Pauly-Evers, & Jenck, 2003; Regoeczi, 2003; Xigeng et al., 2004). Overcrowding has been defined in terms of density of living space, with having more persons than rooms useable for living typically considered overcrowding (i.e., bedrooms, living rooms; Rutter, Yule, Quinton, Rowlands, Yule, & Berger, 1975; United States Census Bureau [USCB], 2000). Families living in poverty tend to experience overcrowding in the home because of their inability to afford larger accommodations, often necessitating the sharing of a residence by extended family members (e.g. grandparents; Baydar & Brooks-Gunn, 1998; Caputo, 1999). When examined simultaneously, overcrowding in the home has proved to be a more reliable predictor of child externalizing behavior than family size (Fagan & Najman, 2003; Kalff et al., 2001).

Overcrowded conditions in the home have been associated with child (Shaw, Winslow, Owens & Hood, 1998), adolescent (West & Farrington, 1977) and adult behavior problems (e.g., Lawrence & Andrews, 2004; Kposowa, Breault, & Harrison, 1995; Schichor, Decker & O’Brien, 1980). Such associations have been attributed in part, to higher rates of conflict among residents in more crowded conditions (Evans, Lepore, Shejwal & Palsane, 1998; Regoeczi, 2003) and competition for resources, such as individual attention and emotional support (NICHD ECCRN, 2004). Because of the relatively large percentage of time toddlers spend in the home environment relative to the neighborhood and broader community, we expected associations between overcrowding and externalizing behaviors to be evident earlier than for macro-level factors such as neighborhood quality.

1.3.2. Chaos in the home.

Chaotic homes are characterized by frequent foot traffic (e.g., neighbors, family, children), phone calls, and noise (e.g., children, electronics, etc.), as well as disorganization (e.g., difficult to find items, Dumas, Nissley, Nordstrom, Smith, Prinz, & Levin, 2005). Chaotic
homes may have frequent transitions of adults and children in the environment and are a centralized socialization location for the extended family and neighborhood members. The measurement of chaos provides a qualitatively rich assessment of the organizational structure of the home, and while chaos may occur more often in overcrowded homes, previous research suggests that chaos and the number of people in a home are only modestly related (Dumas et al., 2005).

Chaos in the home, a micro-level factor in the current study, has been negatively associated with cognitive (Petrill, Pike, Price, & Plomin, 2004) and social development in preschool-age children (Wachs, Gurkas, Kontos, 2004) and child behavior outcomes in school-age children (Dumas et al., 2005). In addition, chaos in the home has been associated with parenting factors that contribute to the development of externalizing behavior (e.g., maternal responsivity; Corapci & Wachs, 2002), and factors shown to compromise caregiving skills (e.g., parenting stress; Dumas et al., 2005; Evans, Lepore, Shejwal & Palsane, 1998). With the exception of the literature above, little research has been conducted on associations between chaos in the home and child externalizing behaviors, particularly in early childhood. Similar to overcrowding, it is hypothesized that chaos will be directly related to children’s behavioral outcomes at earlier ages than macro-level environmental factors due to the higher amount of time young children spend in the home versus their neighborhood (Research Connections, 2005).

1.4. Macro-Level Environmental Factors

1.4.1. Neighborhood Quality.

The majority of research investigating associations between physical environmental factors and child outcomes has focused on neighborhood quality (e.g., Greenberg et al., 1999; Kohen et al., 2002; Leventhal & Brooks-Gunn, 2004 Sampson, 1983; Sampson, Raudenbush, & Earls, 1997). Typically, low SES neighborhoods include risk factors such as poverty (Leventhal & Brooks-Gunn, 2003), high unemployment (McLoyd, 1990), and dangerousness (Wilkstrom &
Loeber, 1999), all of which have been associated with child externalizing behaviors (Brooks-Gunn, Ducan, Klebanov, & Sealand, 1993; Chase-Lansdale and Gordon, 1996; Deater-Deckard, Dodge, Bates, & Pettit, 1998). Though there are multiple theories of mechanisms by which neighborhoods influence the development of externalizing behavior, most models focus on lack of access to individuals with education and employment (e.g. Wilson, 1996), lack of collective efficacy (e.g. Sampson et al., 1997), normalization of violence, and exposure to deviant peers (e.g. Guerra, Huesmann, & Spindler, 2003; Schwab-Stone et al., 1995).

Previous research has focused most heavily on neighborhood effects for adolescents (Ingoldsby & Shaw, 2002) because of their greater reliance and time spent outside of the home and in the neighborhood relative to younger children, which would potentially make them more susceptible to the influence of deviant neighborhood peers and adults in communities where collective efficacy is low (e.g., Dishion, Capaldi, Spracklen, & Li, 1995). However, in the most impoverished North American neighborhoods, research suggests that children as young as age 3 can be directly affected by their neighborhood quality after accounting for more proximal risk factors (Brooks-Gunn, Duncan, Klebanov, & Sealand, 1993; Kohen et al., 2002). Specifically, the presence of few managerial and professional workers in the neighborhood has been associated with later externalizing problem among 3-5 year old children, with similar results found for other neighborhood factors and later externalizing problems (Brooks-Gunn et al., 1993; Kohen, Brooks-Gunn, Leventhal, & Hertzman, 2002; Matheny & Phillips, 2001; Winslow & Shaw, 2005). However, to our knowledge, previous research has not examined the influence of neighborhood quality on externalizing behavior in children younger than three. In contrast to micro-level physical environment factors, for which we anticipate associations with externalizing behaviors to be evident earlier, we do not expect to see significant associations between neighborhood factors and child externalizing behaviors to emerge until at least age 3 when children begin to spend more time outside of the home through their growing independence and
new relationships with peer groups outside of the family (Chase-Lansdale, Gordon, Brooks-Gunn, & Klebanov, 1997; Duncan, Brooks-Gunn, & Klebanov, 1994).

1.5. Parental monitoring in the context of overcrowding in the home, chaos and poor neighborhood quality and child behavior outcomes

At a broad level, parental monitoring of children’s activities and well-being has been widely studied in relation to child externalizing behavior, but primarily with school-age and adolescent populations (e.g. Dishion & McMahon, 1998; Leventhal & Brooks-Gunn, 2000; Loeber & Dishion, 1983; Pettit, Laird, Dodge, Bates, & Criss, 2001). Parental monitoring has been defined as a set of correlated parenting behaviors involving attention to and tracking of children’s whereabouts and activities (Dishion & McMahon, 1998).

While much of the research on parental monitoring has been focused on school-age children and adolescents (e.g., Brown, Mounts, Lamborn, & Steinberg, 1993; Fletcher, Darling, & Stenberg, 1995; Kolko & Kazdin, 1986, 1990), the importance of parental monitoring in children’s activities can be traced back to early childhood, particularly toddlerhood. During these years, young children gain a newfound independence (e.g. walking and talking) that often requires active monitoring on the part of their caregivers to ensure the safety of the child, valuable property, pets, and other family members (Shaw, Bell & Gilliom, 2000). For example, low parental monitoring has been related to increased accidental poisonings in children 3 to 7 years of age (Brayden, MacLean, Bonfiglio, & Altemeir, 1993), exposure to household safety hazards in children between the ages of 6 months to 4.5 years (Glik, Greaves, Kronenfeld, & Jackson, 1993), and handling of hazardous substances in grocery stores in preschool-age children (Harrell & Reid, 1990). In the context of schools, higher rates of student victimization have been found in overcrowded classrooms (Khoury-Kassabri, Benbenishty, Astor, & Zeira, 2004), which has been attributed to teacher’ inability to monitor and actively engage students.

It is reasonable to expect similar dynamics in overcrowded or chaotic homes, where parents are less able to monitor child behavior. In addition, in an overcrowded or chaotic home
where there are multiple adults and children within enclosed areas with frequent distractions, interruptions and competition for attention makes it challenging for mothers to spend focused time with one particular child. In fact, preschool-age children who spend more time wandering aimlessly not interacting with their mother or being monitored by her have been found to have an increased risk of externalizing behavior over time (Gardner, Ward, Burton, & Wilson, 2003).

However, a parent who addresses the challenges posed by a chaotic or overcrowded home or dangerous neighborhood by more rigorously structuring the child’s home environment and monitoring the child’s activities in the neighborhood may decrease the risk of child externalizing behavior. For example, parents high on monitoring would be expected to more regularly know where the child is and what the child is doing, as well as setting aside time to connect personally with the child (e.g., playing, talking with them during housework). In fact, past research indicates that parents of early adolescents who effectively monitor their children’s exposure to neighborhood influences, such as playmates, have children with low levels of externalizing behavior (Brody et al., 2001; Pettit, Bates, Dodge, & Meece, 1999).

Therefore, a second goal of the current study is to examine the potential protective effects of maternal monitoring in relation to different types of physical environment risk. Though parental monitoring has been shown to be associated with reduced risk of delinquent activity for adolescents (Patterson & Stauthamer-Loeber, 1984), few studies have examined if monitoring serves as a protective factor in relation to externalizing behavior within the context of physical environment risk in early childhood (Shaw et al., 2006).

1.6. Study hypotheses

The current study tested two hypotheses. First, based on previous research, we expect to find direct associations between overcrowding and chaos in the home, neighborhood quality, and later child externalizing outcomes both at home at age 4 and in school at age 5.5. We expect such relations to be found beginning at age 2 for overcrowding and chaos, but not until age 3 for neighborhood quality. Second, we hypothesize that maternal monitoring at age 2 and
3 will serve as a protective factor to moderate the effects of chaos and overcrowding in the home, and neighborhood dangerousness on children’s later externalizing behaviors.

2. Method

2.1. Participants

Participants included 120 mother-son dyads recruited from the Women, Infant and Children (WIC) Nutritional Supplement Program in the Pittsburgh, PA metropolitan area. The sample was restricted to male children due to the greater prevalence of serious behavioral issues in male versus female children. Families were approached at WIC sites and invited to participate if they had a son between 17 and 27 months old, following a screen to ensure that they met the study criteria by having socioeconomic, family, and/or child risk factors for future behavior problems. Two or more of the three risk factors were required for inclusion in the sample. Of 271 families who participated in the screening, 124 families met the eligibility requirements and 120 (97%) agreed to participate in the study. The children in the sample had a mean age of 24.1 months ($SD = 2.8$). At the time of assessment, the mean age of mothers was 27.2 years ($SD = 6.1$), with a range between 18 and 45 years of age. The average family income was $15,374 per year ($SD = 8,754$), with per capita income $3,594 ($SD = 2,076$) per family member. The mean level of education attainment for mothers was 12.23 years ($SD = 1.41$), with approximately 66.6% of the sample having a high school education or less. In terms of ethnicity, 48.3% were African American, 40.0% were European American, and 11.7% were biracial. At the time of the initial assessment, 45% were married or living together, 50% were single and never married, and 5% were separated, divorced, or widowed.

Mothers and their sons were approached at eight WIC sites in the Pittsburgh metropolitan area and asked if they would be willing to complete a series of questionnaires about the “Terrible Two’s.” The questionnaires were focused on the child’s disruptive behavior and emotionality, parenting hassles, and maternal depressive symptoms and took approximately 20-25 minutes to complete. Participants who completed this screen received
compensation for their assistance. Families who met criterion for study inclusion based on socioeconomic status (i.e., maternal education and family income) and either or both family and/or child risk (e.g., maternal depressive symptoms or substance abuse; child externalizing symptoms), were contacted about participating in a more intensive study, of which fifty percent would have the opportunity to take part in a home-based, family intervention. If risk criterion were attained for only socioeconomic and family risk, mothers were also required to rate children above the normative mean on either the Intensity or Problem factors of the Eyberg Behavior Inventory.

Mothers and sons 1.75 to 2.5 years of age who met eligibility requirements and who agreed to participate in the study were then scheduled for a 2.5-hour home visit. The home visit included both videotaped structured tasks (e.g., a clean up task, delay of gratification, cooperative play) for the mothers and sons to participate in as well as time for the mothers to complete questionnaires. Families were compensated for participating in this home visit. Immediately following the first assessment, families were randomly assigned to a treatment or no-treatment condition. Those families assigned to the treatment condition were presented with the opportunity to meet with a parent consultant for two or more sessions. The sessions would include a time for the parent consultant to get to know the family (session one) and a time for the parent to receive feedback on the child’s behavior, which employed motivational interviewing techniques (session two). If desired, the families could participate in follow-up sessions with the parent consultant to address parenting issues. For additional details on the intervention, see Shaw and colleagues (2006). Although the intervention was strictly voluntary, 92% of the families participated in the feedback and a smaller percentage (41%) engaged in one or more additional sessions with the parent consultant. For the purposes of the current study, the family’s treatment status was used as a covariate in the analyses.

When the children were approximately 3 ($N = 112, 93\%$ retention) and 4 ($N = 109, 91\%$ retention) years of age, families participated in follow-up home visits. These follow-up home
visits occurred annually, one and two years after the original assessment when children were 1.75 to 2.5 years of age. Therefore, at the age 3 home visits the children ranged from 2.75 years to 3.5 years of age and at the age 4 home visit children ranged from 3.75 years to 4.5 years of age. The final home visit was conducted 1.5 years after the age 4 visit (children were 5.5-6 years of age) to ensure that the child would be attending school. These visits were similar in structure and measures used to the initial home visit, with a few alterations in the observation procedures to match the child’s developmental status. Families were reimbursed for their time at each of the follow-up assessments. There were no differences in the participants who were not retained based on socioeconomic status at age 3, $F(1, 119) = .16$, ns, or age 4, $F(1, 119) = 2.34$, ns. In addition, when the children were 5.5-6 years of age, their classroom teachers were contacted to complete a number of questionnaires on child behavior. Of the children who completed the age 4 assessment, 72 (72%) teachers completed and returned these measures and received compensation for their time. There were no significant differences at age 2 between those children who did and did not have teacher reports at age 5.5-6 on socioeconomic status, $F(1, 119) = 2.02$, ns, maternal monitoring, $F(1, 119) = 1.71$, ns, externalizing behavior, $F(1, 119) = .29$, ns, or neighborhood quality, $F(1, 119) = .15$, ns.

2.2. Measures

2.2.1. Demographics.

At both assessments the mothers reported on demographic characteristics of their household, including family income, education levels, number of children and adults in the home, and size of the family home. A composite of the family’s socioeconomic status was created by standardizing each variable and then creating a composite for income and education. Child ethnicity was included as a covariate because of research on low-income children suggesting the potential for ethnic biases for teacher’s ratings of children’s behavior problems (Lau, Garland, Yeh, McCabe, Wood, & Hough, 2004).

Maternal monitoring was measured using three observable items from the infant-toddler version of the *Home Observation for Measurement of the Environment* (HOME). The HOME is a measure of the quality of the home environment that was completed by a trained examiner at the end of the first home visit. The three items that were used to represent maternal monitoring were: 1) parent keeps child in visual range, 2) parent talks to child while doing housework, and 3) parent structures child’s play (α = .53 at age 2 and .56 at age 3). In the current study, the items were considered observer impressions and therefore no inter-rater reliability was calculated, which may contribute to the factor’s low internal consistency. Previous research has found negative associations between HOME maternal monitoring scores and child problem behavior (Shaw et al., 2006).

2.2.3. *Confusion, Hubbub and Order Scale* (CHAOS; Matheny, Wachs, Ludwig, & Phillips, 1995).

The CHAOS is a 15-item measure of environmental confusion. Items are derived from a list of factors typically found in chaotic homes. Previous research has found the measure to have good internal consistency (α = .79; α = .84 in the current sample) and test-retest reliability (r = .74), and to be correlated with observations of environmental confusion (e.g., noise measurement, number of siblings, r = .30-.55). Recent research has also found the measure to be significantly correlated with the externalizing subscale of Achenbach’s Child Behavior Checklist and Teacher Report Form, as well as with the anger-aggression subscale of the Social Competence and Behavior Evaluation, Short Form (parent version) (Dumas et al., 2005). As the CHAOS measure was a late addition to the age 2 assessment battery, the initial families were not administered the questionnaire. However, all participants did complete the questionnaire at the age 3 assessments.

2.2.4. *Overcrowding in the home*.

The overcrowding variable was obtained from information gathered during a demographic interview, and derived by taking the ratio of the number of people reported to be
Living in the home to the number of rooms (not counting bathrooms or hallways) in the home. This variable was found to have a skewed distribution (skewness = 1.40) and therefore a log transformation was used to normalize scores.

2.2.5. **Neighborhood quality.**

The measure of neighborhood quality was based on data gathered from official records, including: 1) overcrowding in the neighborhood (i.e., number of housing units within the family’s census tract from the 2000 Census, Regoeczi, 2003), 2) rates of crime based on FBI reporting of serious crime (e.g., murder, manslaughter, rape, United States Department of Justice, 2005) and 3) the percentage of people in the census-tract living below the poverty line according to U.S. Census data (2000). All three of these items have been found to be associated with high levels of neighborhood deviance and low levels of collective efficacy (e.g., Sampson, 1983; Sampson et al., 1997). The final score of neighborhood quality was created using the regression coefficient generated by a factor analysis, with a higher score indicating a higher quality neighborhood (eigenvalue = 1.73; percentage of variance explained = 57%).

2.2.6. **Child behavior problems: Mother report.**

To assess children’s externalizing behaviors, the Child Behavior Checklist 4-18 (Achenbach, 1991a) was used to measure maternal report of child externalizing behavior (including delinquent and aggressive behavior) at the age 4 assessments. The CBCL is one of the most widely used behavior checklists of childhood behavior problems and has been found to be significantly correlated with similar measures of child behavior problems. In addition to correlations with other self-report measures of behavior problems (i.e. Strengths and Difficulties Questionnaire, \( r = .84 \)), the CBCL has been shown to be a good predictor of clinical referral for behavioral issues (Achenbach, 1991a). The externalizing factor demonstrated satisfactory internal consistency in the current sample (\( \alpha = .87 \)).

2.2.7. **Child behavior problems: Teacher report.**
Classroom teachers were asked to complete the Teacher Report Form (TRF) (Achenbach, 1991b) when the children were between 5.5 to 6 years of age. The TRF assesses teacher perceptions of the frequency (ranging from 0 “not true” to 2 “very true”) of 113 problem behaviors that a child may display in school, for which both broad- (e.g., externalizing) and narrow-band (e.g., aggression, delinquency) factors of conduct problems can be derived. The TRF is widely used, is considered to be a reliable measure of child behavior problems, and has been found to be significantly correlated with other teacher report measures of child behavior problems in a high risk sample ($r = .77$ with oppositional defiance and conduct disorder scales of the Child Symptom Inventory-4T) and with clinical referrals for mental health and special education services (Achenbach, 1991b). The externalizing behavior factor had high internal consistency in the current sample ($\alpha = .97$).

3. Results

Descriptive statistics for all study variables are provided in Table 1. To interpret the current findings, a better understanding of the risk status of the sample is necessary. At both age 2 and 3, 15.8% of the boys lived in an overcrowded home. The family’s age 2 and 3 chaos scores ($M_2 = 5.92, SD_2 = 3.82; M_3 = 5.82, SD_3 = 3.87$) were somewhat higher than those reported by Dumas and colleagues’ (2005) original study using both a normative sample of kindergarten families ($M = 3.99, SD = 3.42$) and a low-income sample of third-grade children ($M = 2.90, SD = 3.03$). Finally, t-scores on the CBCL and TRF Externalizing factors support the behavioral risk status of the current sample. Approximately 46% of the boys were reported by mothers to be above the 84th percentile on the CBCL and 23.6% of the children were above the 84th percentile for the TRF in kindergarten.

3.1. Relationships between environmental factors at ages 2 and 3 on mother- and teacher-reported child behavior problems

The first goal was to examine the direct relationships between physical environmental variables and child behavior. As shown in Table 2, bivariate correlations indicated that chaos in
the home at both ages 2 and 3 was significantly related to mother’s but not teacher’s report of child behavior problems at ages 5.5-6. In addition, maternal monitoring at age 3 was negatively related to both maternal and teacher report of child behavior problems at school entry. Surprisingly, there were no significant relationships between neighborhood quality and either mother- or teacher-reported externalizing behavior.

Due to significant relationships found for socioeconomic status and child ethnicity in relation to predictor and/or outcome variables, these variables were included as covariates in subsequent analyses. However, because no associations were found between the family’s treatment group assignment and either predictor or outcome variables, treatment status was not included in subsequent analyses to reduce the number of parameters and increase power to detect effects.

3.2. The effect of maternal monitoring at ages 2 and 3 on moderating the relationship between physical environmental factors and child outcomes

Our second goal was to assess the potential moderating influence of maternal monitoring on attenuating associations between physical environmental variables and child externalizing problems. To ensure that there were a similar number of mothers high and low on monitoring in all three environments, the maternal monitoring and the environmental variables were dichotomized into high and low levels. Chi-square analyses indicated that a similar number of mothers high on monitoring were in both high and low chaos homes at age 2, \( \chi^2(1, 120) = .03, \text{ ns} \), and age 3, \( \chi^2(1, 107) = .91, \text{ ns} \), in both high and low overcrowded homes at age 2 \( \chi^2(1, 120) = .45, \text{ ns} \) and age 3 \( \chi^2(1, 107) = .02, \text{ ns} \), and in high and low quality neighborhoods at age 3, \( \chi^2(1, 107) = .96, \text{ ns} \). There was a significant chi-square for maternal monitoring and neighborhood quality at age 2, \( \chi^2(1, 120) = 4.56, p < .05 \), with more mothers high on monitoring in low quality versus high quality neighborhoods.

Using hierarchical linear regression, child ethnicity and socioeconomic status were entered first in each equation, followed by the entry of the physical environmental variables and
individual two-way interaction terms for maternal monitoring and the physical environmental variables (see Tables 3 and 4). When an interaction term was significant, a test of simple slopes (Aiken & West, 1991) was used to investigate the pattern of slopes at low, average, and high levels of the moderator.

The overall equation examining the direct effects of the age 2 environmental variables on the child’s age 4 externalizing behavior at home was not significant; however, the equation examining the direct effects of the age 3 environmental variables was significant, $F(8, 88) = 3.62, p < .001, R^2 = .18$, with direct effects for neighborhood quality, chaos, and a significant interaction between monitoring and neighborhood quality. The test of simple slopes revealed poor neighborhood quality was associated with higher levels of externalizing behavior at age four at low and mean levels of maternal monitoring (slope = -4.11, $p < .01$ & slope = -1.87, $p < .01$ respectively), but not at high levels of maternal monitoring (slope = .36, ns, see Figure 1).

Similar findings emerged using the same equation to predict teacher’s report of children’s externalizing behavior at school at age 5.5. The overall equation examining the effect of the age 2 physical environmental variables was not significant, but the equation including age 3 physical environmental variables was significant, $F(8, 56) = 4.02, p < .001, R^2 = .27$. There were significant direct effects for neighborhood quality, overcrowding in the home, chaos in the home, and the interaction between neighborhood quality and maternal monitoring. To examine the nature of the interaction, a test of simple slopes was computed and revealed that poor neighborhood quality was associated with higher levels of externalizing behavior at low and mean levels of maternal monitoring (slopes = -8.26 and -13.67, $p < .01$ for both), but was not significant at high levels of maternal monitoring (slope = -2.85, see Figure 2).

4. Discussion

The purpose of this study was to examine associations between risk factors in children’s physical environment and the development of early externalizing behavior. In addition, we investigated the potential protective role of maternal monitoring in relation to risk factors in the
physical environment. In general, both micro- and macro-physical environmental risk factors were related to later child externalizing behavior; however, the effects of overcrowding and neighborhood quality emerged only after accounting for sociodemographic variables. Direct effects of neighborhood risk on children’s externalizing problems were not evident until age three and only when accounting for sociodemographic risk, whereas associations between chaos in the home and later externalizing behaviors were present beginning at age two. Additionally, maternal monitoring was found to attenuate the negative association of poor neighborhood quality and children’s later externalizing behavior.

4.1. Direct effects of physical environmental factors on later externalizing behavior

Consistent with our hypotheses, there were direct associations between physical environmental variables and children’s later externalizing behavior. Corroborating recent research (Dumas et al., 2005), maternal reports of chaos in the home were directly related to children’s later externalizing behavior at age 4. In addition, after controlling for child SES and ethnicity, chaos was also positively associated with teacher reports of externalizing problems at school when the children were 5.5 years old. Interestingly, Dumas and colleagues (2005) found similar relationships between chaos and maternal-reported behavior problems with third-grade children; however, in the Dumas and colleagues’ study after controlling for sociodemographic variables, associations with teacher-reported problems were no longer evident. The current findings suggest that at least for low-income boys at elevated risk for externalizing behaviors, chaos in the home may be associated with problematic child behavior in the early grades at school. It may be that children living in chaotic homes may not develop the necessary regulatory skills to behave in a structured context, making the transition to the classroom challenging.

One possible reason to explain the different pattern of findings found in the current study and by Dumas and colleagues (2005) is sample selection. Whereas in the Dumas study children were not selected based on risk factors associated with early-starting externalizing problems, a gating procedure was used to recruit the sample in the current study. Socioeconomic risk
factors accounted for associations between chaos and school-based externalizing problems in Dumas’ sample of non-selected children; however, perhaps because children in the current study were required to have risk factors present beyond socioeconomic factors, controlling for socioeconomic risk did not attenuate associations between chaos and externalizing behaviors at school. In fact, SES appeared to serve as a suppressor variable, amplifying the association between chaos and externalizing when included as an independent variable in the regression equation.

Overcrowding in the home also was expected to be directly associated with child externalizing behavior in the home and at school. However, this association was only evident for children’s school-based externalizing when the children were 5.5 years old and only after controlling for sociodemographic variables. It may be that in overcrowded homes it is difficult for the mother to observe and therefore accurately report children’s deviant behavior, or that because of the lack of space a higher threshold of child disruptive behavior is tolerated by parents, or that this relationship emerges at later ages (i.e. age 5.5 versus 4). Another possibility is that because of less space, overcrowded homes may elicit more hostile interactions among family members. Although condoned in the context of an overcrowded home, the child may demonstrate similar acrimonious ways of interacting with peers and teachers in the school context, which would more likely be viewed as problematic by teachers.

Regarding neighborhood risk and children’s emerging externalizing behavior, the findings were largely consistent with a small number of studies conducted in early childhood (Brooks-Gunn et al., 1993; Kohen et al., 2002; Winslow & Shaw, 2005). First, as expected, neighborhood effects were found on later child externalizing behaviors, but were not evident until age three. This finding supports previous research (Brooks-Gunn et al., 1993) that neighborhood effects tend to grow as children age and become more independent, providing greater opportunity for direct exposure to neighborhood influences. Second, direct neighborhood effects on later externalizing problems were not evident in correlational analyses,
but did emerge in multivariate analyses that incorporated the influences of family income and maternal education. It may be that, particularly for young children, macro-level factors such as neighborhood quality only become salient after taking into consideration the more proximal influences of income and parental education. In the current study, family income and parental education might have served as proxies for other factors that affect risk for externalizing problems, such as access to high-quality child care and material resources. For young children, the effects of neighborhood quality on later externalizing problems may only be evident when family resources are also low. Though some research has found concurrent interactions between home and neighborhood environments (e.g. Kohen et al., 2002), future research should explore how home and neighborhood factors interact to exacerbate risk on externalizing behaviors over time (e.g. lack of emotional support in the home during infancy and toddlerhood in combination with poor neighborhood during the preschool years).

Whereas the early school years are cited as the time where children begin to have more regular direct contact with neighborhood influences (Farver & Garcia, 1997; Guerra, Huesmann, & Spindler, 2003), this study corroborates previous research suggesting that children as young as preschool age can be influenced by neighborhood factors (Osofsky, 1995). Although our measure of neighborhood did not assess how much time children actually spent in the neighborhood and their specific exposure to aspects of the neighborhood and must be therefore interpreted with caution, the findings are consistent with the notion that exposure to neighborhood influences may be important beginning in early childhood; these negative effects of this exposure can be mitigated by parental monitoring. (Brooks-Gunn et al., 1993).

4.2. Maternal monitoring as a buffer against negative physical environmental risk

Maternal monitoring was not found to act as a buffer of micro-level physical environmental factors in the home (i.e., chaos, overcrowding), but was found to serve as a protective factor in relation to neighborhood risk. The finding suggests that in the most disadvantaged neighborhoods, maternal monitoring in the preschool years may serve a similar
function as parental monitoring of adolescents. Research with adolescents has demonstrated how parental monitoring can buffer the effects of living in a poor quality neighborhood (Dishion & McMahon, 1998; Dishion Andrews, Kavanagh, & Soberman, 1996; Loeber & Dishion, 1983; Pettit et al., 2001; Waizenhofer, Buchanan, & Jackson-Newsom, 2004), particularly in relation to the development of drug use and delinquency. Parents’ use of effective monitoring techniques in the preschool period may protect children from beginning associations with deviant peers or older children and implicitly let children know that externalizing behavior outside of the home will not be condoned (Pettit et al., 2001).

The current results also suggest that interventions promoting the development of monitoring and proactive parenting should be given consideration beginning in early childhood, particularly for those children living in high-risk neighborhoods. The toddler period appears to be a critical developmental point in establishing early-starting trajectories of conduct problems for at-risk children (Shaw et al., 2003). Thus, targeting malleable risk factors that are associated with early-starting externalizing and conduct problem behavior patterns, such as maternal monitoring, should be a priority for prevention scientists.

It is interesting that maternal monitoring did not buffer the effects of chaos or overcrowding on externalizing behavior for these children. Theoretically if the mother shapes the home environment through her behavior, it may be that those mothers in high chaos homes do not have the organizational skills to effectively monitor and structure their child’s environment. However, there were similar numbers of mothers in the current sample high on monitoring were present in each context, indicating that there may be alternate explanations.

One possible explanation for this finding is that neighborhood quality is a more macro-level context and therefore more amenable to the influences of maternal monitoring. This is in contrast to the home environment, for which contact with the child occurs on a daily basis. Parents living in poor quality neighborhoods have noted one protective factor they use -- keeping their children in the home (Blakely, 1994; Jarrett, 1997; Spilsbury, 2005). However, if
the home is overcrowded, it is difficult to know how effectively a mother could monitor children within this challenging environment. A second possible explanation for the finding high maternal monitoring did not lessen the effect of micro-level factors is that micro-level family factors such as chaos and overcrowding are strong predictors of child adjustment and exposure to high levels of these risk factors is challenging to overcome. Therefore, maternal monitoring, even at the highest level, would have only modest influence on these risk factors.

4.3. Limitations

There are several limitations that need to be considered in interpreting the current findings. First the sample only includes low-income, high-risk, urban male toddlers from primarily two ethnic groups. Additional research with children from more diverse socioeconomic strata and region, as well as girls is necessary to better understand the implications of the findings. Second, the current study would have benefited from direct measurement and observation of physical environmental variables (e.g. using multiple methods including scientific measurement of noise and organization in addition to mother and home visitor ratings of chaos) to better capture the quality of the home and immediate neighborhood environment. More research is needed to replicate the current findings using more observationally-based methods.

4.4. Summary and Conclusions

The results of this paper provide support for the importance of physical environmental contributions in relation to early developing child externalizing problems. In addition, the findings highlight the protective role of maternal monitoring in relation to neighborhood risk beginning in early childhood. Future prevention studies targeting family process issues may want to consider the potential buffering role of maternal monitoring for children living in high-risk neighborhoods.
Acknowledgements

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Table 1

*Descriptive statistics for predictor and outcome variables*

<table>
<thead>
<tr>
<th>Predictor Variables</th>
<th>Mean</th>
<th>SD</th>
<th>Range in sample</th>
<th>Possible Range</th>
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<tr>
<td>Overcrowding in the home (age 2)</td>
<td>.88</td>
<td>.34</td>
<td>.36-2.00</td>
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</tr>
<tr>
<td>Neighborhood Quality (age 2)</td>
<td>.00</td>
<td>1.00</td>
<td>-3.39 - 3.38</td>
<td>--</td>
</tr>
<tr>
<td>Chaos (age 2)</td>
<td>5.92</td>
<td>3.82</td>
<td>.00-15.00</td>
<td>0-15</td>
</tr>
<tr>
<td>Overcrowding in the home (age 3)</td>
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<td>.29</td>
<td>.36-2.00</td>
<td>--</td>
</tr>
<tr>
<td>Neighborhood Quality (age 3)</td>
<td>.00</td>
<td>1.00</td>
<td>-2.00 - 3.22</td>
<td>--</td>
</tr>
<tr>
<td>Chaos (age 3)</td>
<td>5.82</td>
<td>3.87</td>
<td>.00-14.00</td>
<td>0-15</td>
</tr>
<tr>
<td>Maternal Monitoring (age 2)</td>
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<td>1.05</td>
<td>.00-3.00</td>
<td>0-3</td>
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<tr>
<td>Maternal Monitoring (age 3)</td>
<td>1.92</td>
<td>1.03</td>
<td>.00-3.00</td>
<td>0-3</td>
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<td>Outcome Variables</td>
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<td></td>
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<tr>
<td>Maternal reported externalizing (age 4)</td>
<td>14.36</td>
<td>8.33</td>
<td>.00-40.00</td>
<td>0-48</td>
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<tr>
<td>Teacher reported externalizing (age 5)</td>
<td>14.53</td>
<td>13.32</td>
<td>.00-59.00</td>
<td>0-84</td>
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</tbody>
</table>

*Note.* The neighborhood quality scores are standard scores.
### Table 2

_Bivariate correlations examining among physical and social environmental variables assessed at ages 2 and 3 and child externalizing behaviors at ages 4 and 5_

<table>
<thead>
<tr>
<th></th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
<th>7.</th>
<th>8.</th>
<th>9.</th>
<th>10.</th>
<th>11.</th>
<th>12.</th>
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<tbody>
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<td>1. Socioeconomic status</td>
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<td></td>
<td></td>
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<tr>
<td>2. Treatment</td>
<td>-.00</td>
<td>---</td>
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<td></td>
<td></td>
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<td>3. Child Ethnicity</td>
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<td>4. Overcrowding in the home (age 2)</td>
<td>-.24**</td>
<td>-.07</td>
<td>.17</td>
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<tr>
<td>5. Neighborhood Quality (age 2)</td>
<td>.19*</td>
<td>.04</td>
<td>-.17*</td>
<td>-.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>6. Chaos (age 2)</td>
<td>-.16</td>
<td>.02</td>
<td>-.19*</td>
<td>.17</td>
<td>-.05</td>
<td></td>
<td></td>
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<tr>
<td>7. Overcrowding in the home (age 3)</td>
<td>-.22*</td>
<td>.13</td>
<td>-.02</td>
<td>.66**</td>
<td>-.07</td>
<td>.09</td>
<td>---</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>8. Neighborhood Quality (age 3)</td>
<td>.18</td>
<td>.05</td>
<td>-.20*</td>
<td>.02</td>
<td>.83**</td>
<td>-.05</td>
<td>-.01</td>
<td>---</td>
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<tr>
<td>9. Chaos (age 3)</td>
<td>-.07</td>
<td>.14</td>
<td>-.16</td>
<td>.13</td>
<td>-.01</td>
<td>.70**</td>
<td>.09</td>
<td>-.02</td>
<td>---</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>10. Maternal Monitoring (age 2)</td>
<td>.26**</td>
<td>.01</td>
<td>-.32**</td>
<td>.02</td>
<td>.27**</td>
<td>-.01</td>
<td>.02</td>
<td>.31**</td>
<td>.01</td>
<td>---</td>
<td></td>
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</tr>
<tr>
<td>11. Maternal Monitoring (age 3)</td>
<td>.16</td>
<td>-.14</td>
<td>.02</td>
<td>.03</td>
<td>.17</td>
<td>-.06</td>
<td>.00</td>
<td>.14</td>
<td>-.08</td>
<td>.18</td>
<td></td>
<td></td>
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<tr>
<td>12. Maternal reported externalizing (age 4)</td>
<td>-.05</td>
<td>.01</td>
<td>-.19</td>
<td>-.04</td>
<td>-.09</td>
<td>.29*</td>
<td>-.02</td>
<td>-.12</td>
<td>.42**</td>
<td>.04</td>
<td>-.21*</td>
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</table>
13. Teacher reported externalizing

<table>
<thead>
<tr>
<th></th>
<th>.06</th>
<th>-.02</th>
<th>.16</th>
<th>-.20</th>
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<th>-.02</th>
<th>-.21</th>
<th>-.15</th>
<th>.22</th>
<th>-.06</th>
<th>-.36**</th>
<th>.19</th>
</tr>
</thead>
</table>

(age 5)

Note: * p < .05, ** p < .01
Table 3

*Summary of linear regressions at age 2 predicting child externalizing behaviors reported by mothers at age 4 and by teachers at age 5*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Maternal Reported Externalizing (age 4)</th>
<th>Teacher Reported Externalizing (age 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE B</td>
</tr>
<tr>
<td>Socioeconomic Status</td>
<td>-.27</td>
<td>1.16</td>
</tr>
<tr>
<td>Child Ethnicity</td>
<td>-1.4</td>
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<td>Maternal Monitoring</td>
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<td>1.80</td>
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<td>Neighborhood Quality</td>
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<td>Overcrowding in home</td>
<td>8.03</td>
<td>12.12</td>
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<tr>
<td>Chaos in home</td>
<td>.64</td>
<td>.49</td>
</tr>
<tr>
<td>Maternal Monitoring x</td>
<td>-.10</td>
<td>.93</td>
</tr>
<tr>
<td>Neighborhood Quality</td>
<td></td>
<td></td>
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<tr>
<td>Maternal Monitoring x</td>
<td>-.02</td>
<td>.23</td>
</tr>
<tr>
<td>Chaos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overcrowding in the home</td>
<td>-6.94</td>
<td>6.38</td>
</tr>
</tbody>
</table>

Maternal Reported Externalizing Behavior: $F(9, 94) = 1.60, p < .13, R^2 = .05, ns$

Teacher Reported Externalizing Behavior: $F(9, 63) = 1.12, p < .37, R^2 = .02, ns$
Table 4

*Summary of linear regressions at age 3 predicting child externalizing behaviors reported by mothers at age 4 and by teachers at age 5*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Maternal Reported Externalizing (age 4)</th>
<th>Teacher Reported Externalizing (age 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>SE B</td>
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<tr>
<td>Socioeconomic Status</td>
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</tr>
<tr>
<td>Child Ethnicity</td>
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</tr>
<tr>
<td>Maternal Monitoring</td>
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<td>Neighborhood Quality</td>
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<td>Overcrowding in home</td>
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<td>10.69</td>
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<td>Chaos in home</td>
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<td>.30</td>
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<td>Maternal Monitoring x</td>
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<td>.76</td>
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<td>Neighborhood Quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal Monitoring x</td>
<td>-.05</td>
<td>.13</td>
</tr>
<tr>
<td>Chaos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overcrowding in the home</td>
<td>6.38</td>
<td>5.23</td>
</tr>
</tbody>
</table>

Maternal Reported Externalizing Behavior: $F(9, 88) = 3.23, p < .002, R^2 = .19$

Teacher Reported Externalizing Behavior: $F(9, 58) = 3.56, p < .002, R^2 = .28$
Figure 1

*Interaction between maternal monitoring and neighborhood quality on mothers' report of child externalizing behavior at age 4*
Figure 2

*Interaction between maternal monitoring and neighborhood quality on teachers’ report of child externalizing behavior at age 5.5*
Physical Environment

Teacher Reported Externalizing Behavior

- High Neighborhood
- Low Neighborhood