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The Moderating Effect of Substance Abuse Service Accessibility on the Relationship between Child Maltreatment and Neighborhood Alcohol Availability

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Abstract

This study investigates how the relationship between dense concentrations of alcohol retailers and high rates of child maltreatment may be moderated by the presence of substance abuse service facilities. Using a cross-sectional design, the study utilized data from Bergen County, New Jersey on child maltreatment reports, alcohol-selling retailers, substance abuse service facilities, and the United States Census. Findings indicate child maltreatment rates were higher in neighborhoods with lower socioeconomic status and those with greater alcohol outlet density. Neighborhoods with easily accessed substance abuse service facilities had lower rates of child maltreatment. Additionally, the relationship between child maltreatment and alcohol outlet density was moderated by the presence of substance abuse service facilities. The study findings highlight the relevance of making primary prevention approaches readily available and using multi-sector collaboration to reduce child maltreatment.

1. Introduction

In contrast to the typical child maltreatment prevention strategies that focus on changing individual risk behavior, structural or environmental prevention approaches attempt to locate the source of risk within the physical environment of communities and make changes that support pro-social behavior (Blankenship, Friedman, Dworkin & Mantell, 2006). Most of the existing programs to prevent child maltreatment rely on secondary or tertiary prevention approaches and generally focus on family or individual (i.e. parent) level interventions aimed at improving parent-child interactions, educating families, increasing formal and informal family support, or improving family home environments through home visitation (Daro & Donnelly, 2002; Stagner & Lansing, 2009). Although these approaches may be successful for individual families, there has been little empirical support for the success of these family- and individual-level interventions in reducing overall rates of child maltreatment (reviewed in Reynolds, Mathieson & Topitzes, 2009). Efforts rooted at the community level seek to permanently alter the environment, rooting out the structural determinants of behavior and altering that structure to promote well-being (Yacoubian, 2007). There has been increasing attention in the field of child welfare in the identification of structural risk factors for child maltreatment with particular attention to the role of neighborhood environment. This research has investigated the linkages between high rates

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of neighborhood level drug and alcohol availability, poverty, residential instability, and child care burden to higher rates of child maltreatment, and findings suggest changes in the structure of neighborhoods could influence rates of child maltreatment (Coulton, Crampton, Irwin, Spilsbury & Korbin, 2007; Freisthler, Merritt & LaScala, 2006).

1.2 Neighborhood substance use environment and child maltreatment

Investigating the substance use environment of neighborhoods is important as parental substance abuse has long been recognized as a problem inextricably linked with child maltreatment. It is estimated that 40–80% of all children who come to the attention of child welfare agencies are living in homes with a substance abusing parent (Banks & Boehm, 2001; Besinger, Garland, Litrownik & Landsverk, 1999; Young, Boles & Otero, 2007). Of those substance abusing parents, alcohol has been identified as the primary problem (Young, Boles & Otero, 2007). The environment of substance availability as evidenced by the density and distributions of alcohol retailers has important consequences for rates of child maltreatment. Freisthler and her colleagues have conducted a series of studies on neighborhoods within California counties to explore how alcohol availability, operationalized as the density of alcohol retailers in a neighborhood, was linked with increased rates of child maltreatment. Rates of child maltreatment were found to be higher in neighborhoods with dense concentrations of alcohol outlets (Freisthler, Midanik & Gruenewald, 2007; Freisthler, Needell & Gruenewald, 2005). Adding an additional bar per 1,000 people in the population was found to increase rates of child maltreatment by 2.2 children per 1,000 (Freisthler, 2004).

1.3 Neighborhood effects and child maltreatment

The body of research on structural risk factors for child maltreatment has shown clear linkages between socioeconomic factors and features of a neighborhood's built environment as being related to child maltreatment. Higher poverty, neighborhoods with high rates of residential turnover, an environment that places a burden on caregivers in terms of diminished social networks, and neighborhoods inundated with alcohol retailers all serve to influence greater rates of child maltreatment (Coulton, Korbin & Su, 1999; Coulton, Korbin, Su & Chow, 1995; Ernst, 2001; Freisthler, 2004; Molnar, Buka, Brennan, Holton & Earls, 2003; Paulsen, 2003).

1.3.1 Poverty—Impoverished neighborhoods have been consistently linked with high rates of child maltreatment (Coulton, Korbin & Su, 1999; Drake and Pandey, 1996; Freisthler, 2004; Paulsen, 2003). Rather than use economic indicators of poverty alone, researchers have utilized a variety of U. S. Census indicators to proxy not only the economic dimension of poverty but the structural and demographic as well. Using indicators from the U. S. Census, Coulton and her colleagues have utilized principal components analysis to reveal the underlying dimensions of poverty in neighborhoods, finding percent single, female-headed households, percent living below the poverty line, percent unemployed, number of vacant housing units, 5 year population loss, and percent African American combined to represent an impoverished neighborhood. They found an overall strong relationship between child maltreatment and poverty, and further analysis showed that poverty was an important predictor in both predominately black and predominately white neighborhoods (Coulton, Korbin, Su & Chow, 1995; Coulton, Korbin & Su, 1999; Korbin, Coulton, Chard, Platt-Houston & Su, 1998). Similarly, Freisthler, Bruce and Needell (2007) found neighborhood level measures of poverty were positively related to child maltreatment substantiation rates for African American, Hispanic, and white children. At a population level, poverty has consistently been the best predictor of a family's chances for child welfare system involvement (Coulton, et al., 2007; Freisthler, Merritt & LaScala, 2006).

1.3.2 Residential instability—Researchers have also investigated the relationship between neighborhood residential instability and rates of child maltreatment. Stable neighborhoods are operationalized as those where residents have a long tenure, housing units are fully/mostly occupied and there is less movement in and out of the area. The relationship to rates of child maltreatment here has been weaker and less consistent for residential instability than that for impoverishment. Investigations have found mixed effects when using residential instability to predict overall higher rates of child maltreatment. Ernst (2001) found residential instability to be a positive, significant predictor when investigating a county in Maryland, but Freisthler, et al. (2004) and Coulton, Korbin and Su (1999) did not find a relationship for neighborhoods in California and Ohio, respectively.

1.3.3 Child care burden—Child care burden has been defined as the "amount of adult supervision and resources that may be available for children in the community" (Coulton, et al., 1995, p. 1270). When children outnumber adults in areas and there is a lack of natural support networks (i.e. elderly residents), that child care burden may become stressful for parents. Child care burden suggests a breakdown in the structure of helping networks in a neighborhood where parents have few choices for help when it comes to caregiving as well as possible reservations about children being able to play freely in the neighborhood. If there are no neighborhood sentinels in the form of adult or elderly residents who can act as de facto guardians for the children in a neighborhood, the result is an increase in stress as parents and children are either in constant contact, children are left alone more frequently without adequate adult supervision, or parents must travel outside their community to obtain competent child care, incurring both financial and human costs.

Coulton and her colleagues operationalized child care burden by using a factor score representing the indicators of percent elderly, ratio of children to adults, and the ratio of males to females. Using this approach, child care burden was found to be positively related to overall rates of child maltreatment (Coulton, *et al.*, 1995; Coulton, Korbin & Su, 1999). When investigating child maltreatment reports separated by race, only predominately white neighborhoods and substantiation rates for white children were found to have a positive relationship to child care burden (Freisthler, Bruce & Needell, 2007; Korbin, *et al.*, 1998). Child care burden has been less consistent in predicting rates of child maltreatment, suggesting it may operate differently for different forms of child maltreatment and among ethnic and racial groups.

This body of research has been able to define with some consistency the structural risk factors for child maltreatment, but there has been limited attention so far to the structural component of protection against child maltreatment. Klein (2011) found the availability and use of early childhood education services within neighborhoods was a mitigating factor for child maltreatment among children aged 0–5 years old when controlling for the neighborhood risk factors mentioned above. This paper investigates the possibility that access to substance abuse services in a community could serve as a mitigating factor for child maltreatment.

1.4 Substance abuse services and child welfare outcomes

Substance abuse service facilities are not often structured in a way that ensures participation of impoverished clients due to their inaccessibility (i.e. not convenient to public transportation) (Semidi, Radel, & Nolan, 2001). Jacobson (2004) referred to this problem as the travel burden, or the difficulty experienced when neighborhood geography places an extreme distance between one's home locale and the service facility. If it is difficult to access services, individuals may be less likely to engage with service providers to start treatment for substance abuse problems or continue in treatment when the travel burden

outstrips an individual's tolerance for the travel costs incurred. However, when clients involved in child welfare services are able to access substance abuse services, the permanency outcomes have been shown to be largely positive, with completion of treatment associated with a shorter tenure in foster care for children and greater odds of reunification (Choi, Huang, & Ryan, 2012; Green, Rockhill, & Furrer, 2007). Additionally, Marsh, D'Aunno, & Smith (2000) found mothers with children in foster care who were provided transportation to overcome the geographic inaccessibility of substance abuse services were more likely to refrain from substance use than mothers who did not receive transportation services. While the studies referenced above were completed at the individual level, several studies offer additional support that accessibility to other social services could be an important factor in reducing rates of child maltreatment.

Bai and colleagues (2009) investigated mental health service utilization among child welfare involved children with mental health service needs and found the number of mental health practitioners per 100,000 children were positively related to the use of mental health services, but the number of mental health clinics per 100,000 children was negatively associated with the use of these services. The negative findings in the Bai, *et al.* (2009) county-level study could be developed and clarified by including indicators of how the location of services are geographically distributed. Freisthler (2013) investigated the relationship between child maltreatment referrals and foster care entries to the spatial distribution of child welfare-related services. Findings here indicated a greater overall density of social services predicted lower rates of child maltreatment referrals and foster care entries. Interestingly, when social services were separated by type, findings indicated the density of substance abuse services was related to higher rates of both referrals and entries (Freisthler, 2013). These paradoxical findings were posited to occur due the possibility of substance abuse service facilities locating in high-need areas and additional work is needed to further explore this issue in other areas of the United States.

2. Theoretical framework

The social disorganization perspective suggests communities characterized by poverty, residential instability, racial and ethnic heterogeneity or isolation, and disruptions in family life often suffer from breakdowns in social cohesion and control (Bursik & Grasmick, 1993; Kornhauser, 1978; Shaw & McKay, 1942). The consequences for a community lie in the inability to solve shared problems because of structural impediments to the development of coherent, interconnected social networks (Sampson & Groves, 1989). Thus the breakdown of formal and informal social networks restricts the ability of a community to regularly enforce social control in terms of working together to reduce interpersonal violence, prohibit an inundation of unhealthy retail, or attract investment in the community. Rates of child maltreatment have consistently been found to be higher in neighborhoods that can be characterized as socially disorganized (Coulton, et al., 2007; Freisthler, Merritt & LaScala, 2000). Poor neighborhoods are often structured in a way that concentrates disadvantage, leading to an erosion of social control allowing for not only negative outcomes in terms of interpersonal violence but also the inundation of addictive retail that is not welcome in more affluent areas. As a result, researchers have consistently found alcohol outlets are more likely to be located in areas characterized by social disorganization (Gorman, Speer, Gruenewald & Labouvie, 2001; LaVeist & Wallace, 2000; Popova, Giesbrecht, Bekmuradov & Patra, 2009). The current study concentrates on neighborhood availability of alcohol, its relationship to child maltreatment, and the ability of substance abuse service facilities to act as mitigating factors for child maltreatment, while controlling for the socioeconomic risk factors representative of social disorganization.

3. Study hypotheses

The specific study hypotheses are as follows, based on the empirical and theoretical review above:

1. Higher densities of alcohol outlets will be related with higher rates child maltreatment, controlling for socioeconomic and demographic factors.
2. Easier access to substance abuse service facilities will be associated with lower rates of child maltreatment.
3. A neighborhood's substance abuse service accessibility will moderate the relationship between alcohol outlet density and child maltreatment, controlling for socioeconomic and demographic factors. In areas with a higher density of alcohol outlets, child maltreatment rates will be lower if there is easy access to substance abuse services.

4. Methods

4.1 Data sources

Data for this study were drawn from five sources: (1.) 2003 New Jersey Department of Children and Families (DCF) Bergen County child maltreatment referral data, (2.) 2003 New Jersey Division of Alcoholic Beverage Control (ABC) listing of alcohol-selling retailers, (3.) New Jersey Division of Mental Health and Addiction Services (DMHAS) listing of licensed substance abuse providers active in 2003, (4.) Bergen County Center for Alcohol and Drug Resources' (CADR) listing of substance abuse service facilities active in 2003, and (5.) the 2000 United States Census. The DCF data provide information for all child maltreatment referrals to Child Protective Services and the addresses included in this data reflect the residential address of the family involved in the referral. The ABC listing of alcohol retailers contains information about the licensee including the address where each outlet is located. The DMHAS and CADR data combine to create a listing of all licensed substance abuse service facilities in Bergen County, New Jersey and contains the address where each facility is located. The address for each child maltreatment report, alcohol outlet and substance abuse service facility was geocoded using ArcMap 10.0, with match rates exceeding 90% for each.

Finally, the Census data were used to create demographic and socioeconomic profiles of the neighborhoods in Bergen County, New Jersey. Bergen County is the most populous county in New Jersey with a population of 884,118 that includes 235,070 families in the year 2000. Residents were 10.3% Hispanic (of any race), 78.4% White, 10.7% Asian, and 5.3% African American. It encompasses 247 square miles and has a population density of 3,776 people per square mile.

This study uses administrative units defined by the U. S. Census Bureau to represent neighborhoods, specifically the Census tract which has anywhere from 1500 to 8000 residents with the average number of residents being 3,000 (US Census Bureau, 2002). Census tracts are chosen both to follow the neighborhood effects child maltreatment research and to provide a unit of aggregation that is relatively homogenous, while at the same time providing enough variability in the rates of child maltreatment for valid statistical estimates.

4.2 Measures

4.2.1 Child Maltreatment—The dependent variable for this analysis was the rate of child maltreatment referrals per 1,000 children in Bergen County, NJ for the year 2003. Using

child maltreatment referrals, instead of substantiated reports or foster care entries, follows previous research in order to account for the number of cases that may go unreported (Deccio, Horner, & Wilson, 1994; Garbarino & Sherman, 1980). To date, one study has compared three operationalizations of child maltreatment commonly found in the neighborhood effects literature (CPS referrals, substantiated referrals, and foster care entries). The findings across the three child maltreatment measures did not conflict with one another in terms of finding a positive correlation for one and negative for another, and the model fit statistics indicated referrals as marginally better than substantiation and foster care entry (Freisthler, *et al.*, 2007). This study is concerned with the possibility that increased access to substance abuse services could act as a primary prevention strategy for child maltreatment, meaning there would in effect be a reduced need for CPS referrals in those neighborhoods with easily accessed substance abuse service facilities.

4.2.2 Alcohol outlet density—Alcohol outlet density was measured as the number of alcohol outlets (this includes, bars, liquor/beer stores, and restaurants that serve alcohol) per 10 kilometers of roadway which operationalizes availability based on how frequently alcohol retailers are encountered in the street network of a community (Gruenewald & Johnson, 2010). A roadway measure for Bergen County was favored here over a population based measure because of its dense population. Consider the following example: if there is an alcohol outlet on the first floor of a large, mixed-use building with 1000 residents, one assumes that all residents have equal access to the outlet. Using a population density measure would produce a small density value, describing the residents' access to alcohol as relatively low; however, the roadway measure produces a higher density statistic, indicating easier access to alcohol.

4.2.3 Substance abuse service accessibility—Service accessibility was measured as the distance from the centroid of each census tract to the nearest substance abuse service facility (Schonlau, Scribner, Farley, Theall, Bluthenthal, Scott & Cohen, 2008). This measure was chosen due to the low occurrence of these facilities in census tracts in order to assign each census tract an overall measure of accessibility to substance abuse service facilities.

4.2.4 Socioeconomic controls—Finally, measures of community structure tested in other studies on neighborhood effects on child maltreatment and population characteristics unique to Bergen County, NJ were used as control variables (Coulton, *et al.*, 1995; Freisthler, 2004). These were taken from the 2000 U.S. Census and include: poverty rate, unemployment rate, percent vacant housing units, percent of people who moved from 1995–2000, percent single female-headed households, child to adult ratio, male to female ratio, percent of population over 65 years of age, percent African American, percent Latino/Hispanic, percent Asian, and percent immigrant population.

4.3 Analytic strategy

The analytic strategy relied on Ordinary Least Squares (OLS) or spatial regression to assess the relationship between predictor and criterion variables. This technique of choosing between two regression techniques is most appropriate when considering data that is spatially ordered as one must address spatial autocorrelation. For this analysis, it may be that not only are independent observations highly correlated (multicollinearity), but also observations can be influenced by their proximity in a spatial plane violating the assumption in regression that observations are independent. So, measures from neighborhoods that share a boundary may be highly correlated, introducing measurement error into the statistical test employed as relationships vary as a result of space (Cahill & Mulligan, 2007; Graif & Sampson, 2009).

To assess the presence of significant spatial autocorrelation that would bias statistical estimates, a two-step process was conducted. First, the dependent variable was investigated to determine the level and statistical significance of spatial autocorrelation using a rook weights correlation matrix. This process produced the Moran's Index (Moran's I) statistic which is interpreted like a correlation coefficient: values range from −1 to 1 indicating neighboring areas are either perfectly dissimilar (negative spatial autocorrelation) or perfectly similar (positive spatial autocorrelation). Second, it is possible that the array of independent variables can explain away the spatial autocorrelation of the dependent variable, if present (Charlton & Fotheringham, 2009; Freisthler, Bruce & Needell, 2007; Griffith, 1988). Here, the residuals from the OLS regression model were analyzed and, again, Moran's I was assessed for significance. If the Moran value was significant in both accounts, spatial autocorrelation was controlled for in subsequent analyses using spatial regression model (Fotheringham & Rogerson, 2009; Freisthler, 2004; Freisthler, Bruce & Needell, 2007; Freisthler, Needell & Gruenewald, 2005).

Another concern is the small area analysis problem (hetereoskedasticity) where areas with exceedingly small populations are given the same weight in the regression equation as areas with large populations. To control for this, each unit of observation was weighted by the square root of the child population for that area (Klein, 2011; Freisthler, Needell & Gruenewald, 2005; Freisthler, 2004). This study used ArcGIS 10 and SPSS 19.0 to test the relationship between predictor and criterion variables, controlling for spatial autocorrelation, where present, and hetereoskedasticity.

The moderating effect of substance abuse service accessibility was tested following Baron and Kenney's (1986) conceptualization. The moderator model was tested by entering an interaction term in the regression equation, here the product of the alcohol outlet density measures and the substance abuse service accessibility measure. Hierarchical regression was employed to lend support to the moderator model by examining the significance of the R^2 and *F* change in the model as the interaction between alcohol outlet density and substance abuse service accessibility was stepped into the model. To aid in the visualization of the moderator effect, post hoc analysis of covariance (ANCOVA) was performed to illustrate the relationship between alcohol outlet density and child maltreatment at different levels of the substance abuse service accessibility, controlling for the sociodemographic profile of neighborhoods. This follows other public health research investigating moderator effects (Peterson, Lowe, Peterson, & Janz, 2006; Lachman & Weaver, 1998).

4.3.1 Criterion Variable Transformation—The criterion variable of child maltreatment rate had an extreme positive skew with a skewness statistic of 2.92. In order to correct for this skew, a Box Cox transformation was applied to rates of child maltreatment. This transformation is a power transformation, where each observation is raised to some power in order to achieve normality (Osborne, 2010). Box Cox transformations are different from other power-family transformations (e.g., log, square root transformations) in that, rather than picking an arbitrary value to use as the power to raise all values by, one is presented with a range of power transformations in order to choose the value that best normalizes the data (Allison, Gorman & Kucera, 1995). These values are known as lambda (λ) and the value of λ that best normalized the data was chosen as the transformation power which eliminated skew. Using the Box Cox transformation, the rate of child maltreatment was normalized, improving skew to .16 where λ=.10. The transformed variable was used in the regression equation.

4.3.2 Principal Components Analysis—Principal Components Analysis (PCA) with varimax rotation was conducted on the set of 12 socioeconomic variables as a data reduction strategy to protect against the issue of multicollinearity. This follows previous research in

the area of child maltreatment neighborhood effects research and allows for the identification of the underlying structure of the data (Coulton, *et al*, 1995; Ernst, 2001; Korbin, *et al.,* 1998). Results from the PCA are presented in Table 2.

PCA on the 163 census tracts revealed three components with eigenvalues greater than 1, explaining 68% of the variance in the set of socioeconomic variables. Seven variables loaded onto the first component, PC1: poverty rate, immigrant population, 5-year residential movement, percent Latino, vacant housing units, and child to adult ratio. Here, disadvantage seems concentrated in certain areas with the economic indicator of poverty status combining with residential movement and vacant housing to suggest capital disinvestment. Additionally, ethnic minorities and immigrant populations loaded onto this component. The second component, PC2, was characterized by high percentages of African American residents, single female-headed households, unemployment, and low percentages of Asian residents. PC2 hints at economic disadvantage as well, but is differentiated from the first by being predominately African American with high percentages of single female-headed households. Lastly, two variables loaded onto the third component, PC3, where census tracts were characterized by low percentages of residents over 65 years of age and a high male to female ratio. The factor scores from the PCA were used in the regression equation.

5. Results

5.1 Descriptive statistics

Descriptive statistics for each variable included in the analysis are presented in Table 1. The mean overall child maltreatment rate for Bergen County, NJ was 3.97/1000 which is a bit higher than the child maltreatment rate of 3.9/1000 for New Jersey in 2003 (USDHHS, 2009). Mean alcohol outlet density was 2.46 outlets per 10km of roadway and the mean community substance abuse service facility distance was 1.39 miles to the nearest facility from each census tract's centroid.

5.2 Effect of alcohol outlet density and substance abuse service accessibility on child maltreatment rates

Table 3 presents the OLS results where the three components of neighborhood structure, the number of alcohol outlets per 10km of roadway, and substance abuse service accessibility were all significantly positively related to higher rates of child maltreatment. The results of a hierarchical regression to support the moderator model for the interaction of alcohol outlet density and substance abuse service accessibility indicate significant R^2 and *F* change statistics when the interaction term was stepped into the regression equation. While first order spatial autocorrelation was positive and significant (MI=.220, p<.001), the set of independent variables explained away the significant autocorrelation in the regression model where the Moran's I for the residuals from the OLS were negative and non-significant (MI= −.057, *p*=.279).

Post hoc tests of the moderator effect using ANCOVA were performed to further explore the interaction effect for illustration purposes only. For the post hoc analysis, alcohol outlet density was recoded into tertile groups: low, medium, and high density. Similarly, substance abuse service accessibility was recoded into short, medium, and long distance categories. As in the regression analysis, the factor scores from the principal components analysis were used as controls/covariates. Figure 1 illustrates the post hoc analysis. In areas with low accessibility (longer distance to nearest substance abuse service facility), a significant difference in mean child maltreatment rates was found between tracts with low and high alcohol outlet density. In areas with the highest alcohol outlet density, child maltreatment rates were greatest in areas with long distance to substance abuse services.

6. Discussion

It was hypothesized that neighborhoods with greater alcohol outlet densities would have correspondingly high rates of child maltreatment. Controlling for socioeconomic and demographic factors, this was found to be true. Those areas inundated with alcohol outlets had higher rates of child maltreatment. A greater distance to the nearest substance abuse service facility was related to higher rates of child maltreatment as a main effect. Additionally, it was hypothesized was that access to substance abuse service facilities would moderate the relationship between alcohol outlet density/accessibility and rates of child maltreatment. Specifically, child maltreatment rates would be higher in neighborhoods with greater alcohol outlet density and less accessible substance abuse service facilities. The interaction between alcohol outlet density and substance abuse service access was significant. Neighborhoods with the greatest distance to substance abuse service facilities and the highest alcohol outlet density had the highest rates of child maltreatment. Interestingly, neighborhoods with what was defined as medium access to substance abuse services had the lowest rates of child maltreatment. This finding and may be indicative of desirable neighborhoods being those that are not too close to commercial activity but not too far from it either to be cut off from adjacent community resources.

Overall, the strongest predictors of increased rates of child maltreatment were the measures of community structure found in previous work in this area (Coulton, et al, 2007; Freisthler, Merritt & LaScala, 2006). Results show predominately African American census tracts with high unemployment and single female-headed households were the strongest predictor of increased rates of child maltreatment, which mirrors much of the literature on the racial composition of the child welfare system (Drake, Jolley, Lanier, Fluke, Barth & Jonson-Reid, 2011; Fluke, Yuan, Hedderson & Curtis, 2003; Morton, Ocasio & Simmel, 2011; U.S. Department of Health and Human Services, 2011). Census tracts characterized by poverty and residential instability were the second strongest predictor of increased rates of child maltreatment. Again, this finding is confirmed by prior research; living in poverty and its attendant consequences is a consistent predictor of child maltreatment (Coulton, et al, 2007; Freisthler, Merritt & LaScala, 2006). Lastly, neighborhoods characterized by a great number of male and younger residents were connected with increased rates of child maltreatment. This may be a novel finding in terms of the neighborhoods effects literature, but it does find support elsewhere. Some studies have found perpetrators of severe physical abuse to be predominately male (Naidoo, 2000; Ricci, Giantris, Merriam, Hodge & Doyle, 2003). This could be an important finding in terms of needs assessment and program development to reduce the risk of child maltreatment.

6.1 Limitations

This study is limited by its reliance on secondary data as well as its cross-sectional design. The child maltreatment indicators used were reports of child abuse and neglect. As such, they may not be indicative of what the true rates of child maltreatment are in the areas under investigation, they only include those families who were reported to CPS. Measuring child maltreatment has always been difficult and researchers are developing innovative ways to couple different sources of administrative data to compute child maltreatment rates that do not rely exclusively on CPS reports, retrospective surveys, or community sentinels. Recent work has combined child maltreatment reports with child fatality data to develop indices of child maltreatment (Putnam-Hornstein, 2011). Future research should continue to explore ways to present rates of child maltreatment that attempt to account for its hidden nature. Additionally, the data for this study were drawn from 2003; future work could compare these findings with more recent data to account for any changes in the landscape of child welfare practice in New Jersey as well as expand to include data for the entire state.

This study treated all alcohol retailers the same in that risk was considered to be distributed equally among the set of outlets. It may be that there are alcohol outlets in a neighborhood that are considered especially problematic in terms of crime or property damage occurring in and around them, compared to outlets that have little or no collateral damage associated with their location. Future research could identify problem alcohol outlets by connecting rates of alcohol-related crime occurring in close proximity and investigating whether a difference exists between good and bad outlets in terms of their relationship to child maltreatment. This study relied on the physical location of alcohol retailers and substance abuse services facilities to make connections to population-level rates of child maltreatment. The indicators of alcohol outlet density and substance abuse service facilities do not necessarily mean residents are purchasing and abusing alcohol or accessing the services of substance abuse professionals. Future work could utilize multi-level modeling that couples survey data on individual drinking behavior and service use with community indicators of child maltreatment, alcohol access, and access to substance abuse service facilities. Research that can link individual behavior to increased access to either alcohol or substance abuse service facilities will help close the gap in linking these attributes of the built environment to rates of child maltreatment. The inability to determine causality is also a limitation of this study. It is impossible to know whether drinking behavior was influenced by the easy access to alcohol or if those with alcohol problems are drawn to live in areas with easy access to alcohol. Accordingly, it is not known whether increased child maltreatment rates were caused by increased alcohol accessibility, conducting time-series designs that track the changing alcohol retail environment along with changes in rates of child maltreatment would be necessary to add weight to any causality argument.

6.2 Implications for child welfare policy and practice

The results from this study support a primary prevention approach to reducing child maltreatment through environmentally-focused interventions. This study adds to the existing literature confirming the importance of neighborhood structure in influencing rates of child maltreatment. This is not only limited to the socioeconomic and demographic profile of an area, but also the study adds to evidence of the importance of the built environment, both for risk and protection. Prevention strategies could investigate the possibility of limiting alcohol licenses in areas that are already saturated with alcohol retailers as a way to reduce the harms associated with alcohol use. Restricting the number or density of alcohol retail licenses is seen as a promising area and others have made the call to target alcohol outlet density as an environmentally-focused prevention goal (Campbell, *et al.*, 2007). As a result. the implementation of policy changes aimed at zoning and land use regulations to limit the physical availability of alcohol are seen as some of the most effective interventions to reduce alcohol-related harms (Sparks, Jernigan & Mosher, 2011). These strategies have limited the total number of retail licenses for alcohol, limited the days and hours alcohol is sold or increased the price of alcohol through taxation. Child welfare agencies could lend considerable support to substance abuse prevention agencies in terms of leveraging support for this type of policy change. Connecting the reduction of alcohol-related harms to the prevention of child abuse could open policy windows to limit the density of alcohol retailers in ways that substance abuse prevention agencies working alone could not.

Additionally, the significant findings for substance abuse service facility access and the significant moderation effects also support a primary prevention approach in terms of democratizing access to substance abuse treatment. This may be an important protective factor against child maltreatment. Areas with easier access to substance abuse services not only had lower rates of child maltreatment but also impacted the relationship between alcohol outlet density and overall child maltreatment and neglect. This type of strategy would not focus on those at risk of committing child abuse or those who had already become

involved with the child welfare system. Rather, increasing access to substance abuse services targets the population as a whole to see change across systems.

For child welfare clients, reducing the logistical barriers to substance abuse treatment has been shown to increase the likelihood of positive permanency outcomes (Rockhill, Green & Newton-Curtis, 2008; Marsh, D'Aunno & Smith, 2000). Attention should be paid to the location of human service facilities as both a functional benefit and an ethical imperative. Impoverished communities are often over-looked and segregated from resources such as substance abuse services (Massey, 2004), locational strategies for these facilities should consider how to best diffuse the network of locations to reach communities in need. Community assessments could utilize GIS in order to locate areas considered treatment deserts and those historically segregated from quality services due to economic or racial attributes and engage community leaders in planning any extensions of service.

Primary prevention and especially environmentally-focused prevention are not familiar waters for the child welfare field. Its focus has traditionally been on providing services to families and not on organizing communities in a way that benefits child well-being. The ability to shift some resources from providing services to investing in communities in a way that builds capacity would take considerable partnership between governmental departments in terms of linking resources between health and human services, child welfare, mental health, addiction services, and alcoholic beverage control. At the federal level, the United States Department of Health and Human Services created the National Center on Substance Abuse and Child Welfare (NCSACW) with funding from the Substance Abuse and Mental Health Services Agency and the Administration on Children, Youth and Families (USDHHS, n.d.). This multi-sector initiative is meant to support state-level collaborations between systems of substance abuse services, child welfare, and family courts by providing technical assistance for collaborative efforts. This type of collaboration is crucial as innovative and environmentally-focused strategies aimed at the primary prevention of child maltreatment would require a critical mass of support to build communities that facilitate family and child well-being.

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Highlights

- Access to substance abuse services was related to lower rates of child maltreatment.
- Rates of child maltreatment were positively associated with alcohol outlet density.
- Rates of child maltreatment were positively associated with impoverished communities.

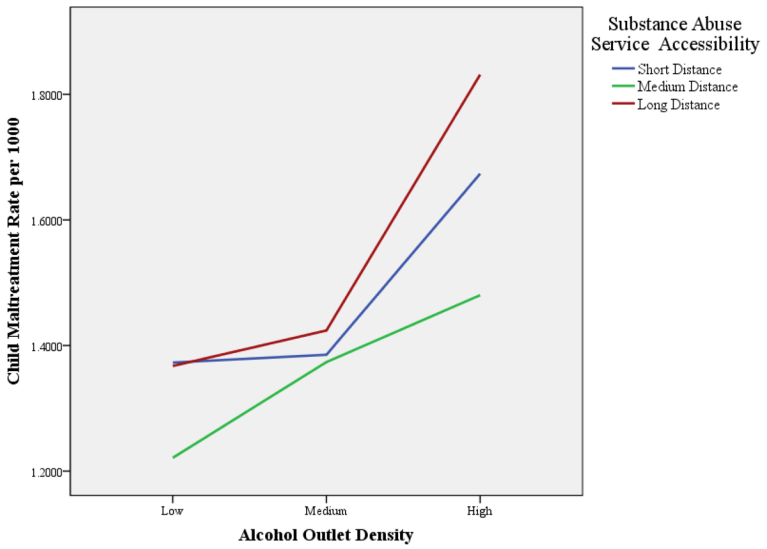

Figure 1.
Interaction of Alcohol Outlet Density and Substance Abuse Service Facility Accessibility on Rates of Child Maltreatment.

Table 1

Descriptive statistics for rates of child maltreatment, alcohol outlet density, substance abuse service accessibility, and socioeconomic controls for Bergen County, NJ census tracts, 2003 (n=163)

	Mean	Standard Deviation
Child maltreatment rate[1]	3.97	4.06
Alcohol outlet density[2]	2.46	2.80
Substance abuse service access[3]	1.39	.90
Socioeconomic Controls		
% in poverty	4.78	3.29
% unemployed	3.92	1.96
% vacant housing units	2.45	1.38
% 5 year residential movement	36.62	8.62
% single female-headed households	5.38	3.28
Child to adult ratio	.31	.07
Male to female ratio	.89	.06
% population over 65	15.09	3.50
% African American	4.67	10.92
% Asian	10.46	8.58
% Latino/Hispanic	10.01	8.56
% immigrant population	24.52	11.96

[1] Measured as number of child maltreatment reports per 1000 children

[2] Measured as number of outlets per 10km of roadway

[3] Distance in miles from centroid of each census tract to nearest facility

Table 2

Principal Components Analysis of socioeconomic controls

Variable	PC1	PC2	PC3
% immigrant population	**.909**	.032	.122
% poverty	**.763**	.380	.136
% 5-year residential movement	**.787**	.246	.214
Child to adult ratio	**−.705**	.−.131	.420
% Latino/Hispanic	**.596**	.384	.301
% vacant housing units	**.576**	.202	−.030
% African American	.087	**.765**	−.049
% single female headed households	.492	**.701**	.192
% unemployment	.425	**.678**	.146
% Asian	.599	**−.566**	.056
% over 65 years of age	.059	−.234	**−.846**
Male to female ratio	.183	−.066	**.742**

Note: N=163. These 3 factors explained 68% of the variance in the set of variables.

Table 3

OLS regression model of child maltreatment rate, alcohol outlet density, substance abuse service facility access, and socioeconomic controls.

	Variables	Dependent variable: child maltreatment rate per 1,000 children			
		Model 1 Socioeconomics, alcohol, and prevention access		Model 2+ Interaction effect	
	Spatial autocorrelation (Moran's I)	−.059		−.057	
Socioeconomics		**B**	**se**	**B**	**se**
	Component 1: Social Disorganization	.288***	.010	.294***	.010
	Component 2: Predominately African American	.383***	.009	.376***	.009
	Component 3: Young male	.070***	.009	.067***	.009
Alcohol density					
	Outlet density per 10km	.022***	.004	.022***	.007
Substance abuse services					
	Distance to nearest facility	.020*	.010	.093***	.013
Interaction					
	Alcohol outlet density x Distance to nearest facility			−.026***	.003

Model 1 R^2=.41, Model 2 R^2=.42

F change between Model 1 and 2 was 79.92***

* *p*<.05,

** *p*<.01,

*** *p*<.001