Busy Streets Theory: The Effects of Community-engaged Greening on Violence[a]

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Abstract

Lack of maintenance on vacant neighborhood lots is associated with higher levels of depression, anxiety and stress for nearby residents. Overgrown grasses and dense brush provide hiding spots for criminals and space to conduct illicit activities. This study builds upon previous research by investigating greening programs that engage community members to conduct routine maintenance on vacant lots within their neighborhoods. The Clean & Green program is a community-based solution that facilitates resident-driven routine maintenance of vacant lots in a mid-sized, Midwestern city. We use mixed effects regression to compare assault and violent crime counts on streets where vacant lot(s) are maintained by community members (N=216) versus streets where vacant lots were left alone (N=446) over a 5-year timeframe (2009-2013). Street segments with vacant lots maintained through the Clean & Green program had nearly 40 percent fewer assaults and violent crimes than street segments with vacant, abandoned lots, which held across 4 years with a large sample and efforts to test counterfactual explanations. Community-engaged greening programs may not only provide a solution to vacant lot maintenance, but also work as a crime prevention or reduction strategy. Engaging the community to maintain vacant lots in their neighborhood reduces costs and may increase the sustainability of the program.

Keywords: crime prevention; community improvement; greening hypothesis

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Governments and residents from cities of all sizes are confronting the dilemma of unprecedented numbers of abandoned and vacant lots (Schilling and Logan 2008). Thousands of unsalvageable residential buildings were demolished across the country leaving an abundance of vacant lots (GAO, 2011). Prior to 2008, city officials from across the US reported that abandoned property was a substantial problem that affected up to 40% of some communities (Accordino and Johnson 2000). Formerly booming industrial cities with already limited budgets frequently face the burden of thousands of abandoned properties requiring as much as \$800,000 - \$3 million annually for maintenance (Johnson 2008).

High concentrations of abandoned properties are frequently located in minority and socially disadvantaged neighborhoods (GAO, 2011; Housing Policy Debate, 2017). Neighborhood environmental conditions affect residents' quality of life, health and longevity (Pickett et al. 2008; Roux and Mair 2010). Advocates for environmental and social justice recommend addressing negative neighborhood characteristics to improve the health of at-risk populations (Braveman et al., 2011; EPA, 2014). A growing body of literature supports arguments that well-maintained green spaces hold promise for reducing health disparities by providing safe areas to be active and restorative natural settings improve psychological well-being (Okvat and Zautra 2011; Jennings and Gaither 2015). In contrast, researchers found that overgrown, untended vacant lots are associated with higher levels of depression, anxiety and stress for nearby residents (Kuo and Sullivan 2001; Garvin et al. 2012). These unmaintained lots, often overgrown with high grasses and dense brush, provide sites for illegal dumping (Garvin et al. 2012), hiding spots for criminals, and discrete places to conduct illicit activities (Branas et al. 2011; Donovan and Prestemon 2012; Garvin et al. 2012). Violent crimes such as assaults and homicide are more likely to occur near unmaintained, vacant lots than maintained vacant lots (Garvin et al. 2012; Culyba et al. 2016).

The scope and ramifications of problems associated with distressed and abandoned properties prompted a variety of responses from researchers and community-based organizations (Accordino and Johnson 2000; Heckert and Mennis 2012; De Sousa 2014). One promising strategy involves greening (restoration and remediation) distressed and abandoned properties. The Philadelphia LandCare (PLC) program greens a multitude of vacant lots throughout the city, including professional maintenance of the lots after remediation. PLC's greening involves trash removal, grading the lot, planting grass and trees, and installing a low wooden fence (Pennsylvania Horticultural Society, n.d.). In Philadelphia, vacant lot remediation was associated with crime reduction (South et al.; Branas et al. 2011; Garvin et al. 2012; Kondo et al. 2016), but drew on PLC resources and was largely organization driven. Beginning in 2010, the Youngstown Neighborhood Development Corporation in Ohio funded a community-engaged greening program, "Lots of Green." Community groups revitalized unmaintained vacant lots into community gardens, urban farms, golf putting greens, parks and a vineyard. Community members planned, implemented and maintained their Lots of Green; many times assisted by neighborhood youth. Kondo and colleagues (2016) found reductions in felonious assaults, robberies and burglary nearby the vacant lots greened by community members compared to unmaintained vacant lots. Yet, less intensive greening efforts that engage community members may offer similar advantages, while still building community capacity and increasing the likelihood of sustained greening efforts in the future. Routine maintenance of mowing, weeding and trash removal of non-rehabilitated vacant lots by community members, for example, may offer similar benefits with less investment.

Community Engaged Greening and Busy Streets

Due to the nature of the rehabilitation efforts (e.g., grading of soil, installation of fences), greening activities are more likely to be conducted by professionals. Routine maintenance of mowing and trash removal, however, is a more accessible greening activity that could engender community member engagement and increase connection to their neighborhood, while buffering the negative effects of neighborhood disorder (Sampson and Raudenbush 1999; Kruger et al. 2007). Aiyer and colleagues presented Busy Streets Theory as a conceptual framework for understanding neighborhood ties that foster deeper social connectedness, greater sense of accountability and responsibility, and strengthening social ties and control in neighborhoods (Authors, 2015). The phrase busy streets emerged from the perspective that one way to reduce crime and violence is to generate community connectedness and vibrant neighborhoods that are consistently populated and filled with positive social interactions including neighborly behavior and thriving businesses. Such busy streets in turn encourage residents to engage in prosocial behavior and increase social capital. Drawing on ideas from crime prevention through environmental design (CPTED), community engaged greening not only helps to clean up abandoned properties, demonstrating visual evidence of local care and establish local ownership, but also provides opportunities for positive social interactions among residents (Cozens, Saville, & Hillier, 2005; Jeffrey, 1991).

In addition to changing the physical environment of their neighborhoods, community-engaged greening also affects the social environment (Okvat and Zautra 2011). Community-engaged greening programs typically involve residents in maintaining vacant lots that are most often interspersed throughout their neighborhoods. These social encounters coupled with the physical removal of trash, overgrown lots, and abandoned properties, form a foundation for creating busy streets and reducing violence and crime. Researchers highlight several mediating neighborhood processes that promote these social outcomes including a sense of community, collective efficacy, and social cohesion which result from collective action to improve neighborhood structural factors (Collins et al. 2014; Henderson et al. 2016). Collective efficacy, sense of community, and shared expectations of social control, such as the shared belief in creating a safe neighborhood, are associated with lower neighborhood crime rates because residents are more likely to intervene for the common good of the neighborhood (Bursik & Grasmick, 1993; Sampson et al., 1997). Such community-level empowerment can strengthen the social fabric of a community, which reduces interpersonal violence and crime (Okvat and Zautra 2011). Greening activities may thus have both direct (i.e., ownership signals) and indirect (i.e., community empowerment) influences on crime rates. Questions remain, however, how readily community-driven greening activities extend to crime reduction. Unlike beautification efforts (e.g., community gardens), residents in dangerous urban locations may be less-likely to organize and engage in cleaning efforts, interrupting the social mechanism linking greening to reduced crime.

Current Study

This study focuses on a community-engaged greening program, Clean and Green (C & G), developed by the Genesee County Land Bank Authority (GCLBA) in the city of Flint, Michigan. Since 2004, ownership of 15,000 foreclosed properties was transferred from the Genesee County Treasurer after tax foreclosure to the GCLBA, about 30% of which were vacant lots. The C & G program is a community-based solution that addressed the need for vacant lot routine maintenance including mowing, weeding and trash removal. Local neighborhood groups submit a proposal for small funds to care for GCLBA vacant lots in their neighborhood. Groups are required to mow the lot once every three weeks with a focus on maintenance, but a smaller number of groups also perform additional landscaping such as planting a flower or vegetable garden. We examine whether routine maintenance (i.e., mowing, weeding, and gardening) of vacant lots by local community members is associated with a reduction in crime relative to vacant lots where no maintenance occurs. We hypothesized that routine maintenance of vacant lots by community members would be associated with less violent crimes than vacant lots without community-engaged maintenance. A key distinction of this study was the absence of intense remediation of vacant lots prior to receiving routine maintenance by the community-engaged greening program.

Methods

We compared the incidence of violent crime among 216 residential streets segments in Flint, Michigan that contained vacant lots maintained by C & G groups to street segments (n=446) with unmaintained vacant lots. A street segment is a portion of a street with end points either due to a dead-end or intersection with another street. Greening activities occurred from May-September (henceforth, 'season') and crime was monitored throughout each season. Street segments in both groups had no vacant lots maintained by C & G groups in the season prior to the season of analysis in an effort to connect change in crime to the implementation of C & G activities. All lots in the study must have completed the foreclosure process during the analysis season to be eligible. It is possible that vacant lots on comparison street segments received maintenance, but if so, it was not part of the C & G program. The study meets the requirements of [Institution] research with human subjects (HUM00111418).

Sampling Procedure: We included eligible street segments over a 5-year timeframe (2009-2013) by selecting street segments one year at a time based on whether the segment had a C & G maintained vacant lot versus an unmaintained vacant parcel during that summer of selection. A street segment could only be included for one season during the 5-year period, even if the street segment met eligibility criteria in later years. We excluded street segments with any of the following characteristics to help ensure that street segments were as similar as feasible: commercial parcels; a C & G vacant lot and vacant lots foreclosed the same year; and a vacant lot maintained by a C & G group the prior year. Once the street segments for a season were selected for the study, the process repeated for subsequent seasons. This selection process accounted for changes over time such as ownership and foreclosure status of parcels and maintenance of vacant lots by the C & G groups. To account for clustering effects (i.e., intraclass correlation) due to street segment proximity or other neighborhood influences, we included the census block group for all selected street segments as a nesting variable.

Outcome Variables. Our outcome variables were recorded police incidents from the Flint Police Department. These data were geocoded to the street segment level and used the FBI Uniform Crime Report classification to identify three types of assault incidents (aggravated assault, simple assault, and battery), as well as four types of violent crime incidents (murder and non-negligent manslaughter, forcible rape, robbery and aggravated assault). We aggregated the total number of crime incidents on the street segment during the C & G program period (May through September). Assaults represented the majority of violent crimes (83%) over the program period. We thus ran analyses that focused only on assault incidents (Models 1-4) and analyses that included combined counts of all violent incidents (Models 5-8), given the lower total incidence of homicide, forcible rape and robbery.

Covariates. We included additional street and neighborhood level predictors previously demonstrated to be associated with crime.

Neighborhood Disadvantage. We used American Community Survey (ACS) data from 2008-2012 to control for neighborhood disadvantage, including: 1) the percentage of population with a high school education or less, 2) percent of the population earning $15,000 or less, 3) population density, and 4) a count of owner-occupied households separately in the analyses. We measured neighborhood factors at the census block group level as they are the smallest geographic unit in which population statistics are provided by the ACS.

Residents' Neighborhood Attitudes. We also used locally collected survey data regarding residents' perception of neighborhood disorder, fear of crime in their neighborhood, neighborhood social capital and the level of participation in neighborhood activities (Author et al., 2015).

Prior Year Police Incidents. We accounted for the previous year's crime on the street segment. We used the same strategy for defining the outcome variable to create this control variable.

Vacancy Density. We used data from the city of Flint to create a ratio of occupied homes to vacant lots on each street segment.

Analytic Strategy. For each outcome, assaults and all violent crime, we fit a series of hierarchical generalized linear models (HGLM) using HLM version 7 (Raudenbush and Bryk 2002). We first ran an unconditional model with a neighborhood level random effect (Models 1 and 5 for assaults and all crime, respectively) to determine the amount of variation in crime rates present at the neighborhood (level-2) level. We then introduced C & G as a level 1 (street level) predictor and included a fixed slope at level 2 to allow for unique intercepts (i.e., mean neighborhood crime counts) while constraining the effect of C & G on crime to be equal across neighborhoods (Models 2 and 6). A subsequent model permitted unique C & G slopes to test whether the effect of C & G varied across neighborhoods (Models 3 and 7). We then considered a model that included previous year assaults and vacancy density at the street level, along with neighborhood-level covariates at level 2 (Models 4 and 8). In this model, intercepts were still allowed to vary by neighborhood but slopes were assumed to be equal in light of results from Model 3. Given the delimited range of both assaults and violent crime, we assumed a Poisson sampling distribution and used a standard log link function. Models were corrected for over-dispersion. Given the large number of level 2 units (i.e., neighborhoods), we determined the significance of point estimates using robust standard errors which are less sensitive to violations of assumptions for the random effects. We report population average odds ratios averaging over the random effects.

Results

Aggregated assaults and total violent crime counts by treatment condition are reported in Table 1. In the year prior to the program period, 21.5% of street segments with a vacant lot and 17.6% of street segments with Clean and Green (C & G) lots reported at least 1 assault. During the program year, 21.5% of street segments with a vacant lot and 13.4% of segments with a C & G lot reported at least 1 assault. In the year prior to the program period, 24.2% of street segments with a vacant lot and 19.4% of street segments with C & G lots reported at least 1 violent crime. During the program year, 25.1% of street segments with a vacant lot and 16.7% of segments with a C & G lot reported at least 1 violent crime.

Assaults

Model 1. Results of the unconditional model revealed that the average assault rate was 0.33 assaults per program period ($\hat{\gamma}_{00} = -1.11$, t(106) = -11.86, p < .001), but rates varied by neighborhood ($\hat{t}_{00}$= 0.46, $\chi^2(106) = 183.43$, $p < .001$; see Table 2). Under a normality assumption, 95% of average neighborhood assault rates would be expected to range between 0.09-1.25 per season. The significant variation in assault rates across neighborhoods indicates, however, that neighborhood level predictors may explain some variation in street segment level crime counts.

Model 2. Model 2 added C & G as a level 1 (street level) predictor and included a fixed slope across neighborhoods. Results from model 2 indicate that street segments with C & G lots had lower assault rates ($\hat{\gamma}_{10} = -0.52$, $t(525) = -2.78$, $p < .001$). Specifically, segments with C & G would expect over a 40% reduction in the assault rate (exp(-.52) = 0.597 95%CI: 0.42,0.86) per season relative to those segments with a non C & G vacant lot; that is, 0.13 fewer assaults per month.

Model 3. Introducing a random effect to allow the effect of C & G to vary across neighborhoods resulted in minor changes to the point estimates from Model 2 (see Table 2) and yielded a non-significant variance estimate ($\hat{t}_{11} = 0.66$, $\chi^2(46) = 44.00$, $p > .500$). We therefore excluded the random effect for model 4 in favor of a more parsimonious model.

Model 4. A final model introduced main effect covariates at both the street segment (previous year assault counts and residential vacancies) and neighborhood levels (see Table 2). The effect of C & G parcels persisted even after controlling for both the street and neighborhood level covariates, with C & G streets having fewer assaults compared to non C & G segments with a vacant parcel ($\hat{\gamma}_{10} = -0.48$, $t(523) = -2.35$, $p = .02$). Previous year assault counts ($\hat{\gamma}_{20} = 0.29$, $t(523) = 4.77$, $p < .001$) and ratio of residential homes to vacant lots ($\hat{\gamma}_{30} = 0.07$, $t(523) = 3.68$, $p < .01$) were each associated with a higher rate of assaults. No neighborhood level predictors were associated with assault counts, although nested model tests indicated the saturated model fit the data best ($\chi^2(8) = 35.39$, $p < .001$).

All Violent Crime

Model 5. Results of the unconditional model revealed that the average violent crime rate was 0.40 violent crimes per season ($\hat{\gamma}_{00} = -0.93$, $t(106) = -10.08$, $p < .001$), but rates varied by neighborhood ($\hat{t}_{00}$= 0.41, $\chi^2(106) = 175.61$, $p < .001$). Under a normality assumption, 95% of average neighborhood violent crime rates would be expected to range between 0.11-1.38 per season. The significant variation in violent crime rates across neighborhoods indicates, however, that neighborhood level predictors may explain some variation in street level crime counts.

Model 6. Results from model 6 indicate that street segments with C & G parcels had lower violent crime rates ($\hat{\gamma}_{10} = -0.45$, $t(525) = -2.87$, $p = .004$; see Table 3). Similar to assault rates, street segments with a C & G would expect nearly a 40% reduction in the violent crime rate (exp(-.45) = 0.637 95%CI: 0.47,0.87) per month relative to those street segments with a non C & G vacant lot; that is, 0.15 fewer violent crimes per season.

Model 7. Introducing a random effect to allow the effect of C & G to vary across neighborhoods resulted in minor changes to the point estimates from Model 6 (see Table 3) and yielded a non-significant variance estimate ($\hat{t}_{11} = 0.22$, $\chi^2(46) = 44.34$, $p > .500$). We therefore excluded the random effect for model 8 in favor of a more parsimonious model.

Model 8. A final model introduced main effect covariates at both the street segment (previous year violent crime counts and residential vacancies) and neighborhood levels (see Table 3). The effect of C & G parcels persisted even after controlling for both the street segment and neighborhood level covariates ($\hat{\gamma}_{10} = -0.43$, $t(523) = -2.24$, $p = .03$), with C & G segments having fewer violent crimes compared to non C & G segments with a vacant parcel. Previous year violent crime counts ($\hat{\gamma}_{20} = 0.31$, $t(523) = 6.55$, $p < .001$) and residential vacancies ($\hat{\gamma}_{30} = 0.08$, $t(523) = 3.16$, $p < .01$) were each associated with a higher rate of violent crime. Although no neighborhood level predictors were associated with violent crime counts, the saturated model again showed best fit to the data ($\chi^2(8) = 51.53$, $p < .001$).

Discussion

Our results support community-engaged greening efforts as a strategy help to improve neighborhood safety. We found that community-engaged greening of vacant lots is associated with nearly a 40% reduction in assaults and total violent crime compared to vacant lots not maintained by these groups. Notably, these associations persisted when controlling for several potential confounding factors including neighborhood disadvantage, social capital and cohesion, and prior violent crime. Our results are consistent with findings that violent crime incidences declined near rehabilitated vacant lots (Kondo et al. 2016), but differ in that our results show that the greening does not require much more than mowing and trash removal and community engagement as a key ingredient. Our analysis at the street segment level also indicates that the effects of greening can be found at a relatively granular geographic unit. These results align with qualitative accounts of neighborhood residents who reported that community maintenance of vacant lots results in a reduction in crime (Garvin et al., 2012; Author, 2015).

These findings add to the growing body of evidence supporting crime prevention through environmental design (Cozens et al. 2005) and affirm that low-cost community engaged greening programs can be effective strategies for promoting safer neighborhoods and reducing violence. Community-engaged greening programs provide a lower cost alternative than city-directed and implemented programs and have the added benefit of neighborhood collaboration and community ownership. The Genesee County Land Bank Authority estimates that C & G participants have provided $5.5 million worth of mowing and trash removal work since program inception (Genesee County Land Bank, n.d.). Thus, encouraging and supporting the community in neighborhood greening efforts can provide substantial support for city budgets.

The fiscal benefits of greening strategies are not limited to the present context. The potential cost effectiveness of greening strategies was highlighted by (Branas et al. 2016) who estimated that taxpayers save $32 per vacant lot and $13 per abandoned building remediation due to reductions in assaults; savings which persisted nearly four years after initial vacant lot greening. Branas' analysis, however, did not focus on community-engaged remediation which may improve cost savings because the costs are minimized when residents lead the work. In addition, residents engaged in routine maintenance likely invest more time dispersed throughout their neighborhood, interact with fellow residents over a larger geographic area, and potentially interact with more non-program participants who live next to vacant lots (Nassauer 2011). Given the encouraging results from this study, a comparison of participatory versus non-participatory greening activities and their effect on crime that considers cost effectiveness and social advantages for community members is warranted, as is a more complete test of the hypothesized indirect effects through social mechanisms. It is likely that greening activities have multiple benefits in terms of crime prevention, but also through the promotion of social capital. These potential benefits, however, must be weighed against the ethicality of engaging residents as the chief implementers of the intervention and valuing volunteers' time appropriately so as not to unintentionally burden residents, particularly those in vulnerable communities (Crowley and

Jones 2017). Ensuring community organizing partnerships between residents and other stakeholders are organic can reduce the likelihood of unintentional exploitation and have benefits beyond economic considerations such as development of social capital, beautification of neighborhoods, and community well-being and resilience (Hernández-Cordero et al. 2011; Aiyer et al. 2015).

Limitations

A few study limitations require attention. First, we did not distinguish between firearm and non-firearm assaults due to the limited occurrence of firearm crimes within our sample. It is possible that the effects of greening may be greatest for reducing non-firearm assaults, but this is relevant because many firearm-related incidents begin with lower level conflicts such as an assault which can escalate into more severe retaliatory violence (Kubrin and Weitzer 2003). Second, many crimes resulting in injury may not be reported to the police and thus uniform crime data may be biased. That said, given the wide distribution of both C & G and non-C & G street segments, we have no reason to suspect reporting would be biased for either group of segments. Third, our approach to focus on street segments may have also reduced our ability to test for nuances among less frequently occurring crimes, such as homicides. Yet, our street segment approach provided greater statistical power for our analysis allowing for greater control of confounding factors and focused attention on a unit of analysis closest to people's lived experiences. We also argue that events on a street segment would more likely influence behavior on that street segment than events occurring further away but within a larger analytic unit such as a block group or census tract (Zmyslony and Gagnon 2000). Although selecting street segments introduces some concerns of spatial dependence (i.e., contagion), our multilevel approach should limit biased estimates due to spillover. Fourth, the C & G program required a neighborhood application process which suggests that these neighborhoods may have either less fear of crime or more social capital to begin with; this potential confound could explain the reduction in crime and not the greening process. This selection bias explanation is reduced because of our street segment selection process and data analytic approach. Although greened street segments are not randomly selected, we only analyzed newly greened street segments while controlling for prior year violent crime, neighborhood socioeconomic factors, and residents' perceptions of their neighborhood and the effects of greening remained. This is a powerful finding demonstrated across multipe years with a large sample and substantial efforts to test counterfactual explanations. Future research, however, should examine whether similar effects are sustainable across multiple seasons, which our analysis precluded, as well if displacement occurs after implementation. Finally, although Flint contains many similar characteristics of other economically challenged post-industrial cities, caution should be used in generalizing the results to other cities. Yet, land use policies, community dynamics, spatial distribution of vacant lots and crime incident patterns intermingle to create unique neighborhood environments; given our results and those of previous work, it is reasonable to assume greening efforts may be efficacious in a variety of contexts.

Conclusion

The limitations notwithstanding, this study makes several unique contributions to our understanding of neighborhood factors associated with violent crime. First, our study focused on the effects of changing physical factors in a neighborhood as a strategy to reduce interpersonal violence and enhance safety in a small city. Second, our analysis focused on small geographical areas (street segments) that are not typically the unit of analysis for testing neighborhood effects. Third, our study is among a burgeoning area of research supporting the idea that creating green space can be an effective strategy for violence prevention(Prevention 2017). Finally, our study was conceptually grounded in Busy Streets Theory, which suggests the importance of community engagement in neighborhood improvement efforts. Overall, the study provides compelling evidence that community engaged physical improvement of neighborhood properties can be an effective violence prevention strategy.

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Table 1: Assaults and All Violent Crime (Pre/Post) by Clean and Green Status, Flint, MI (2009-2013)

	N	Assaults Pre[ǂ ξ] (% of group total)	Assaults Post[§]	Total Violent Crime Pre[ǂξ]	Total Violent Crime Post[§]
Clean and Green Segments	216	67 (17.6%)	42 (13.4%)	77 (19.4%)	53 (16.67%)
Vacant Parcel Segments	446	175 (21.5%)	149 (21.5%)	207 (24.2%)	177 (25.11%)
Total	662	242	191	284	230

Note: [ǂ]Aggregated counts occurring at parcel sites between May and September of the year prior to inclusion in the study.

[§]Aggregated counts occurring at parcel sites between May and September of the year included in the study.

[ξ] 'Assaults' includes simple and aggravated assaults, as well as battery. 'Violent crime' includes murder and non-negligent manslaughter, forcible rape, robbery and aggravated assault.

Table 2: Association between Clean and Green Lots and Monthly Assault Counts Controlling for Street and Neighborhood Level Predictors

Assaults	Model			
	1	2	3	4
Intercept	-1.11 (0.10)***	-1.00 (0.11)***	-1.01 (0.10)***	-0.90 (0.72)
Nearby Clean & Green		-0.52 (0.19)**	-0.44 (0.18)*	-0.48 (0.21)*
Previous Year Assaults				0.29 (0.06)***
Ratio of Residential Homes to Vacant Lots				0.07 (0.02)***
Population Density				0.00 (0.00)
Less than High School				0.003 (0.009)

Education				
Income Less than $15,000				-0.007 (0.004)
Occupied Households				0.00 (0.00)
Social Capital/Cohesion				0.17 (0.24)
Neighborhood Participation				-0.14 (0.10)
Neighborhood Disorder				-0.06 (0.24)
Fear of Crime				0.14 (0.36)
Fit Statistics and Nested Model Tests[¥]				
Deviance (est. parameters)	2064.10 (2)	2057.32 (3)	2055.15 (5)	2019.76 (13)
χ^2(d.f.)		6.82(1)**	2.17(2)	35.39(8)***
Variance Estimate				
μ0	0.46***	0.33**	0.36**	0.11
μ1			0.66	
σ^2	1.00	1.19	1.10	1.37

Note: Model 1 is unconditional model, followed by Model 2 with C & G only. Model 3 introduces random slopes for C & G. Model 4 includes all street and neighborhood level covariates. Deviance = -2 times the natural log of the likelihood function at convergence. Standard errors are in parentheses.

[¥]Nested model tests based on models run with Laplace approximation and do not account for overdispersion.

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

Table 3: Association between Clean and Green Lots and Monthly All Violent Crime Counts Controlling for Street and Neighborhood Level Predictors

	Model			
Predictor	5	6	7	8
Intercept	-0.93 (0.09)***	-0.82 (0.10)***	-0.83 (0.10)***	-0.64 (0.62)
Nearby Clean & Green		-0.45 (0.16)**	-0.40 (0.16)*	-0.43 (0.17)*
Previous Year Assaults				0.31

				(0.05)***
Ratio of Residential Homes to Vacant Lots				0.08 (0.02)***
Population Density				0.00 (0.00)
Less than High School Education				-0.002 (0.008)
Income Less than $15,000				-0.008 (0.004)
Occupied Households				0.00 (0.00)
Social Capital/Cohesion				0.16 (0.22)
Neighborhood Participation				-0.09 (0.09)
Neighborhood Disorder				-0.08 (0.22)
Fear of Crime				0.01 (0.32)
Fit Statistics and Nested Model Tests[¥]				
Deviance	2173.18 (2)	2167.13 (3)	2165.54 (5)	2114.01 (13)
χ^2(d.f.)		6.08(1)*	1.59(2)	51.53(8)***
Variance Estimate				
$\mu 0$	0.41***	0.36***	0.37**	0.17
$\mu 1$			0.22	
σ^2	1.17	1.19	1.14	1.26

Note: Model 1 is unconditional model, followed by Model 2 with C & G only. Model 3 introduces random slopes for C & G. Model 4 includes all street and neighborhood level covariates. Deviance = -2 times the natural log of the likelihood function at convergence. Standard errors are in parentheses.

[¥]Nested model tests were on models run with Laplace approximation and do not account for overdispersion.

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