

ORIGINAL ARTICLE

Associations between land bank ownership and stewardship of vacant properties and crime, violence, and youth victimization in Flint, MI

Gregory Bushman¹  | Michelle C. Kondo²  | Laney A. Rupp¹  |
 Bernadette C. Hohl³  | Catherine H. Gong¹ | Marc A. Zimmerman¹

¹Department of Health Behavior and Health Education, University of Michigan School of Public Health, Ann Arbor, Michigan, USA

²USDA Forest Service, Northern Research Station, Philadelphia Field Station, Philadelphia, Pennsylvania, USA

³Penn Injury Science Center, Perelman School of Medicine, The University of Pennsylvania, Philadelphia, Pennsylvania, USA

Correspondence

Laney A. Rupp, Department of Health Behavior and Health Education, University of Michigan School of Public Health, 1415 Washington Heights, Ann Arbor, MI 48109, USA.

Email: laneyr@umich.edu

Abstract

Land banks across the United States are managing expanding vacant property inventories. By maintaining vacant properties and engaging residents in the process, land banks facilitate processes integral to building safe neighborhoods and may play a role in violence prevention. Using generalized additive mixed model regression, adjusted for spatial and temporal dependencies, we examined whether land bank ownership and stewardship of vacant properties in Flint, Michigan were associated with trends in serious, violent, and firearm-involved crime, between 2015 and 2018. We tested for differences in trends in crime density between properties owned by the Genesee County Land Bank Authority (GCLBA; $n = 7151$) and comparison properties not owned by the land bank ($n = 6,245$). In addition, we tested for differences in crime density trends between vacant properties that received different levels of land bank stewardship, including biannual mowing, GCLBA standard stewardship, and GCLBA-sponsored community-engaged stewardship. We found that GCLBA ownership was associated with net declines in densities of all types of crime and violence, over time, relative to properties not owned by the GCLBA. When we distinguished between levels of stewardship, we found that GCLBA stewardship, both with and without community engagement, was associated with net declines in serious and violent crime relative to comparison properties. Only community-engaged GCLBA stewardship was associated with declines in firearm-involved crime and firearm-involved crime with a youth victim over time, relative to comparison properties. Land bank stewardship of vacant properties may be protective against crime, violence, and youth victimization in legacy cities like Flint, MI that experience high rates of vacant properties and violent crime.

KEYWORDS

community engagement, firearm violence prevention, land bank stewardship, vacant property maintenance, violence prevention, youth violence prevention

Highlights

- Land bank ownership of vacant properties is associated with declines in crime.
- Land banks steward vacant properties in their care in a variety of ways.
- Standard land bank stewardship was associated with declines in serious, violent crime.
- Only community-engaged land bank stewardship was associated with declines in firearm-involved crime.

This is an open access article under the terms of the Creative Commons Attribution License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2023 The Authors. *American Journal of Community Psychology* published by Wiley Periodicals LLC on behalf of Society for Community Research and Action.

INTRODUCTION

Vacant and abandoned property expanded rapidly across the United States following the Great Recession of 2007 and the subsequent housing crisis. The number of vacant homes increased by more than 25% (from 9.5 to 12 million) nationwide from 2005 to 2010 (Heins & Abdelazim, 2014; O'Keefe et al., 2020). In legacy cities of the industrial north, the foreclosure crisis exacerbated an existing problem of systemic vacancy (Center for Community Progress, 2022b) that had resulted from decades of manufacturing job and population loss, diminished tax revenue, and subsequent economic and physical decline (Dewar & Thomas, 2013). As inventories of vacant homes grew, communities often used demolition to address the public health and safety hazards associated with these abandoned residences (Spelman, 1993; United States Department of the Treasury, 2019). While the increase in abandoned homes has stabilized somewhat in recent years (Mallach, 2018), decades of local, state, and federal investments in demolition created a large and increasing supply of vacant lots (O'Keefe et al., 2020).

The physical condition of this vacant land has important implications for community safety. When vacant properties are left unmaintained, they increase the risk of community violence (Branas et al., 2012; Spelman, 1993). Untended vacant lots are often sites of illegal dumping and overgrown weeds, which signal a lack of social control and provide uninhabited space for illegal activities with few witnesses (Garvin, Cannuscio, et al., 2013). Deteriorated vacant properties diminish a sense of safety and connectedness between neighbors and reduce community capacity for deterring violence (Burt et al., 2021; Garvin, Branas, et al., 2013). Notably, these deteriorated property conditions are concentrated in disinvested cities and disproportionately affect communities of color. Disinvestment in these settings has included years of neglect, economic deprivation, and racist policies (e.g., redlining, block-busting, racial segregation), which have contributed to the cycle of poverty, limited opportunities, and stress that are root causes of interpersonal violence (Carter et al., 2017; Dewar & Jacoby et al., 2018; Dewar & Thomas, 2013; Knopov et al., 2019).

Violence in the United States, and especially firearm-related violence, has a disproportionate effect on Black communities (Goldstick et al., 2022). Although firearm homicide has had a steep, unprecedented increase over the last decade for all populations (Goldstick et al., 2022; Kegler et al., 2022; Rosenfeld & Lopez, 2020), Black youth experience firearm homicide rates (31 per 100,000) that are 17 times higher than those of White youth (1.8 per 100,000) (Web-based Injury Statistics Query and Reporting System [WISQARS], 2019). Firearm-involved homicides have been the leading cause of death for Black youth for well over a decade (Centers for Disease

Control and Prevention, 2019) and Black youth accounted for 35% of all firearm-related deaths among youth in 2019, despite making up only 2% of the US population (WISQARS, 2019). Firearm violence may also contribute to other racial health disparities, as researchers have documented many negative health sequelae (e.g., mental illness, addiction) of such exposures across the lifespan (Carter et al., 2017; Gabarino et al., 2002; Ranney et al., 2019; Rowhani-Rahbar et al., 2015). Like vacancy, interpersonal gun violence is concentrated in cities with histories of racist policies and economic disinvestment that are at the root of racial disparities in violence outcomes (Carter et al., 2017; Jacoby et al., 2018; Knopov et al., 2019; Krieger et al., 2017). Improving the physical condition of vacant properties in these communities is one pathway to reducing these disparities.

Whether vacant properties increase the risk of interpersonal violence or are stabilized into well-maintained urban green spaces that support community health and well-being (Branas et al., 2018; South et al., 2015) depends in large part on the effectiveness of state property tax foreclosure processes (Dewar, 2009; O'Keefe et al., 2021). Many communities operate with dysfunctional delinquent property tax enforcement systems, in which governments hold public auctions of tax-foreclosed properties (Alexander, 2015; Heins & Abdelazim, 2014). In communities with weak housing markets with low demand, unsold properties often remain in foreclosure for years, contributing to chronic vacancy, lost tax revenue, and rapid physical deterioration (Heins & Abdelazim, 2014). Alternatively, these properties may be purchased by absentee, speculative buyers who have no intention of maintaining or reinvesting in these properties (Alexander, 2015; Heins & Abdelazim, 2014). These scenarios contribute to the neighborhood deterioration that is associated with community violence (Branas et al., 2012).

Land banks have been created to interrupt this cycle in communities across the country, by acquiring tax-foreclosed properties ahead of auction (or if they do not sell at auction) and holding them tax-free until they can find a responsible buyer (Alexander, 2015; Heins & Abdelazim, 2014). Land banks are public entities with unique governmental powers, created pursuant to state-enabling legislation, that focus on converting problem properties into productive use according to local community goals (Center for Community Progress, 2022a). The special powers granted to land banks differ from state to state, but most land banks have the authority to (1) acquire tax-foreclosed property cost-effectively; (2) extinguish liens and clear title; (3) hold property tax-exempt; (4) generate and collect revenue from delinquent property tax fees; and (5) flexibly sell property to a responsible buyer or developer, driven not by the highest price but by the outcome that most closely aligns with community goals (Center for Community

Progress, 2022a). Land banks in Michigan, where our study takes place, hold all of these special powers.

Land Banks are most commonly found in legacy cities, due to decades of economic decline, population loss, and economic disinvestment in these communities (Center for Community Progress, 2022b, 2023). In these settings, land banks are frequently unable to find responsible buyers for vacant properties, even at very discounted costs. As a result, land banks often hold vacant properties indefinitely, assuming responsibility for demolishing deteriorated buildings, and maintaining the resulting vacant lots (Center for Community Progress, 2022c; Heins & Abdelazim, 2014). In a national survey of vacant land management organizations, over 92% of land banks reported mowing the vacant properties in their inventory (O'Keefe et al., 2020). Land banks also frequently develop programs that involve residents in helping them maintain the vacant property inventories in their care (O'Keefe et al., 2020; Rupp et al., 2022). Ninety-four percent of land banks offered at least one method for residents to access their vacant properties for community maintenance and reuse (e.g., deeds, license agreements, short-term leases) (O'Keefe et al., 2020). Around 20% operated a formal stewardship program that engaged residents and community groups in consistent mowing and trash removal (O'Keefe et al., 2020).

Busy Streets Theory (BST)

BST provides a conceptual model for explaining how the stewardship activities that land banks perform, including property oversight, vacant lot maintenance, and community engagement, may be effective violence prevention strategies (Aiyer et al., 2015). BST posits that by reducing disorder and responding to complaints on vacant properties, land banks may have benefits for crime prevention as these activities signal positive ownership and social control (Aiyer et al., 2015; Cozens & Love, 2015; Kubrin & Weitzer, 2003; Reynald, 2011). Land bank-led efforts to remediate disordered vacant properties may be particularly important for preventing violence and firearm violence, as vacant, overgrown lots provide hiding places for firearms and often serve as storefronts for drug dealing (Branas et al., 2018; Garvin, Cannuscio, et al., 2013). A key aspect of BST is the development of community empowerment through creating opportunities for resident engagement in vacant lot greening, community cleanups, and neighborhood improvement projects. BST suggests that these opportunities help generate neighborhood trust and social capital, a sense of community, and collective efficacy. Consequently, the positive effects of land bank-led property maintenance may be enhanced when land banks facilitate community engagement in their work, as residents who collaborate to improve their

neighborhoods build social resources that can help deter crime and violence (Alaimo et al., 2010; Heinze et al., 2018; Rupp et al., 2020). Busy street processes may be further enhanced when land banks support community-engaged greening with tools, technical assistance, and financial support (Aiyer et al., 2015; Rupp et al., 2020). This organizational support may be particularly critical for helping residents reclaim systemically vacant and disinvested neighborhoods (Aiyer et al., 2015).

The effects of land bank ownership on crime and violence have not been explicitly studied. Yet, several researchers have found that the types of vacant lot remediation and greening that land banks can facilitate, such as mowing, trash removal, landscaping, and community reuse, are associated with reductions in crime (Pizarro et al., 2020), violent crime (Branas et al., 2018; Gong et al., 2022; Heinze et al., 2018; Kondo et al., 2016), and firearm violence specifically (Branas et al., 2016). Land banks also support community engagement in the stewardship of vacant properties, which researchers have found may augment the benefits of vacant property greening for violent crime prevention (Gong et al., 2022; Kondo et al., 2016). For example, Gong et al. (2022) found greater reductions in violent crimes for community-led compared to contractor-led greening of vacant lots.

Despite the potential for land banks to catalyze processes that are consistent with BST and that support safe neighborhoods, we are not aware of any previous research evaluating the relationship between land bank ownership of vacant properties, different levels of land bank stewardship, and serious interpersonal, violent, and firearm crime. Understanding the role of land banks in ameliorating the harms of vacancy is critical as vacant property inventories, particularly vacant lots, are expanding across the nation, and land banks are the entities managing the largest inventories of vacant properties in the country (O'Keefe et al., 2020).

Current study

We conducted our study in Flint, Michigan, a legacy city with among the highest rates of residential vacancy (Sauter, 2019; US Census Bureau, 2021) and violent crime in the United States (Federal Bureau of Investigation, 2019). Using a geocoded database of 13,396 vacant properties in Flint, we conducted a longitudinal study on the association between land bank ownership and violent crime, and land bank stewardship and violent crime, between 2015 and 2018 using generalized additive mixed models (GAMMs).

We hypothesized that land bank-owned vacant properties would demonstrate greater reductions in crime and violence over time compared to vacant properties not owned by the land bank. We further hypothesized

that land bank-owned vacant properties that received land bank-sponsored stewardship via community-engaged mowing and maintenance would experience less crime and violence than vacant properties that are stewarded by the land bank without community participation, because community engagement may strengthen neighborhood resources for deterring crime (Aiyer et al., 2015; Alaimo et al., 2010; Rupp et al., 2020).

METHODS

Study context

The United States currently has 300 land banks across the country and 49 in Michigan alone (Center for Community Progress, 2023). This is due in part because the State of Michigan has a robust legislation that empowers state, county, and municipal level land banks to acquire vacant properties not sold at tax auction. Genesee County, located in Southeastern Michigan, created the Genesee County Land Bank Authority (GCLBA) to manage its vacant land. The GCLBA currently owns over 14,000 residential, commercial, and industrial properties across the county. This makes the GCLBA the second largest land bank, by inventory, in both Michigan and the United States (J. O'Keefe, personal communication, May 24, 2023). The GCLBA is also among the oldest and most well-established land banks in the nation. It is known for being responsive to community complaints about blight and other concerns

on vacant property and for its robust community-engaged stewardship programs (J. O'Keefe, personal communication, May 24, 2023). The majority of the GCLBA's property is located in the city of Flint, the County seat, where this study takes place. Flint is a legacy city that has experienced significant disinvestment and economic decline over the last 50 years and now has among the highest residential vacancy (Sauter, 2019; US Census Bureau, 2021) and violent crime rates in the United States (Federal Bureau of Investigation, 2019). Notably, approximately 70% of the GCLBA-owned properties are vacant lots. The GCLBA is responsible for maintaining these properties through mowing, clean-ups, and creative reuse (e.g., community gardens), but their inventory is too large and their budget too limited to be able to manage all of their properties with the same level of stewardship. This provides our team with an opportunity to study the effects of different forms of land bank stewardship in a natural experiment.

Data

Independent variable: Land bank ownership and stewardship of vacant properties

We classified vacant properties as owned by GCLBA or not owned by GCLBA (i.e., privately owned “comparison properties”; see Figure 1). We obtained property vacancy data from Genesee County, which conducts a neighborhood inventory survey biannually. GCLBA

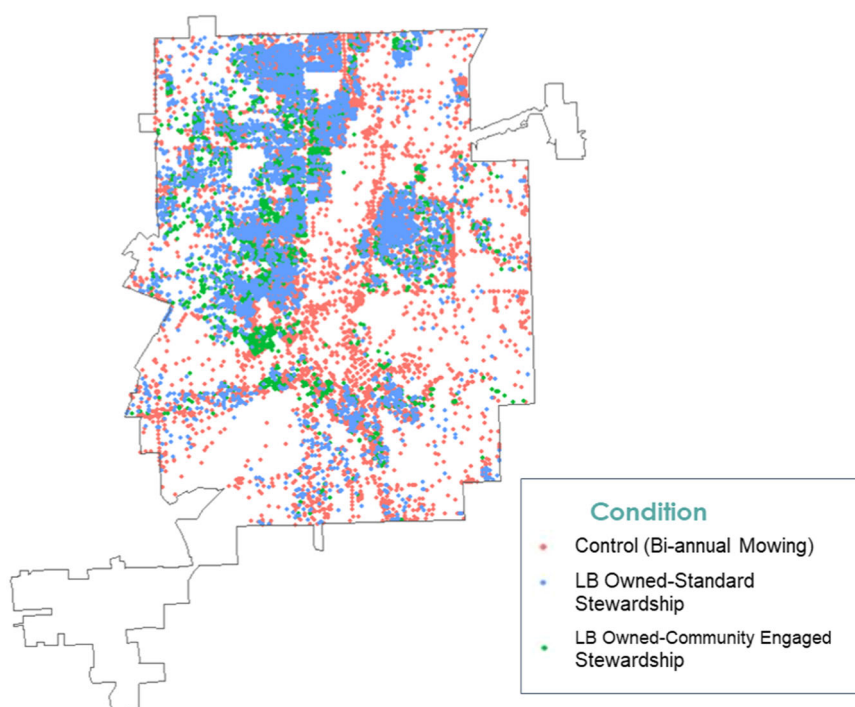


FIGURE 1 Map of study parcels by ownership and stewardship type. LB, land bank.

provided a database of property ownership and maintenance records. The city of Flint contains approximately 56,000 properties, 27% of which were vacant properties that remained vacant throughout the duration of the study period between 2015 and 2018. The GCLBA owned approximately 51% of these vacant properties, and, through their Clean & Green (C&G) and Lots Available programs (described below), sponsored the maintenance of 22%. Properties were excluded from the study if their unique Parcel ID changed during the study period (e.g., due to a parcel being split in two) resulting in incomplete data records for those properties ($n = 15$), or if properties changed between private and land bank ownership during the study period ($n = 2$). Our final sample included 13,396 vacant properties across the city.

We also classified vacant properties based on the stewardship they received. The GCLBA facilitates stewardship of vacant properties in Flint in three primary ways:

- (1) *Biannual mowing*: The land bank engages professional work crews to mow *all* unmaintained vacant properties, irrespective of land bank ownership, approximately one to two times per year.
- (2) *Standard stewardship* is applied to all land bank-owned vacant properties and often includes building demolition, site clearing, property grading, planting with grass or clover, and biannual mowing by crews.
- (3) *Community-engaged stewardship*: Due to the widespread, systemic nature of vacancy in Flint (Center for Community Progress, 2022b), the number of vacant properties in the GCLBA's inventory exceeds what their professional work crews can maintain. As a result, the land bank relies on networks of community volunteers to consistently maintain vacant properties across the city. Community-led greening activities typically include mowing and trash removal, but may also involve community gardening, or other group-defined community reuses. GCLBA's community-engaged greening activities are primarily organized and supported through the Clean & Green (C&G) and Lots Available Programs, described below. Founded in 2004, C&G is a well-established stewardship program that invites community groups to apply on an annual basis for financial support to mow and maintain a minimum of 25 vacant properties seven times per summer (approximately once every 3 weeks, from May to September) (GCLBA, 2023a). Groups receive US\$25 per mow, such that the total stipend amount depends on the number of properties each group elects to maintain (M. Hertlein, personal communication, May 24, 2023). The geographic areas where C&G works are defined by the groups themselves and are selected based on group members' sense of local connection, caring, and attachment to areas in Flint, where they often reside, worship, or grew up. These connections contribute to their motivation to improve physical conditions and quality

of life within their group boundaries (GCLBA, 2023a; M. Hertlein, personal communication, May 24, 2023). During the application process, groups are scored by GCLBA staff on a scale of 0–100 based on their strength of connection to the area they propose to maintain, prior experience with property maintenance (e.g., mowing lots in the community), maintenance performance based on past-year site evaluations (for returning groups), and access to reliable mowing equipment (M. Hertlein, personal communication, May 24, 2023). The opportunity to apply for C&G spreads primarily by word of mouth, based on the program's positive reputation, strong local presence, and community ties. While C&G group members are maintaining properties, they wear program T-shirts and often interact with nearby residents, which builds awareness of the program. In addition, the GCLBA conducts community outreach about the program through an annual kick-off meeting, media coverage, and a community liaison who is a long-term Flint resident. Each year, approximately 90% of participating groups are returning from the prior season (GCLBA, 2023a; M. Hertlein, personal communication, May 24, 2023).

The land bank also supports community members to access vacant properties for community maintenance via their Lots Available Program (GCLBA, 2023b). Through this program, GCLBA offers renewable 1 year lot “adoptions” for more simple maintenance and greening activities, or 2–5 years leases for groups interested in more involved reuses like community gardens. Opportunities to adopt or lease lots are advertised through GCLBA's website, social media, and local press. Interested applicants (typically nearby neighbors) apply to adopt or lease properties they are interested in maintaining and each application is considered based on the applicant's connection to the properties they hope to maintain and their proposed maintenance plans (M. Hertlein, personal communication, May 24, 2023). The GCLBA surveys the properties community residents maintain to ensure they are fulfilling their agreements. Substandard maintenance may result in voided agreements. Of all the land bank-owned properties receiving community-engaged stewardship, approximately 85% are maintained by C&G groups and 15% are maintained through Lots Available (M. Hertlein, personal communication, May 24, 2023).

Dependent variable: Police crime incidents

We calculated densities of crime incidents at vacant properties from Michigan Incident Crime Reporting data, which are administrative data reported to the Michigan State Police by participating law enforcement agencies throughout the state. The Flint City Police Department is the primary reporting agency in Flint,

Michigan. An incident refers to a reported event that a law enforcement official judges to be a crime, but notably not all reported and recorded incidents lead to arrests.

We examined Part I crime incidents that occurred within 1 km of Flint City boundaries, between May and September 2015–2018. Part I crimes, as defined by the FBI's Uniform Crime Reporting program, include homicide, rape, robbery, aggravated assault, burglary, larceny, motor vehicle theft, and arson. We examined all Part I crimes, and four subcategories of Part I crimes: (1) Part I violent crimes (i.e., homicide, rape, robbery, and aggravated assault), (2) Part I violent crimes involving a firearm, (3) Part I violent crimes with a youth victim (under age 25), and (4) Part I violent crimes involving a firearm with a youth victim. We only examined crime incidents between May and September (i.e., the season when grass and vegetation are growing and require maintenance in Michigan), because this is when the GCLBA runs their programs and to reduce potential biases from seasonal trends in crime.

For each year and each type of crime, we calculated separate 50 m resolution kernel density raster layers using ArcGIS Pro (ESRI Inc., 2021), and then extracted density values at the property centroids. We report these values in units of crime incidents per square mile, and graphed crime densities by year by ownership and stewardship type in preliminary analyses.

Population size and neighborhood disadvantage

We obtained block group-level sociodemographic data from the 2014–2018 5-year American Community Survey estimates (US Census Bureau, 2018). We used block group total population in our analyses to account for differences in population size across the city.

Additionally, neighborhood disadvantage is a potential confounder of the relationship between vacant property greening activities and crime rates. Therefore, we calculated a neighborhood disadvantage score for each block group in Flint using four factors from census data: percent households in poverty, percent households on public assistance, percent renting their home/apartment, and percent vacant properties. We chose these factors based on indices of neighborhood disadvantage that have been used in other studies (Burt et al., 2021; Sokol et al., 2022), and because these neighborhood economic and environmental conditions are related to the risk of violent crime (Branas et al., 2012; Carter et al., 2017; Schmidt et al., 2019). To create the neighborhood disadvantage score, we normalized the factors as Z-scores and then calculated an average of the normalized factors for each block group. We assigned block group-level total population and neighborhood disadvantage scores to properties.

Statistical analyses

First, we calculated descriptive summaries of neighborhood context variables, and densities of crime and violence, for all vacant properties and by stewardship category. Next, we performed the analysis of variance tests to determine whether the stewardship category was associated with these property characteristics. We then ran two series of models in which we tested the associations between (1) GCLBA ownership and crime incident densities; and (2) GCLBA stewardship level and crime incident densities, while controlling for population size and neighborhood disadvantage.

In all models, we estimated the effect sizes of the associations between GCLBA ownership/stewardship and trends in crime and violence between 2015 and 2018 by examining the interaction effects of ownership/stewardship and year using GAMMs. GAMMs are extensions of generalized linear mixed models (GLMMs) in which the parametric assumptions of GLMMs are relaxed, and in which the functional relationships between outcomes and predictors are not assumed to be linear (Hastie & Tibshirani, 1993; Wood, 2006). We specified property-level random intercepts to account for the correlation between repeated observations of the same property, across years. This method implicitly controls for time-invariant characteristics of the vacant properties, on which we do not have other available data.

Additionally, we found spatial autocorrelation among the residuals of this model (2015 values and total crimes; Moran's I : 0.282, $p < .001$). We therefore used a two-dimensional thin-plate spline surface to account for the spatial dependency of these data. This method allowed us to minimize any spatial signal detectable in the residuals of the models so that estimates of the associations between GCLBA stewardship and our outcome variables are not confounded by the spatial location/proximity of properties that were owned or maintained by the GCLBA. This approach has been used in prior efforts to estimate the effects of greening activities on crime, independent of spatial effects (see Pizarro et al., 2020). We performed all our statistical analyses in R (version 4.0.2; R Core Team, 2020) using the *gammap* package (version 0.2.6; Wood, 2006).

RESULTS

Description of properties

Table 1 provides a descriptive summary of vacant properties in Flint by form of GCLBA stewardship. Overall, 46.6% of properties in our sample were not owned by GCLBA, but may have received biannual mowing by land bank crews. Depending on the year, the percentage of GCLBA properties in our sample receiving standard stewardship ranged from 27.1% to 32.5%, while the percentage of GCLBA properties receiving community-engaged

TABLE 1 Description of vacant properties in Flint, 2015–2018.

Variable	Overall	Properties, by GCLBA ownership/stewardship			<i>p</i> Value ^a
		Non-GCLBA, biannually mowed properties	GCLBA standard stewardship properties	GCLBA community-engaged stewardship properties	
Number of properties, <i>N</i> (%) ^b					
2015	13,396 (100.0)	6245 (46.6)	4355 (32.5)	2796 (20.9)	—
2016	13,396 (100.0)	6245 (46.6)	4319 (32.2)	2832 (21.1)	—
2017	13,396 (100.0)	6245 (46.6)	4199 (32.3)	2952 (22.0)	—
2018	13,396 (100.0)	6245 (46.6)	3633 (27.1)	3518 (26.3)	—
Sociodemographic variables, mean (SD) ^c					
Population density (persons/ sq. mile)	1100 (656)	1080 (693)	1100 (627)	1160 (612)	<.001
Neighborhood disadvantage	29.9 (8.53)	29.9 (8.84)	30.3 (8.42)	29.6 (8.00)	<.001
Crime incident density variables (incidents/mile ²), mean (SD)					
Part 1 crime	75.8 (39.6)	72.1 (42.3)	77.1 (36.5)	81.9 (36.9)	<.001
Part 1 violent crime	27.4 (17.0)	24.8 (17.4)	28.8 (16.2)	30.7 (16.4)	<.001
Part 1 violent crime w/youth victim ^d	8.68 (7.61)	7.92 (7.50)	8.96 (7.51)	9.87 (7.78)	<.001
Part 1 violent firearm crime	12.8 (11.3)	11.0 (10.7)	13.8 (11.3)	15.1 (12.1)	<.001
Part 1 violent firearm crime w/youth victim ^d	4.52 (5.84)	3.82 (5.38)	4.86 (5.92)	5.52 (6.45)	<.001

Abbreviations: ANOVA, analysis of variance; GCLBA, Genesee County Land Bank Authority.

^a*p* Values derive from ANOVA tests.^bPercentages associated with the number of properties per year reflect row percentages.^cCensus block group level.^dYouth refers to individuals under 25 years old.

stewardship ranged from 20.9% to 26.3%. We found that properties receiving community-engaged stewardship tended to be located in slightly more densely populated block groups than comparison properties. We also found that vacant properties receiving standard stewardship were located in block groups with the highest levels of neighborhood disadvantage.

Comparisons of vacant properties owned and not owned by the GCLBA

Yearly crime densities by ownership, for all Part I crimes, are shown in Figure 2, and for youth-only crimes are shown in Figure 3. In general, crime densities increased through 2017 and then declined in 2018. Between 2015 and 2018, densities of all crime types decreased more at GCLBA-owned properties than at comparison properties (although they remained higher at GCLBA-owned properties).

Parameter estimates of associations between GCLBA ownership of vacant properties and crime incident densities

over time, from regression analyses, are shown in Table 2. We found a main effect of ownership. We also found interaction effects of GCLBA ownership and year across all subcategories of crime, except for Part I violent firearm crimes involving youth. These interaction effects indicate that vacant properties owned by the GCLBA have experienced net reductions in the incident densities of all Part I crimes, Part I violent crimes, and Part I violent crimes involving firearms, between 2015 and 2018, relative to comparison properties.

Comparisons of vacant properties by level of GCLBA stewardship

Yearly crime densities by stewardship, for all Part I crimes, are shown in Figure 2, and for youth-only crimes are shown in Figure 3. In general, standard stewardship properties experienced the highest crime densities over time, community-engaged had lower crime densities, and biannual mowing comparison properties experienced the lowest crime

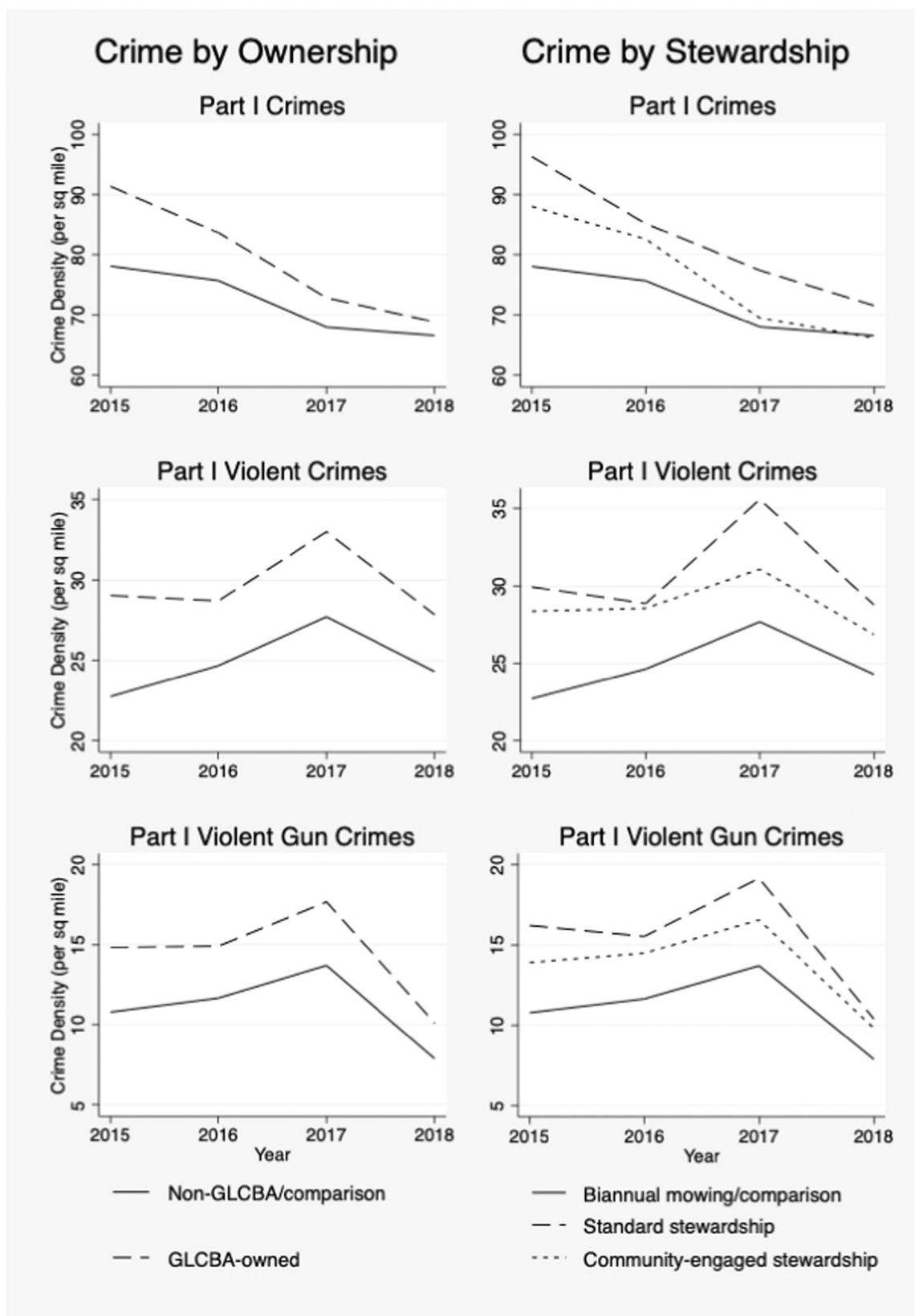


FIGURE 2 Crime densities (all crimes) over time by ownership and stewardship type. GLCBA, Genesee County Land Bank Authority.

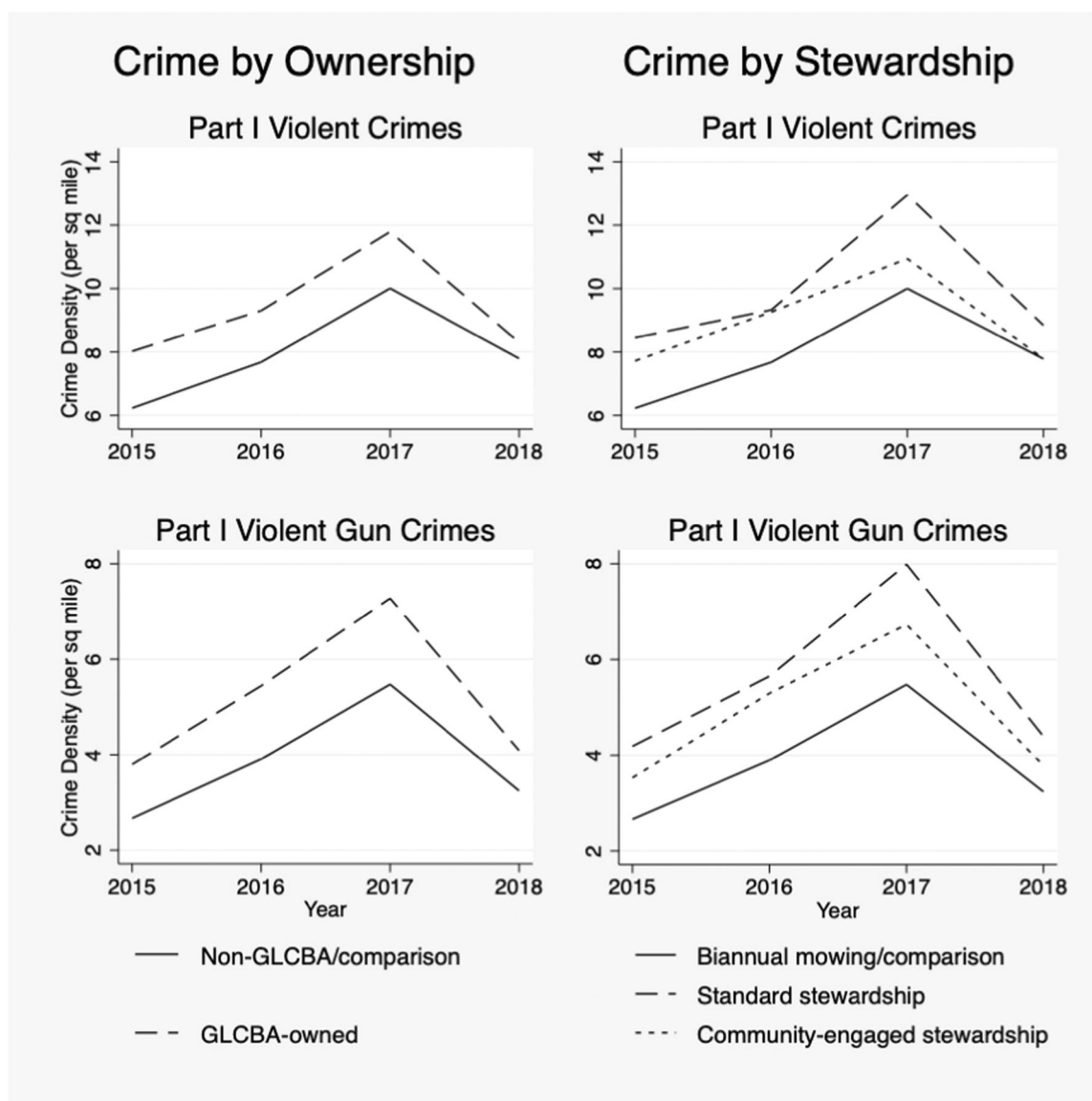


FIGURE 3 Crime densities (youth only) over time by ownership and stewardship type. GLCBA, Genesee County Land Bank Authority.

densities. Yet, crime densities at community-engaged stewardship properties experienced relative reductions compared to the other stewardship categories and had lower Part I crime densities than did comparison properties by 2018. This trend also occurred for Part I violent crimes involving youth (Figure 3), where community-engaged properties had higher crime levels in 2015, but declined by 2018 to have the same crime density as did comparison properties.

Parameter estimates from regression of the associations between levels of GCLBA stewardship of vacant properties and crime incident densities over time are shown in Table 3. We found interaction effects between both community-engaged stewardship and year, and standard stewardship and year, across all Part I crimes, Part I violent crimes, and Part I violent crimes involving youth. This indicates that more intensive forms of GCLBA stewardship are associated with greater net reductions in the incident densities of these

forms of crime, between 2015 and 2018, relative to comparison properties.

Notably, we found an interaction effect between community-engaged stewardship and year, for Part I violent crimes involving a firearm for victims of all ages and for youth victims specifically. We did not observe this effect for the standard stewardship condition. This indicates that community-engaged GCLBA stewardship was the only stewardship condition that was associated with reduced firearm violence over time.

DISCUSSION

Our findings suggest that the GCLBA-sponsored, community-engaged stewardship of vacant properties was associated with reductions in violent crime in

TABLE 2 Parameter estimates (95% confidence intervals) of associations between GCLBA ownership of vacant properties and crime incident densities, over time.

Predictor ^a	Models, by crime outcome				
	P1 crime	P1 violent crime	P1 violent crime involving youth ^b	Firearm crime	Firearm crime involving youth ^b
(Intercept)	76.80 (75.36, 78.23)***	23.77 (23.11, 24.43)***	5.94 (5.62, 6.27)***	12.16 (11.68, 12.63)***	3.05 (2.78, 3.32)***
Property condition					
Comparison properties	Ref.	Ref.	Ref.	Ref.	Ref.
GCLBA ownership	6.50 (5.85, 7.14)***	1.50 (1.17, 1.83)***	0.79 (0.61, 0.97)***	0.97 (0.71, 1.22)***	0.22 (0.08, 0.37)**
Year (2015–2018)	−4.31 (−4.51, −4.11)***	0.80 (0.68, 0.92)***	0.72 (0.65, 0.78)***	−0.68 (−0.78, −0.59)***	0.33 (0.28, 0.39)***
GCLBA ownership × year	−3.54 (−3.81, −3.27)***	−0.73 (−0.89, −0.53)***	−0.39 (−0.48, −0.29)***	−0.46 (−0.59, −0.33)***	−0.07 (−0.14, 0.01)
Control variables					
Disadvantage index	−0.08 (−0.12, −0.04)***	−0.02 (−0.04, −0.008)**	0.01 (0.003, 0.02)**	−0.001 (−0.01, 0.01)	0.01 (0.003, 0.01)**
Population density	−0.007 (−0.006, −0.007)***	0.002 (0.002, 0.003)***	0.001 (0.001, 0.001)***	0.001 (0.001, 0.001)***	0.0005 (0.0004, 0.0006)***

Abbreviations: GCLBA, Genesee County Land Bank Authority; P1, Part 1; Ref., reference.

^aYouth refers to individuals under 25 years old.^bAll models also control for population density, neighborhood disadvantage, and nonlinear spatial trends.* $p < .05$; ** $p < .01$; *** $p < .001$.

general, and firearm crime in particular, over time. Moreover, these effects held when we examined only youth-involved crime. This finding builds upon previous evidence that community-engaged vacant property maintenance may provide additional violence-prevention benefits, compared to standard maintenance that does not involve engagement (Gong et al., 2022; Kondo et al., 2016). Our results also suggest that the benefits of GCLBA land bank stewardship are not wholly attributable to their most intensive, community-engaged stewardship strategies. Even properties that only received standard stewardship experienced greater reductions in serious and violent forms of crime than comparison properties. Finally, we found that, regardless of stewardship activities, GCLBA-owned properties experienced greater reductions in crime and violence over time than vacant properties not owned by the land bank. This effect was found across all types of serious and violent crimes and for youth victimization in particular. While neighborhood socioeconomic disadvantage is potentially related to rates of vacant properties, and each of our outcome variables, we were able to adjust for this variable in regression analyses to reduce any potential bias.

A number of potential explanations for our findings are possible. Consistent with BST (Aiyer et al., 2015; Gong et al., 2022; Heinze et al., 2018), the GCLBA may help to create a positive synergy between physical and social environments that can be protective against crime

and violence. The GCLBA's efforts to secure and maintain vacant properties signal positive, responsive, and present ownership. This includes demolishing unsafe structures, responding to complaints, and mitigating negative activities linked to violence, such as drug dealing (Garvin, Cannuscio, et al., 2013; Heins & Abdelazim, 2014; Spelman, 1993). It also includes maintaining and greening vacant properties (O'Keefe et al., 2020), which has been shown to reduce fear of crime and violence over time (Branas et al., 2018; Burt et al., 2021). These activities are in contrast to the physical deterioration and neglect that can occur when vacant properties languish in tax foreclosure or are purchased by absentee private owners (Alexander, 2015; Heins & Abdelazim, 2014).

Further, the GCLBA facilitates community engagement in vacant property stewardship. Engaging residents in vacant lot maintenance and greening has been found to increase social control (Alaimo et al., 2010), which can be protective against crime and violence (Weisburd et al., 2021). We have found that residents involved in vacant property maintenance have reported feeling better about their neighborhood, more connected to their neighbors, and more efficacious in making changes in their neighborhood (Rupp et al., 2020). Community engagement in stewardship activities may also facilitate increased resident leadership and action to improve neighborhood conditions (Rupp et al., 2020). Future studies that explicitly test the mechanisms underlying the greater

TABLE 3 Parameter estimates (95% confidence intervals) of associations between levels of GCLBA stewardship of vacant properties and crime incident densities, over time.

Predictor ^a	Models, by outcome				
	P1 crime	P1 violent crime	P1 violent crime involving youth ^b	Firearm crime	Firearm crime involving youth ^b
(Intercept)	76.79 (75.36, 78.23)***	23.79 (23.13, 24.46)***	5.97 (5.64, 6.30)***	12.19 (11.71, 12.66)***	3.06 (2.79, 3.33)***
Property condition					
Comparison properties	Ref.	Ref.	Ref.	Ref.	Ref.
GCLBA standard stewardship	5.84 (5.12, 6.57)***	1.64 (1.26, 2.02)***	0.84 (0.64, 1.04)***	0.59 (0.30, 0.88)***	0.20 (0.03, 0.36)*
GCLBA CE stewardship	7.37 (6.55, 8.18)***	1.20 (0.77, 1.63)***	0.61 (0.38, 0.84)***	1.49 (1.16, 1.81)***	0.23 (0.05, 0.42)*
Year (2015–2018)	−4.29 (−4.49, −4.08)***	0.81 (0.69, 0.93)***	0.71 (0.65, 0.78)***	−0.68 (−0.77, −0.58)***	0.34 (0.28, 0.39)***
GCLBA standard stewardship × year	−3.35 (−3.67, −3.02)***	−0.74 (−0.93, −0.55)***	−0.38 (−0.49, −0.28)***	−0.15 (−0.31, 0.001)	−0.03 (−0.12, 0.06)
GCLBA CE stewardship × year	−3.84 (−4.19, −3.49)***	−0.70 (−0.90, −0.49)***	−0.35 (−0.47, −0.24)***	−0.86 (−1.02, −0.69)***	−0.12 (−0.20, −0.02)*
Control variables					
Disadvantage index	−0.08 (−0.12, −0.04)***	−0.02 (−0.04, −0.008)**	0.01 (0.002, 0.02)**	−0.002 (−0.01, 0.01)	0.01 (0.003, 0.01)**
Population density	0.007 (0.006, 0.007)***	0.002 (0.002, 0.003)***	0.001 (0.001, 0.001)***	0.001 (0.001, 0.001)***	0.0005 (0.0004, 0.0006)***

Abbreviations: CE, community-engaged; GCLBA, Genesee County Land Bank Authority; P1, Part 1; Ref., reference.

^aAll models also control for population density, neighborhood disadvantage, and nonlinear spatial trends.^bYouth refers to individuals under 25 years old.* $p < .05$; ** $p < .01$; *** $p < .001$.

reductions in violence around vacant properties owned and stewarded by the GCLBA relative to comparison properties would be worthwhile.

Key features of the GCLBA and its programming may support the observed associations. As an older, more established land bank, the GCLBA and its programs are well known in the community, meaning that residents are aware that they can report their property complaints to the land bank (J. O'Keefe, personal communication, May 24, 2023). This may improve the GCLBA's ability to address blight in the community through its standard stewardship activities. GCLBA also has the capacity to implement a formal community stewardship program that provides financial support (e.g., stipends), program coordination, and technical assistance to encourage consistent community-engaged maintenance (Alexander, 2015; Heins & Abdelazim, 2014; J. O'Keefe, personal communication, May 24, 2023). This organizational support is vital in sustaining community maintenance in a low-resource community where residents may experience multiple barriers to participating (Lowe & Thaden, 2016; Rupp et al., 2022). Additionally, GCLBA offers multiple avenues for community-engaged maintenance (e.g., lot leasing, adoption), which may enable it to engage more residents,

maintain more lots, and potentially expand public health benefits for the community.

In legacy cities like Flint, where government decisions and racist policy making (e.g., redlining, block-busting, and urban renewal projects) have contributed to inequitable and systemic vacancy and physical deterioration (Center for Community Progress, 2022b; Fullilove, 2004; Sadler & Lafreniere, 2017), it is particularly crucial for land banks to restore trust with community residents and promote equity through their work. The GCLBA therefore employs multiple resident engagement methods (e.g., outreach through a dedicated community liaison, surveying, participatory programming) to increase transparency, assess and respond to community needs, and expand community voice and leadership in their greening programs. Such approaches may support GCLBA's organizational functioning and the reach of its stewardship activities (Rupp et al., 2022). Notably, these organizational features are replicable for other land bank organizations in Michigan and nationwide.

Our study builds upon prior evaluations of GCLBA's C&G program (Heinze et al., 2018; Pizarro et al., 2020) indicating reductions in property crimes, violent crimes, and assault-related injuries around vacant properties maintained with land bank support.

First, our study differentiates land bank ownership and different levels of land bank-sponsored stewardship activities, which prior evaluations did not consider. This is significant because it helps inform our understanding of the different roles that land banks can play in transforming disinvested communities experiencing elevated violence. Second, we have included additional outcome measures not included in prior evaluations, including violent crimes involving firearms and violent crimes with youth victims.

Our confidence in the results is strengthened by several factors. First, we examined trends over a 4-year period for several different crime-related outcomes. Second, by examining multiple violence-related outcomes and finding consistent relationships across all of them, we triangulate our findings that land bank ownership and stewardship of vacant properties are associated with reductions in crime and violence. Third, we applied statistical models that accounted for spatial and temporal correlations that could bias our analyses. Finally, we controlled for other possible confounding factors such as population density and neighborhood disadvantage that might explain the patterning of crime and violence.

Although the foreclosure crisis in Flint and Genesee County has slowed since the study period (Fonger, 2023), Flint's challenges with vacancy are not easing. The total number of vacant lots in Flint rose from over 14,000 in 2014 to more than 17,000 in 2023 (Genesee County Land Bank Authority et al. 2023; Pruett, 2015). This follows GCLBA's efforts to demolish over 5000 vacant structures over the last decade (GCLBA, 2022). Consistent with national trends (O'Keefe et al., 2020), vacant lot inventories are expected to continue to expand. The city's Blight Elimination Plan indicates that an additional 4600 deteriorated vacant structures need demolition (GCLBA, 2022). Demolition helps to control the public health and safety risks associated with abandoned structures, but the resulting vacant lots still require stewardship to prevent them from becoming public health liabilities in the community (Branas et al., 2012).

As vacant lot inventories rise across the country (O'Keefe et al., 2020), land banks may increasingly turn to community-engaged stewardship to be able to maintain the vacant properties in their care. Our findings suggest that the GCLBA's community-engaged stewardship of vacant properties may have added benefits for crime and violence prevention, above and beyond standard stewardship activities. Yet, due to inadequate funding, this level of stewardship depends on the mostly unpaid volunteer labor of Flint residents. Residents of Flint and other legacy cities have many other priorities and concerns, and the GCLBA staff aptly note that asking them to shoulder the burden of maintaining vacant properties without fair compensation is not an ideal or sustainable model. Land banks are part of a long-term, systemic approach to managing vacancy. One potential model that would support land banks and the

economic vitality of legacy cities would be to pursue funding to pay community workforces providing vacant lot maintenance competitive wages.

Limitations

Our study also has a number of limitations. First, crime incident reporting data are an imperfect measure of violence and victimization because not all incidents are reported to the police. Thus, our outcome measure may have underestimated the true density of crime incidents in areas where residents may be less likely to report crime incidents, but we have no reason to think this bias was differential across the conditions studied. In addition, if the police data are underestimated, then it would decrease the chances of finding the effects we observed. Finally, we minimized the possible influence of under-reporting bias by focusing only on Part I (serious) crimes, which are more likely to be reported to police than less severe crimes, particularly when they involve injury (Harlow, 1985).

Second, we identified vacant properties that have received community-engaged stewardship using administrative data from the GCLBA. Although the GCLBA is by far the largest owner of vacant properties in Flint, vacant properties *not* owned by the GCLBA may have received maintenance or attention in other ways, either through other programs or through informal means such as when community members decide to pick up trash or mow vacant properties near their home. This, however, would bias our results toward the null hypothesis. Despite this, we found consistent support for our hypotheses across outcomes and with relevant controls.

Third, while we minimized the effects of spatial autocorrelation by testing multiple spatial modeling approaches (spatial lag models, spatial error models, trend surface GAMMs) and selecting the approach that yielded the smallest degree of spatial autocorrelation among model residuals, we still found that our model residuals were autocorrelated. This is not surprising given our sample size and the spatial distribution of vacant properties in Flint; however, it does suggest that our results may be biased by the spatial configuration of our units of analysis. Nevertheless, given the pattern of violent crime in many cities (e.g., crime hotspots), we expect that some spatial autocorrelation is inevitable and the best we can do is minimize it as an alternative explanation for our results. The fact that our results are also consistent with past research both in Flint and other cities suggests that the spatial autocorrelation alone does not explain our results.

Fourth, our analyses are limited by selection bias, and the nonrandom determination of which vacant properties receive GCLBA-sponsored greening activity. Notably, the GCLBA-owned lots were located in low-population and high-crime areas. Genesee County has

legislation in place that bundles the worst foreclosed properties for future demolition to deter speculative buyers, which are then involuntarily transferred to GCLBA (Heins & Abdelazim, 2014). As a result, properties deemed to be in the worst condition and lowest value end up in the hands of GCLBA when foreclosed. Land banks in other cities across the nation also receive properties located in areas of greatest vulnerability for violent crime. Differences found in the densities of crime and violence around vacant properties owned by the GCLBA and vacant properties not owned by the GCLBA, in 2015, means that the declines we found in crime and violence around GCLBA-owned vacant properties may, to some degree, be explained by regression to the mean. Yet, we found an association between community-engaged GCLBA stewardship and firearm violence, which we did not find for standard GCLBA stewardship without community engagement. If the associations we found in our analyses were explained simply by regression to the mean, then it is unlikely that community engagement would accelerate this regression.

Finally, the unique features of the GCLBA, including the many years it has been operating in the community and its large property inventory, may mean that our findings do not generalize to other land banks. While the GCLBA is an outlier in terms of its age and inventory size, its standard stewardship activities (e.g., demolition, mowing, and complaint response) are common among land banks nationally (Heins & Abdelazim, 2014; O'Keefe et al., 2020). We hypothesize that these standard stewardship activities would be beneficial for violence prevention in other legacy cities (e.g., Cleveland & Youngstown, OH; Newark & Camden, NJ; Detroit & Saginaw, MI; St. Louis, MO) contending with the population decline, widespread vacancy, and physical deterioration that attract crime (Branas et al., 2012). The GCLBA's community stewardship activities are also not entirely unique, as most land banks support community maintenance to some extent by providing access to vacant lots for care (O'Keefe et al., 2020). Conversely, formal community stewardship programs like Clean and Green, in which residents engage in consistent greening of multiple properties, are more common (~50%) among land banks managing larger property inventories (≥500 vacant lots) (J. O'Keefe, personal communication, May 24, 2023; O'Keefe et al., 2020). Examining the specific organizational features and programming associated with reductions in crime and violence across a larger sample of land bank organizations would help to develop this program of research.

CONCLUSIONS

Our study demonstrates that vacant properties that are owned and stewarded by a community land bank, experienced greater reductions in serious, violent, and

firearm crime, as well as youth victimization, over time, than vacant comparison properties that were not owned by the land bank. As such, our findings suggest that land banks may have a role to play in deterring crime and violence by supporting disinvested communities to maintain vacant properties and reclaim their neighborhoods. Our results also suggest that policies that support land banks to develop programming that engages local residents in the process of vacant land maintenance may be an innovative way to prevent interpersonal violence in general, and firearm violence in particular. Adequately funding the largely volunteer workforces maintaining vacant properties in cities contending with systemic vacancy may be key to ensuring the long-term sustainability of community-engaged stewardship. A land bank approach to addressing the negative effects of untended property vacancy may be advantageous because it does not focus on individual behavior change or victim blaming to help reduce community- and firearm-related violence. This is a critical area for research as land banks are the entities responsible for holding and maintaining the largest inventories of vacant properties across the country. Finally, land bank-sponsored vacant property stewardship, and particularly community-engaged stewardship, may be critical for preventing community violence and addressing persistent disparities in youth firearm violence in disinvested communities.

ACKNOWLEDGMENTS

This study was conducted as part of a federally funded evaluation of community-engaged vacant property greening conducted by the Genesee County Land Bank in Flint, MI (CDC Grant # U01CE002698, PI: Dr. Marc Zimmerman). The findings and conclusions in this paper are those of the author(s) and do not necessarily represent the official positions of the Centers for Disease Control and Prevention. Co-authors include evaluators of the program under study. We would like to thank our partners, including the Genesee County Land Bank Authority and Michigan State Police, for providing the necessary data for this study.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

ORCID

Gregory Bushman  <https://orcid.org/0000-0003-4529-1721>

Michelle C. Kondo  <http://orcid.org/0000-0001-9152-1589>

Laney A. Rupp  <http://orcid.org/0000-0003-1645-9572>

Bernadette C. Hohl  <https://orcid.org/0000-0002-2901-281X>

REFERENCES

- Aiyer, S. M., Zimmerman, M. A., Morrel-Samuels, S., & Reischl, T. M. (2015). From broken windows to busy streets: A community

- empowerment perspective. *Health Education & Behavior: The Official Publication of the Society for Public Health Education*, 42(2), 137–147. <https://doi.org/10.1177/1090198114558590>
- Alaimo, K., Reischl, T. M., & Allen, J. O. (2010). Community gardening, neighborhood meetings, and social capital. *Journal of Community Psychology*, 38(4), 497–514. <https://doi.org/10.1002/jcop.20378>
- Alexander, F. S. (2015). *Land banks and land banking* (2nd ed.). Center for Community Progress. <https://communityprogress.org/publications/land-banks-and-land-banking-2nd-ed/>
- Branas, C. C., Kondo, M. C., Murphy, S. M., South, E. C., Polsky, D., & MacDonald, J. M. (2016). Urban blight remediation as a cost-beneficial solution to firearm violence. *American Journal of Public Health*, 106(12), 2158–2164. <https://doi.org/10.2105/AJPH.2016.303434>
- Branas, C. C., Rubin, D., & Guo, W. (2012). Vacant properties and violence in neighborhoods. *ISRN Public Health*, 2012, 1–9. <https://doi.org/10.5402/2012/246142>
- Branas, C. C., South, E., Kondo, M. C., Hohl, B. C., Bourgois, P., Wiebe, D. J., & MacDonald, J. M. (2018). Citywide cluster randomized trial to restore blighted vacant land and its effects on violence, crime, and fear. *Proceedings of the National Academy of Sciences of the United States of America*, 115(12), 2946–2951. <https://doi.org/10.1073/pnas.1718503115>
- Burt, C. J., Kondo, M. C., Hohl, B. C., Gong, C. H., Bushman, G., Wixom, C., South, E. C., Cunningham, R. M., Carter, P. M., Branas, C. C., & Zimmerman, M. A. (2021). Community greening, fear of crime, and mental health outcomes. *American Journal of Community Psychology*, 69, ajcp.12544. <https://doi.org/10.1002/ajcp.12544>
- Carter, P. M., Cook, L. J., Macy, M. L., Zonfrillo, M. R., Stanley, R. M., Chamberlain, J. M., Fein, J. A., Alpern, E. R., & Cunningham, R. M. (2017). Individual and neighborhood characteristics of children seeking emergency department care for firearm injuries within the PECARN network. *Academic Emergency Medicine*, 24(7), 803–813. <https://doi.org/10.1111/acem.13200>
- Center for Community Progress. (2022a). *Land banks: A tool for addressing problem properties to serve community goals* [Progress points]. <https://communityprogress.org/wp-content/uploads/2022/06/Progress-Points-Land-Banks-2022.pdf>
- Center for Community Progress. (2022b). *Systemic vacancy: How people, policies, and processes contribute to large-scale vacancy* [Progress points]. <https://communityprogress.org/wp-content/uploads/2022/06/Progress-Points-Systemic-Vacancy-2022.pdf>
- Center for Community Progress. (2022c). *Land banks*. <https://communityprogress.org/resources/land-banks/>
- Center for Community Progress. (2023). National land bank map [Map]. <https://communityprogress.org/resources/land-banks/national-land-bank-map/>
- Centers for Disease Control and Prevention. (2019). *Underlying cause of death 1999–2017 on CDC WONDER online database*. National Center for Health Statistics. <https://wonder.cdc.gov/ucd-icd10.html>
- Cozens, P., & Love, T. (2015). A review and current status of crime prevention through environmental design (CPTED). *Journal of Planning Literature*, 30(4), 393–412. <https://doi.org/10.1177/0885412215595440>
- Dewar, M. (2009). *The effects on cities of "Best Practice" in tax foreclosure: Evidence from Detroit and Flint*. Center for Local, State, and Urban Policy.
- Dewar, M., & Thomas, J. M. (2013). *The city after abandonment*. University of Pennsylvania Press.
- ESRI Inc. (2021). *ArcGIS Pro (version 2.9)*. <https://www.esri.com/en-us/arcgis/products/arcgis-pro/overview>
- Federal Bureau of Investigation. (2019). *Offenses known to law enforcement by city, Michigan*. <https://ucr.fbi.gov/crime-in-the-u.s/2019/crime-in-the-u.s.-2019/topic-pages/tables/table-6>
- Fonger, R. (2023, April 16). *789 flint area properties taken through tax foreclosure*. <https://www.mlive.com/news/flint/2023/04/789-flint-area-properties-taken-through-tax-foreclosure-here-are-the-most-valuable-among-them.html>
- Fullilove, M. (2004). *Root shock: How tearing up city neighborhoods hurts America, and what we can do about it* (1st ed.). Ballantine Books.
- Gabarino, J., Bradshaw, C., & Vorrasi, J. (2002). Mitigating the effects of gun violence on children and youth. *Future of Children*, 12(2), 73–86.
- Garvin, E., Branas, C., Keddem, S., Sellman, J., & Cannuscio, C. (2013). More than just an eyesore: Local insights and solutions on vacant land and urban health. *Journal of Urban Health*, 90(3), 412–426. <https://doi.org/10.1007/s11524-012-9782-7>
- Garvin, E. C., Cannuscio, C. C., & Branas, C. C. (2013). Greening vacant lots to reduce violent crime: A randomised controlled trial. *Injury Prevention*, 19(3), 198–203. <https://doi.org/10.1136/injuprev-2012-040439>
- Genesee County Land Bank Authority. (2022). *Beyond blight framework*. Genesee County Land Bank, City of Flint, MI, Flint Police Foundation, Charles Stewart Mott Foundation. https://www.thelandbank.org/downloads/beyond_blight_2022.pdf
- Genesee County Land Bank Authority. (2023a). *Clean & Green program overview*. https://www.thelandbank.org/clean_green_prog.asp#:~:text=Clean%20%26%20Green%20is%20a%20program,vacant%20properties%20in%20Genesee%20County
- Genesee County Land Bank Authority. (2023b). *Lots available*. <https://www.thelandbank.org/lotsavailable.asp>
- Genesee County Land Bank Authority, Imagine Flint, & City of Flint Michigan. (2023). *Flint property portal [dataset]*. <https://flintpropertyportal.com/>
- Goldstick, J. E., Cunningham, R. M., & Carter, P. M. (2022). Current causes of death in children and adolescents in the United States. *New England Journal of Medicine*, 386, 1955–1956. <https://doi.org/10.1056/NEJMc2201761>
- Gong, C. H., Bushman, G., Hohl, B. C., Kondo, M. C., Carter, P. M., Cunningham, R. M., Rupp, L. A., Grodzinski, A., Branas, C. C., Vagi, K. J., & Zimmerman, M. A. (2022). Community engagement, greening, and violent crime: A test of the greening hypothesis and busy streets. *American Journal of Community Psychology*, 71, 198–210. <https://doi.org/10.1002/ajcp.12622>
- Harlow, C. W. (1985). *Reporting crimes to the police* (pp. 1–11) (Special Report). Bureau of Justice Statistics <https://bjs.ojp.gov/content/pub/pdf/rcp.pdf>
- Hastie, T., & Tibshirani, R. (1993). Varying-coefficient models. *Journal of the Royal Statistical Society: Series B (Methodological)*, 55(4), 757–779. <https://doi.org/10.1111/j.2517-6161.1993.tb01939.x>
- Heins, P., & Abdelazim, T. (2014). *Take it to the bank: How land banks are strengthening America's neighborhoods*. Center for Community Progress. <https://communityprogress.org/publications/take-it-to-the-bank-download/>
- Heinze, J. E., Krusky-Morey, A., Vagi, K. J., Reischl, T. M., Franzen, S., Pruett, N. K., Cunningham, R. M., & Zimmerman, M. A. (2018). Busy Streets Theory: The effects of community-engaged greening on violence. *American Journal of Community Psychology*, 62(1–2), 101–109. <https://doi.org/10.1002/ajcp.12270>
- Jacoby, S. F., Dong, B., Beard, J. H., Wiebe, D. J., & Morrison, C. N. (2018). The enduring impact of historical and structural racism on urban violence in Philadelphia. *Social Science and Medicine* (1982), 199, 87–95. <https://doi.org/10.1016/j.socscimed.2017.05.038>
- Kegler, S. R., Simon, T. R., Zwald, M. L., Chen, M. S., Mercy, J. A., Jones, C. M., Mercado-Crespo, M. C., Blair, J. M., Stone, D. M., Ottley, P. G., & Dills, J. (2022). Vital signs: Changes in firearm homicide and suicide rates—United States, 2019–2020. *Morbidity and Mortality Weekly Report*, 71(19), 656–663. <https://doi.org/10.15585/mmwr.mm7119e1>

- Knopov, A., Rothman, E. F., Cronin, S. W., Franklin, L., Cansever, A., Potter, F., Mesic, A., Sharma, A., Xuan, Z., Siegel, M., & Hemenway, D. (2019). The role of racial residential segregation in Black–White disparities in firearm homicide at the state level in the United States, 1991–2015. *Journal of the National Medical Association*, 111(1), 62–75. <https://doi.org/10.1016/j.jnma.2018.06.002>
- Kondo, M., Hohl, B., Han, S., & Branas, C. (2016). Effects of greening and community reuse of vacant lots on crime. *Urban Studies*, 53(15), 3279–3295. <https://doi.org/10.1177/0042098015608058>
- Krieger, N., Feldman, J. M., Waterman, P. D., Chen, J. T., Coull, B. A., & Hemenway, D. (2017). Local residential segregation matters: Stronger association of census tract compared to conventional city-level measures with fatal and non-fatal assaults (total and firearm related), using the index of concentration at the extremes (ICE) for racial, economic, and racialized economic segregation, Massachusetts (US), 1995–2010. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, 94(2), 244–258. <https://doi.org/10.1007/s11524-016-0116-z>
- Kubrin, C. E., & Weitzer, R. (2003). New directions in social disorganization theory. *Journal of Research in Crime and Delinquency*, 40(4), 374–402. <https://doi.org/10.1177/0022427803256238>
- Lowe, J. S., & Thaden, E. (2016). Deepening stewardship: Resident engagement in community land trusts. *Urban Geography*, 37(4), 611–628. <https://doi.org/10.1080/02736368.2015.1101250>
- Mallach, A. (2018). *The empty house nextdoor: Understanding and reducing vacancy and hypervacancy in the United States*. Lincoln Institute of Land Policy. <https://www.lincolnst.edu/sites/default/files/pubfiles/empty-house-next-door-full.pdf>
- O'Keefe, J., Rupp, L., Torres, E., Grodzinski, A., & Zimmerman, M. (2020). *America's vacant lot landscape: Insights from the national survey on greening*. Center for Community Progress. <https://communityprogress.org/publications/yvpc-report/>
- O'Keefe, J., Rupp, L., Torres, E., Ornelas, L., Sing, E., Grodzinski, A., & Zimmerman, M. (2021). *Keys to success: Lessons from the field on vacant lot greening*. Center for Community Progress. <https://communityprogress.org/publications/vacant-land-keys-to-success-lessons-from-the-field/>
- Pizarro, J. M., Sadler, R. C., Goldstick, J., Turchan, B., McGarrell, E. F., & Zimmerman, M. A. (2020). Community-driven disorder reduction: Crime prevention through a clean and green initiative in a legacy city. *Urban Studies*, 57(14), 2956–2972. <https://doi.org/10.1177/0042098019892163>
- Pruett, N. (2015). *Beyond blight: City of flint comprehensive blight elimination framework*. Imagine Flint. <https://www.dropbox.com/s/f7i0vw00g2p9a9d/Beyond%20Blight%20Framework%20Final%20Adopted%202015.pdf?dl=0>
- R Core Team. (2020). *R: A language and environment for statistical computing (version 4.0.2)*. R Foundation for Statistical Computing. <https://www.R-project.org/>
- Ranney, M., Karb, R., Ehrlich, P., Bromwich, K., Cunningham, R., & Beidas, R. S., for the FACTS Consortium. (2019). What are the long-term consequences of youth exposure to firearm injury, and how do we prevent them? A scoping review. *Journal of Behavioral Medicine*, 42(4), 724–740. <https://doi.org/10.1007/s10865-019-00035-2>
- Reynald, D. M. (2011). Factors associated with the guardianship of places: Assessing the relative importance of the spatio-physical and sociodemographic contexts in generating opportunities for capable guardianship. *Journal of Research in Crime and Delinquency*, 48(1), 110–142. <https://doi.org/10.1177/0022427810384138>
- Rosenfeld, R., & Lopez, E. (2020). *Pandemic, social unrest, and crime in U.S. cities*. Council on Criminal Justice, National Commission on COVID-19 and Criminal Justice.
- Rowhani-Rahbar, A., Zatzick, D., Wang, J., Mills, B. M., Simonetti, J. A., Fan, M. D., & Rivara, F. P. (2015). Firearm-related hospitalization and risk for subsequent violent injury, death, or crime perpetration: A cohort study. *Annals of Internal Medicine*, 162(7), 492–500. <https://doi.org/10.7326/M14-2362>
- Rupp, L. A., Kondo, M. C., Hohl, B. C., Sing, E. K., Grodzinski, A. R., & Zimmerman, M. A. (2022). The effects of organizations engaging residents in greening vacant lots: Insights from a United States national survey. *Cities*, 125, 103669. <https://doi.org/10.1016/j.cities.2022.103669>
- Rupp, L. A., Zimmerman, M. A., Sly, K. W., Reischl, T. M., Thulin, E. J., Wyatt, T. A., & Stock, J. P. (2020). Community-engaged neighborhood revitalization and empowerment: Busy streets theory in action. *American Journal of Community Psychology*, 65(1–2), 90–106. <https://doi.org/10.1002/ajcp.12358>
- Sadler, R. C., & Lafreniere, D. J. (2017). Racist housing practices as a precursor to uneven neighborhood change in a post-industrial city. *Housing Studies*, 32(2), 186–208. <https://doi.org/10.1080/02673037.2016.1181724>
- Sauter, M. B. (2019). Despite strong US housing market, these American cities have the most vacant homes. *USA TODAY*. <https://www.usatoday.com/story/money/2019/05/27/this-american-city-has-the-most-vacant-homes/39501917/>
- Schmidt, C. J., Rupp, L., Pizarro, J. M., Lee, D. B., Branas, C. C., & Zimmerman, M. A. (2019). Risk and protective factors related to youth firearm violence: A scoping review and directions for future research. *Journal of Behavioral Medicine*, 42(4), 706–723. <https://doi.org/10.1007/s10865-019-00076-7>
- Sokol, R. L., Bushman, G., Gong, C. H., Rupp, L., Ryan, J. P., & Zimmerman, M. A. (2022). Associations between micro-neighborhood greening and child maltreatment. *International Journal on Child Maltreatment: Research, Policy and Practice*, 5, 281–293. <https://doi.org/10.1007/s42448-021-00109-2>
- South, E. C., Kondo, M. C., Cheney, R. A., & Branas, C. C. (2015). Neighborhood blight, stress, and health: A walking trial of urban greening and ambulatory heart rate. *American Journal of Public Health*, 105, 909–913. <https://doi.org/10.2105/AJPH.2014.302526>
- Spelman, W. (1993). Abandoned buildings: Magnets for crime? *Journal of Criminal Justice*, 21(5), 481–495. [https://doi.org/10.1016/0047-2352\(93\)90033-J](https://doi.org/10.1016/0047-2352(93)90033-J)
- United States Department of the Treasury. (2019). *Hardest hit fund third quarter 2019 performance summary*. <https://home.treasury.gov/data/troubled-assets-relief-program>
- US Census Bureau. (2018). *2014–2018 American community survey 5-year estimates*.
- US Census Bureau. (2021). *2017–2021 American community survey 5-year estimates* [City of Flint Demographics]. https://www.socialexplorer.com/tables/ACS2021_5yr/R13271984
- Web-based Injury Statistics Query and Reporting System (WISQARS). (2019). *Injury data*. National Center for Injury Prevention and Control. <https://www.cdc.gov/injury/wisqars/index.html>
- Weisburd, D., White, C., Wire, S., & Wilson, D. B. (2021). Enhancing informal social controls to reduce crime: Evidence from a study of crime hot spots. *Prevention Science*, 22(4), 509–522. <https://doi.org/10.1007/s11211-020-01194-4>
- Wood, S. (2006). *Generalized additive models: An introduction with R* (2nd ed.). CRC Press/Taylor & Francis Group.

How to cite this article: Bushman, G., Kondo, M. C., Rupp, L. A., Hohl, B. C., Gong, C. H., & Zimmerman, M. A. (2023). Associations between land bank ownership and stewardship of vacant properties and crime, violence, and youth victimization in Flint, MI. *American Journal of Community Psychology*, 72, 428–442. <https://doi.org/10.1002/ajcp.12706>