

**FINAL PERFORMANCE REPORT FOA CE14-006 –
Research Grants for Preventing Violence and Violence Related Injury (R01)
09/01/2014-08/31/2017**

I. Brief Executive Summary/Abstract

Violent crime is a persistent problem in Flint, Michigan, which far surpasses MI and national rates for murder, rape, robbery, and aggravated assaults (Federal Bureau of Investigation, 2016). Although Flint faces economic and social challenges, the city also benefits from assets of community participation that provide a firm foundation for community change. Guided by the theories of busy streets and community empowerment, this project examines the effects of Crime Prevention through Environmental Design (CPTED) on youth violence in collaboration with a local community-based coalition in Flint, MI, The University Avenue Corridor Coalition (UACC). The UACC was established in 2012 to implement CPTED activities to address blight and crime hotspots, stabilize land use, enhance opportunities for recreation, and improve neighborhood health and safety. We are working with the UACC to expand its CPTED activities, and to evaluate the effects of their projects on: 1) resident perceptions and behaviors, 2) property conditions, 3) crime incidents, and 4) assault injuries. Our quasi-experimental evaluation design compares two CPTED intervention areas with a control area that received no CPTED activities. We are also conducting spatial temporal analyses to examine radiating effects of CPTED projects and trajectories of outcomes over time across study conditions and City of Flint census tracts. Finally, we are conducting an extensive implementation evaluation of CPTED through interactive story maps and interviews with UACC collaborators involved in planning and implementing projects.

Preliminary findings indicate that CPTED is a promising public health practice to promote busy streets, defined as organized, safe and inviting physical contexts that promote positive interaction and build community resources to improve social and physical environments. Initial comparative analyses of survey data revealed that, relative to controls, CPTED intervention areas reported more resident participation and improved relationships with police, including willingness to communicate with police and report crimes. An initial qualitative interview study with respondents living in a CPTED intervention area further suggest that participation in community-engaged CPTED projects improved personal sense of community, social capital, collective efficacy and neighborliness. Preliminary analyses of crime incident data additionally revealed significant changes in level and slope for property crime and robbery in the CPTED areas following the start of CPTED activity. Our extensive implementation documenting the growth of coalition highlights CPTED as a promising strategy to boost resident participation, encourage and sustain resident initiated action, facilitate significant investment of capital, and support redevelopment of communities facing economic adversity.

This project contributes to a more integrative understanding of CPTED's role in reducing crime and facilitating conditions of busy streets. We will disseminate our

findings from this project locally to the intervention community, as well as to state and local policymakers through community meetings and data briefs. We will also publish our findings in the MI-Youth Violence Prevention Center's best practice guide to community revitalization, which will be developed in conjunction with the Centers for Community Progress.

II. Background, Purpose, and Aims

A. Theoretical Rationale, Modifiable Protective Factors, and Study Population

Busy Streets Theory. Our Crime Prevention Through Environmental Design (CPTED) efforts are based on the theories of busy streets and community empowerment. Busy streets theory (BST) suggests that organized, safe streets create a positive context for social processes that empower, strengthen, and secure neighborhoods (Aiyer, Zimmerman, Morrel-Samuels, & Reischl 2015). Social interactions that emerge in an inviting and participatory neighborhood context are thought to ultimately strengthen social control, supporting communities to prevent and reduce violence and crime. BST provides an alternative conceptualization of neighborhood effects on violence and safety. While Social Disorganization Theory (SDT) and other theories of neighborhood safety focus on community liabilities such as environmental distress (Kelling & Coles, 1996; Wilson & Kelling, 1982), crime (Skogan, 2001; Taylor, Shumaker, & Gottfredson, 1985), neighborhood disorder, and disadvantage (Wilson, 1996). BST focuses on creating organized, participatory environments that enhance perceptions of safety and promote positive interaction to build community assets of social capital, trust, cohesion and collective efficacy.

Empowerment Theory. Empowerment theory provides a framework to guide interventions that can promote conditions of busy streets (Perkins & Zimmerman, 1995; Peterson & Zimmerman, 2004). Community empowerment is an active, participatory process through which individuals, organizations, and communities work together to exert the control necessary to create safe environments and strengthen their ability to effect the change they desire (Peterson & Zimmerman, 2004; Rappaport, Swift, & Hess, 1984; Solomon, 1976). Community empowerment facilitates conditions of busy streets by engaging the structural context and social processes to give local residents the power and capability to make positive change in their neighborhood. BST and community empowerment theories are aligned with a community-engaged CPTED intervention approach because they emphasize local residents exerting control to create organized, environments in neighborhoods that encourage safety, promote positive social interaction and enhance social bonds, capital and cohesion. Positive street activity and safe, organized environments generated through community-engaged CPTED implementation may create opportunities for informal interactions that ultimately foster deeper social connections. These social connections can inspire resident

accountability and guardianship, enabling residents to exert greater social control to improve and protect their neighborhoods. Thus, community-engaged CPTED may increase community vibrancy that helps to prevent crime and violence.

Crime Prevention Through Environmental Design. Originally coined by Jeffrey (1971), CPTED can be thought of as the effective use of the built and natural environment to enhance defensible space and reduce opportunities for crime that may be inherent in the design of structures or neighborhoods (Crowe, 2000). CPTED is composed of four basic principles: natural access control, natural surveillance, territorial reinforcement, and maintenance. Cozens et al. (2005) also includes territoriality, surveillance, access control, target hardening, and activity support which are subsumed under these 4 principles, but we chose to focus on these for parsimony). Natural access control employs elements such as doors, shrubs, fences, and gates to deny admission to a crime target and to create a perception among offenders that there is a risk in selection of the target. A fence around a playground, for example, provides a controlled surveillance mechanism that both prevents children from straying and perpetrators from gaining easy access. Natural surveillance utilizes design features to increase the visibility of a property or building. The proper placement and design of windows, lighting, and landscaping increases the ability of residents to observe intruders as well as regular users, and thus provides the opportunity to challenge inappropriate behavior or contact the police. Territorial reinforcement employs such design elements as sidewalks, landscaping, and porches to help distinguish between public and private areas and helps users exhibit signs of ownership that send hands off messages to would-be offenders. Territory is enhanced by supplementing the design with regularly scheduled activities, such as routine inspections and maintenance. Maintenance involves the proper upkeep of houses, building, businesses, parks, and other physical structures and their surrounding property. It signals that an owner, manager, or neighbor is watching out for the property and could spot illegal behavior. It also indicates that an area is well cared for and therefore averse to criminal activity. Activities include mowing the grass, trimming trees and landscaping, picking up trash, repairing broken windows, and painting over graffiti.

In its original conception, CPTED emphasized the built or natural environment as a deterrent for crime by reducing opportunities inherent to neighborhood design (e.g., poor lighting; rear parking; high permeability) (Armitage, 2014; Jeffrey, 1971), but recent conceptualizations of CPTED have expanded beyond the architects, designers, and planners of neighborhoods to include the residents themselves and demonstrates how active community participation paired with environmental design reduces the risk of criminal activity (Reynald, 2011). CPTED is consistent with community empowerment because it shifts the focus of crime prevention from the perpetrators to engaging residents in locally controlled action to increase environmental safety and establish conditions that facilitate positive social interactions and build social control.

Flint Implementation Context. CPTED activities were implemented in an urban corridor in Flint, MI, an economically challenged city that ranks among the cities with the highest rates of violent crime (Federal Bureau of Investigation, 2016; U. S. Census Bureau, 2015). During the 1960s, Flint and its surrounding region was one of the most prosperous metropolitan areas in the US due to over 80,000 high paying jobs at local General Motors factories. Since 1970, however, the Flint region has lost 90% of these auto industry jobs, resulting in significant population loss and economic hardship. Flint now ranks well below most other Michigan communities on key economic indicators (U.S. Census Bureau, 2015). Flint's population reached its peak in the 1960s at 196,940 residents, and has declined steadily since. Flint's current population is estimated at 98,310 (U.S. Census Bureau, 2016). This 50 percent decline in total population created critical challenges in the physical and social environment. High vacancies (25.2% vacant housing units) and increased blight attract crime, contribute to breakdowns in social cohesion, and reduce neighborhood resources for deterring violence.

Violent crime is a persistent problem in Flint, which far surpasses both state and national rates for homicide, rape, robbery, and aggravated assaults (Federal Bureau of Investigation, 2016). Flint had 1,451 reported violent crime incidents out of their total population of 98,310, compared with a violent crime rate of 415.5/100,000 for the state as a whole. In 2016, Flint had the 11th highest rate of violent crime among American cities and the 4th highest homicide rate among cities with 50,000 people or more (Federal Bureau of Investigation, 2016).

Although Flint faces economic and social challenges, the city also benefits from assets that provide a firm foundation for community change. Results of the 2013 Speak To Your Health Community Survey indicate that Flint residents were more likely than others in their county to participate in collective action: 36.3% of Flint residents were involved in neighborhood beautification projects, 29% were involved in neighborhood crime watches, and 33.5% took actions with neighbors to address neighborhood problems (Genesee County Health Department, 2013). Flint also has a large number of non-profit organizations that support youth. Flint's significant vulnerabilities in the physical environment paired with its assets of community participation make the city a compelling setting to implement and evaluate CPTED as a strategy to deter youth violence and promote the safe, participatory conditions of busy streets.

Implementation Setting and Study Population.

CPTED projects were implemented and evaluated in an urban corridor in central Flint called the University Avenue Corridor. This roughly three square mile region includes the neighborhoods surrounding University Avenue, extending west to the Glendale Hills neighborhood and east to The University of Michigan Flint Campus. The northern boundary includes the Hurley Hospital Medical Campus and the southern boundary recently expanded to a reclaimed brownfield south of the Flint River. The area has a significant youth population and is racially heterogeneous. The 2015 US Census revealed that the total population of this region is 11,383, with 3,148 people between the ages of 10 and 24 years old (U.S. Census Bureau, 2015). 42.0% of the population are African American, 49.9% are White; and 4.5% are Hispanic. 52.3% of the homes are owner-occupied (U.S. Census Bureau, 2015). According to the 2011-2015 U.S. Census American Community Survey, over 40 percent of residents have an annual income below the federal poverty line and the median household income was estimated at approximately \$23,000 per year (U. S. Census Bureau, 2015). Centrally located close to downtown and home to significant education institutions, hospitals, parks and recreational spaces, the University Avenue Corridor is considered a tipping point for city safety and revitalization.

In 2012, the University Avenue Corridor Coalition (UACC) formed with the mission to transform the University Avenue Corridor into an attractive and crime-free community conducive to sustainable development. Recognizing the challenges presented by the blighted environment, the UACC committed to using CPTED as its guiding framework to strengthen the corridor, create a vital link to downtown, and establish a model for citywide revitalization. The coalition's founding partners included stakeholders from law enforcement, education, philanthropy, health, and human services sectors, including the

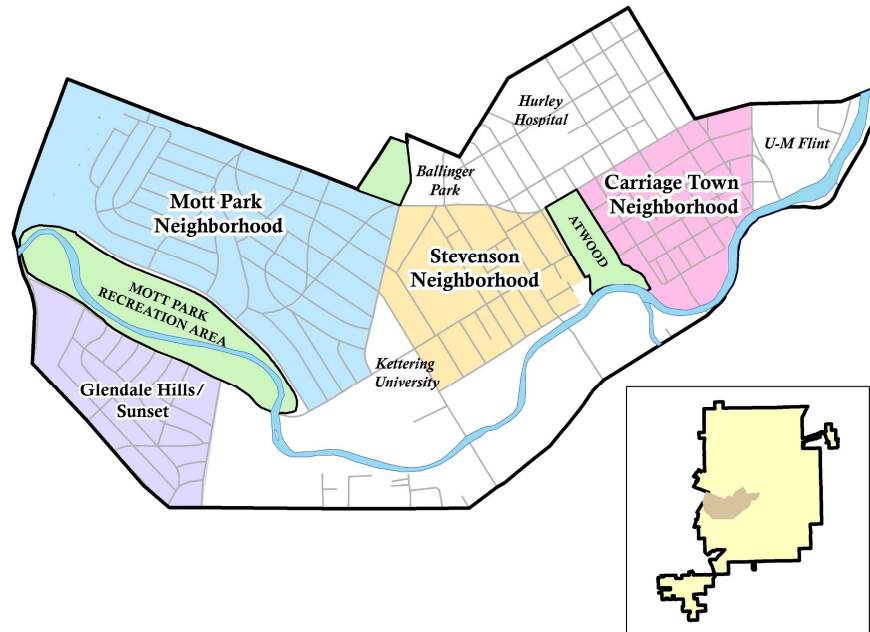
Flint Police, University of Michigan-Flint, Hurley Hospital, Kettering University, Genesee County Land Bank, and Carriage Town Ministries homeless shelter. UACC members plan collaborative CPTED projects and support collective initiatives including smaller-scale community cleanups and larger-scale structural

Table 1. Economic Indicators for Flint (2015 5-year estimates)

Economic Indicators	Flint	Michigan
Unemployment rate (16-64 yrs.)	23.9%	9.9%
Median household income	\$24,862	\$49,576
Median value owner/occupied house	\$32,600	\$122,400
% Population in poverty (Age 18 to 64)	38.7%	16.3%
% Population in poverty (Age 65 and over)	12.2%	8.1%
% Families w/ children <18 in poverty	35.8%	11.9%
% High school graduate or higher	82.9%	89.6%

renovations. Major early achievements of the coalition include converting a blighted lot into a community park, University Square, refurbishing historic Atwood Stadium into a state of the art athletic facility, transforming a closed city golf course into a multi-purpose recreation area, and replacing two liquor stores with budget-friendly

restaurants. Our previous studies in Flint (dating back to 1998) have engaged many of these organizations in collaborative efforts to prevent youth violence. Our partnership with the University Avenue Corridor Coalition (UACC) is built on our longstanding collaborations.



B. Specific goals/objectives/aims.

The goals of the study are threefold: 1) to assist the UACC to expand its work, leverage resources, and use data to guide decisions regarding CPTED; 2) to support the implementation of community-defined projects guided by empirical analysis of implementation and outcome evaluation data; and 3) to address the mixed evidence regarding the effectiveness of CPTED by evaluating the effects of CPTED projects on resident perceptions, property maintenance, police incidents, and assault injury utilizing a variety of analytic strategies that compare conditions, examine radiating effects, include city-wide spatial analyses, and examine change over time. In addition to these original aims, we conducted qualitative interviews to examine a potential association between the implementation of community-engaged CPTED projects and social and physical processes of busy streets. Our original design called for a 2X2 design comparing the effects of CPTED across four conditions (1-CPTED only, 2-CPTED and MI-YVPC overlapping, 3-MI-YVPC alone and 4-neither), however changes in the implementation environment, including the ending of the 2010-2015 MI-YVPC project and its re-funding elsewhere in the city, precluded our original design. We were able, however, to capitalize on the serendipitous funding of the Byrne Criminal Justice Innovation Grant that we were simultaneously evaluating in the University Avenue Corridor area from 2014-2017, which examined the effects of intensive CPTED strategies paired with policing and intensive community engagement on outcomes of resident perceptions and parcel maintenance. Thus, we changed our design to examine

three conditions 1) CPTED only 2) CPTED+Byrne overlapping areas and 3) and neither (comparison area). This design allowed us to examine if intensive CPTED paired with policing and intensive community engagement enhanced the intervention's effects.

C. Research Questions

Our key research questions and hypotheses from our original research plan are as follows:

- Survey respondents in intervention areas will report more positive resident perceptions, including less fear of crime, greater participation, and improved relationships with police, than respondents in the comparison area, with respondents in the intensive CPTED condition (CPTED+Byrne) reporting the most positive perceptions
- Properties in the CPTED intervention areas will have superior property maintenance and less blight than the comparison area, with the best property conditions observed in the intensive CPTED+Byrne area.
- The CPTED+Byrne overlapping areas will have the fewest police incidents and cases of youth violent injury presenting in the Emergency Department, followed by CPTED alone, with the comparison area having the most crime incidents and injuries.
- Rates of violent crime and injury will decrease after the start of CPTED programs as compared to rates of crime before the CPTED project began.
- Areas closer to CPTED projects may experience some spillover effects and areas further away will have decreasing effects as a function of their distance from the intervention.
- Trajectories of change in outcomes will vary as a function of treatment condition, with the CPTED+Byrne area showing the greatest improvement in outcomes over time.

In addition to the originally proposed research questions, we explored an additional qualitative research question:

- Community-engaged CPTED strategies will be associated with social and physical processes of busy streets.

III. Measures and Data, Methodology, and Related Analyses

A. Survey methods, Instruments, Intervals, Recruitment and Sample

1) Resident Survey: Speak To Your Health!/ Neighborhood Life Survey.

The Speak to Your Health! (STYH) Community Survey was designed by academic and community partners to monitor community health concerns and to assess the effects of interventions on community health outcomes and resident perceptions. An abbreviated version of the STYHS was distributed in the intervention and comparison areas during the summer of 2014 and contained measures on neighborhood social relationships, neighborhood participation, relationships with police, perceptions of neighborhood disorder, fear of crime, victimization, and demographics. In 2017, we used a slightly revised instrument, the Neighborhood Life Survey (NLS) to evaluate, monitor, and understand residents' perceptions of their neighborhoods. The survey contained 59 questions with 44 questions retained from the original STYH survey to facilitate multi-year analyses. Responses from survey items were used to compute multi-item scales assessing constructs including social capital and cohesion, relationship with neighbors, resident participation, police perceptions, police relationships, neighborhood disorder, fear of crime, victimization, mental health symptoms and neighborhood satisfaction.

Copies of the Resident Survey for each year and an explanation of the computation of scales are available in Appendices A and B.

Survey Recruitment. In 2014, our goal was to sample one household from each street segment. We grouped households in the intervention and comparison areas by street segment, which included all occupied residences on both sides of a street between intersections and/or street endings. Research assistants received a list of randomly ordered street segments and continued down the list until they successfully recruited one adult respondent from each street segment or until they approached all households on the list. The sampling method changed in 2017 to approach all residential properties in the intervention areas and comparison area. Each wave of survey data was collected on a different sample of households in the intervention and comparison areas.

Sample.

Table 2. Number of Neighborhood Life Surveys Collected By Condition

Condition	Survey Year	
	2014	2017
CPTED Only	40	76
CPTED & Byrne	104	275
Comparison Area	105	159
Total	249	510

Sample Demographics.

Our sample included 249 residents recruited in 2014 and 510 recruited in 2017. The samples were racially and ethnically heterogeneous. In 2014, 26.6% of respondents were White, 68% were African American and 2.5% were Hispanic; and in 2017, 37.1% of respondents were White, 56.1% were African American and 3.2% were Hispanic. We recruited slightly more males (51.4%) than females in 2014 and slightly more females (55.7%) than males in 2017.

	2014		2017	
	n	%	n	%
Total Residents Surveyed	249	100	510	100
Gender				
Males	128	51.4	208	40.8
Females	113	45.4	284	55.7
Self-Identify	--	--	4	0.8
Missing	8	3.2	14	2.7
Race				
White/Caucasian	64	26.6	185	37.1
Black/African American	164	68.0	280	56.1
Hispanic	6	2.5	16	3.2
Arab/Chaldean	--	--	5	1.0
Asian	2	0.8	7	1.4
American Indian/Alaska Native	6	2.5	15	3.0
Native Hawaiian/Other Pacific Islander	--	--	--	--
Multiracial	15	6.2	--	--
Other/Self Identify	6	2.5	20	4.0
Do Not Know	3	1.2	6	1.2

2) Property Maintenance Observation Tool (PMOT). To assess changes in property maintenance and blight levels, we collected observational data of property parcel maintenance in the intervention areas and comparison area. We trained observers to use a validated assessment protocol called the Parcel Maintenance Observation Tool (PMOT). Previous psychometric analysis of the PMOT measures indicated its reliability and validity (Reischl et al., 2016). We assessed the effects of CPTED interventions on maintenance and upkeep of all parcels in the intervention and comparison area at the start of the CPTED intervention in 2014 and then once a year thereafter. The trained observers assessed every parcel in the University Avenue Corridor (UAC) area during each of the summers of 2014, 2015, and 2016. The observers noted the presence or absence of broken windows, boarded windows, broken doors, graffiti, fire damage, and adornments including decorative accents on buildings. Trained observers also rated the maintenance of landscaping, mowing and weeding, litter and trash, protective surfaces

of buildings, and structural exposure of buildings. Based on patterns of correlation among these observations and conceptual considerations, we combined several of these observations to compute parcel maintenance scales including a building maintenance scale and a lawn maintenance scale. In addition to the three parcel maintenance scales, we computed three indices that focused on the most blighted conditions observed on each parcel, as we were interested in identifying and counting parcels that had the most extreme levels of physical disorder. These indices included a building blight index, lawn blight index, and general blight index.

Table 3. Number of PMOT Assessments By Study Condition

Condition	Assessment Year		
	2014	2015	2016
CPTED Only	701	701	725
CPTED & Byrne	1918	1918	2533
Comparison Area	3208	3208	3208
Total	6454	6455	6513

A copy of the PMOT assessment tool and an explanation of the computation of PMOT scales is available in Appendix C.

3) Police Incident Data. We utilized crime incident data drawn from police records from 2007-2016. Indicators of crime, violence, and youth violence for years 2007-2013 were obtained from Flint Police Department crime incident records. From 2014-2016 these data were obtained from the Michigan State Police because personnel and computer system changes at the Flint Police Department precluded our ability to obtain these records directly. Police incident data sets include information regarding the date, time and place that an incident occurred, crime categories associated with each incident, and the victim demographics including age, sex, and race. Incidents were geocoded to assign geospatial information including study condition, census tract and block group information. We grouped incidents according to crime category and date to tabulate monthly counts of assaults (including simple and aggravated assaults), robbery, drug offenses (including substance and equipment violations) and property crime for the specified geographic regions (i.e., study conditions, census tracts and block groups, areas around CPTED project sites).

4) Hospital Emergency Department Data. We collected injury surveillance data to understand and evaluate the number of youth 10-24 presenting with assault injuries at the Hurley Health System Emergency Department during the study period, and to compare the rates of youth violence in study conditions over time. All patients seeking

care at Hurley Medical Center over the study period with appropriate e-codes (intentional injuries (not self-inflicted)) were applied to the Emergency Department surveillance system data. We used discharge data on all intentional injuries (assaults) for youth 10-24 years of age in all Flint zip codes. The fields collected included: e-codes indicating the mechanism of injury, age, gender, race, address, date and time of admission, and Injury Severity Score (ISS). All fields were collected for youth (i.e. mechanism of injury, location of home), and all entries were retroactively re-coded to the new intervention area if necessary.

5) Qualitative Interviews. Finally, we conducted qualitative interviews with resident stakeholders and institutional partners from the University Avenue Corridor Coalition to understand how community-engaged CPTED may be associated with empowered social processes and physical conditions of busy streets. As we were interested in examining the effects of community-engaged CPTED, we chose to interview individuals who were directly involved in organizing or implementing CPTED strategies. Interview participants were identified through snowball sampling, in which participants were asked to identify other residents or institutional partners engaged in CPTED change efforts. All invited participants accepted our invitation (N=19). Our sample included 10 men (52.6%) and 9 women (47.3%); participants included 11 community residents and 8 institutional partners. We identified at least five participants from each of the three University Corridor neighborhoods to provide perspective regarding the application of community-engaged CPTED in neighborhoods with distinct structural conditions. Interviews were semi-structured and lasted approximately 45 minutes to 1 hour. The interview protocol consisted of open-ended questions and follow-up probes to identify themes. Participants were asked to describe physical and social CPTED projects underway in their neighborhoods and how these projects affected the neighborhood, if at all. Participants were also asked follow-up probes to assess physical conditions of busy streets; for example, participants were asked to describe visible resident interactions and street activity in their neighborhoods. All interviews were conducted between August of 2016 and February of 2017. Interviews were audiotaped and transcribed verbatim.

C. Analytic Techniques

Our proposed data analytic strategy consisted of: 1) comparative analyses of resident perceptions, property maintenance, and crime across 3 conditions (CPTED only, CPTED+Byrne, neither); 2) analysis of radiating effects of CPTED projects; 3) spatial analysis comparing outcomes across all census tracts in Flint while controlling for several confounding variables (e.g., population size and demographics); 4) analysis of change over time; and 5) analysis of the association between community engaged CPTED activity and social processes and physical conditions of busy streets. We describe below the basic strategies we will use for the different types of analyses and data that we have, but given the richness of our data and the data analytic skills of our team the depth of analysis we will go beyond what we describe below.

Table 4. Analytic Techniques by Research Question			
Outcome Measure/Indicator	Analysis Type	Planned Analyses	Hypotheses
Resident Survey (STYH/NLS), Property Maintenance Observation Tool (PMOT)	Comparative Analysis	Two-Way ANOVA	More positive resident perceptions and superior property conditions will be observed in CTPED intervention areas
Police Incident, Injury Assault	Comparative Analysis	Chi Square, Fisher Exact Test	Rates of violent crime and injury will be lower in CPTED intervention areas
Police Incident Injury/Assault	Comparative Analysis	Time Series (ARIMA)	Rates of violent crime and injury will decrease after CPTED project start
Police Incident Injury Assault NLS PMOT	Spatial Analysis	Hierarchical Spatial Temporal Modeling, HLM,	Effects will vary as a function of their distance from CPTED project sites
Police Incident Data, Injury Assault, NLS, PMOT	Spatial Analysis	Ecological Regression	Effects will vary as a function of their distance from CPTED projects
Police Incident, Injury Assault, PMOT	Temporal Analysis	Growth Curve Modeling	Change in outcomes will vary as a function of the treatment condition
Participant Interviews	Qualitative Analysis	Directed Content Analysis	CPTED strategies will be associated with social and physical conditions of busy streets

IV. Results and Outcomes, Significant Findings

We have been analyzing the data to test our hypotheses and explore the effects of CPTED on our key outcomes. An initial qualitative interview study with respondents from three focus neighborhoods in our CPTED area suggest that community engaged CPTED projects, including blight reduction, community development projects, and social events improved personal sense of community, social capital, collective efficacy and neighborliness. These results suggest that CPTED activities are helping to create busy streets and community empowerment. We are currently writing a manuscript based on these results. We have also begun to examine our quantitative data in a number of ways. Our initial comparative analyses using our survey data comparing three conditions (intensive CPTED+Byrne focused on crime hot spots, CPTED more diffuse, No CPTED) revealed that residents' relationship with police differed across conditions with the two CPTED conditions reporting greater willingness to report crimes to police than the no CPTED control condition. We also found a trend of a similar direction for neighborhood participation. We have also begun additional analyses of the survey data by collapsing the two CPTED groups into one and also eliminating the diffuse CPTED group and comparing only the hotspot (intensive CPTED +Byrne) and control conditions. This analysis make sense conceptually because diffusing CPTED may not be as noticeable for residents as the more intense hot spot CPTED condition which involved a more concentrated approach with residents more likely to live close to intensive CPTED projects and activity.

We are also beginning to examine our police incident and injury data, as proposed. The Michigan State Police just provided their 2016 incident data in late October and we have only recently cleaned and prepared the data for analysis. For these analyses we are examining both interpersonal crime (assaults, youth assaults) and property crime. Our initial analysis indicated significant changes in level and slope for property crime and robbery in the CPTED areas post the beginning of CPTED activity. We did not see changes in level or slope for assaults, but we are also continuing these analyses in several ways including: 1) examining youth and adult assaults separately; 2) using a different start date for when the CPTED work began to intensify (instead of when the initial CPTED activity was started); 3) focusing only on the intensive hot spot CPTED +Byrne condition; and 4) examining different ways of creating a combined crime score versus examining individual crimes one at a time. We will also integrate these strategies to identify the most compelling and conceptually consistent approach for analyzing the police data. Our injury data has been collected but is not ready for analysis at this time, as we are still finalizing the data.

Planned Analyses.

We are nearing completion of our cleaning and preparing of injury data from 2012-2016, which will enable us to examine comparative, spatial, and temporal questions about youth assault presenting in the emergency department. This will provide a greater breadth of evidence to explore the relationship between CPTED and youth violence prevention. We have recently finished geocoding and preparing 10 years of crime data

to conduct geospatial analyses examining the radiating effects of CPTED, including spillover effects and the distance at which effects from CPTED projects begin to dissipate. These analyses will be completed over the next couple of months for a several individual CPTED project sites, as well as for the condition areas. Additionally, we will examine trajectories of change over time for injury and assault across conditions and across citywide census tracts. Finally, we will run further time series models to examine changes in rate of injury and assaults that may be associated with implementation of specific CPTED projects. A variety of CPTED projects, including major and minor parcel change projects, will be examined to explore the types of projects, including the scale of project (major or minor parcel change) and combinations and intensities of CPTED principles applied, that may be associated with changes in the trajectory of injury and assault in the intervention areas and surrounding specific CPTED project sites.

III. Public Health Relevance and Impact

This project evaluated the effects of community-engaged CPTED on resident perceptions, property conditions, violence and injury. The project contributes to a more integrative understanding of CPTED's role in facilitating conditions of busy streets—defined as organized, safe and inviting physical contexts that promote positive interaction and build the community resources to improve the physical and social environment. Initial findings from resident surveys indicate that, relative to a no-CPTED control condition, CPTED is associated with greater resident participation and improved relationships with police, including willingness to communicate with police and report crimes. Residents participating in a qualitative interview study also reported an association between CPTED, positive street activity, and social processes of empowerment including collective efficacy, social capital, and behavioral action to improve neighborhood environments. Extensive implementation data further indicates that CPTED in the context of a coalition is a promising strategy to boost resident participation, support and sustain resident-driven action, facilitate significant investment of capital, and support redevelopment of areas facing economic adversity. Community-engaged CPTED may therefore be promising public health practice for aiding in the creation of safe and participatory contexts that are characteristic of busy streets.

Our implementation evaluation indicates that community-engaged CPTED activity is a scalable intervention several reasons: CPTED strategies are inexpensive, accessible, non-controversial, and provide a model for intervention that is replicable and responsive to political and resource contexts of communities. The process of implementing community-engaged CPTED invites participation and builds synergistic collaboration between residents, institutions, and other stakeholders. CPTED implementation in the context of a community coalition is also sustainable approach to violence prevention because it is community-owned, locally driven, creates opportunities for youth, and engages multiple ecological levels including intrapersonal, interactional, and community-level change.

The adaptability, accessibility, and low cost of many CPTED strategies makes the intervention a particularly compelling tool for securing physical environments and encouraging community redevelopment and recovery in communities experiencing vacancy and economic adversity, such as rust belt cities. In such contexts, community-engaged CPTED provides a cost-accessible intervention that offers a common language, tools and way forward to transform the physical and social context of neighborhoods to secure, strengthen, and empower communities.

Our extensive documentation of CPTED implementation activities, methods, and strategies via our implementation records, story maps, and outcome evaluation data, may provide relevant case examples and resources for others interested in replicating community-engaged CPTED implementation and evaluation in their communities. The dissemination of the University Avenue Corridor's methods and results may help to translate a community-engaged CPTED model that could be widely replicated by communities seeking to create safe and healthy environments and reduce violence.

III. Translation of Research Findings

A. How Findings will be Translated and Used to Inform Policy or Practice

One of our goals is to produce cost-effective, clear, and timely products that are useful for researchers, practitioners, policy makers, and the general public. We seek to build capacity for policy, practices, and programs that empower communities to change the physical and social context of communities to create busy streets.

To date, we have published multiple articles focused on violence prevention through environmental design and community empowerment in peer-reviewed academic journals. Access to these articles and brief summaries are available on our website, <http://yvpc.sph.umich.edu/>. We have further publications in progress that will help to translate significant findings including the effects of community engaged CPTED on resident perceptions, parcel maintenance, crime, and social and physical processes of busy streets in neighborhoods. We also make a variety of resources available for researchers and practitioners through our website. These include tools for practice, including our Story Map Gallery that illustrates CPTED concepts using examples from Flint, and tools for evaluation, including access to our Property Maintenance Observation Tool and crime maps library. Additionally, we maintain an active presence on social media (Facebook, Twitter, Pinterest), using these venues to disseminate information from the UACC coalition, CPTED evaluation activities, and results and related youth violence content. Faculty and staff from our MI-YVPC center have provided numerous presentations (see Section VIII) in venues ranging from academic seminars to community meetings. These presentations have included specific research findings and more general topics, such as youth empowerment and positive youth

development. We plan to present further CPTED findings at the 2017 APHA and SAVIR conferences. Finally, we have presented on early findings from the CPTED evaluation at UACC coalition meetings and the MI-YVPC steering committee meetings in 2016. Once analyses are complete, we will provide further detailed presentations to guide UACC coalition efforts.

Additionally, we now maintain extensive records of how CPTED has been applied in a high need community experiencing significant vulnerabilities in the physical and social environment. We have used this content to create a Story Map in ArcGIS to serve as a tool for scholars and practitioners who seek to apply and evaluate community engaged CPTED programs. In addition, we plan to conduct further analyses examining the effects of different applications of CPTED projects (including project types, principles applied, and project scale) on resident perceptions, property maintenance, violent crime, injury, and processes of empowerment. In partnership with the MI-YVPC, we plan to translate these findings into a playbook that highlights the most promising physical and social CPTED strategies for revitalizing vacant spaces and strengthening communities. Additionally, we will include best practices and lessons learned for increasing institutional engagement and buy-in to revitalization efforts and building strong and productive partnerships between institutions and community residents that facilitate the work of CPTED and revitalization. This best practice guide will be available on our CPTED and YVPC website and will be disseminated in partnership with Center for Community Progress.

B. Research Findings that Informed Policy or Practice

CPTED data and findings have been used for a variety of purposes related to policy and practice. We have provided UACC leadership and stakeholders with crime data analyses, geospatial mapping, and implementation evaluation reports. UACC leadership and project managers have utilized this data as a project management tool to organize, adapt and expand CPTED strategies. Implementation and outcome data has helped coalition leaders and project managers identify where they were investing significant resources and if efforts were having intended effects. These data informed decisions regarding appropriate distribution of resources, the type of strategies to implement in particular areas, and further strategy regarding the timing and geographic distribution of CPTED programming.

In 2015, PI Zimmerman and co-investigator Dr. Cunningham visited members of the Michigan Congressional delegation to brief them on their research in Flint including crime prevention through environmental design projects in the University Avenue Corridor. Additionally, we plan to develop data briefs which we will disseminate online through our websites and to local and state policy makers. These data briefs will be used to inform future CPTED based projects in Flint and the State of Michigan.

IV. Other Activities, Accomplishments, Lessons Learned, and Recommendations

A. Activities and Accomplishments.

Expanded and Formalized Participation and Engagement. Our implementation evaluation highlights significant progress towards the specific aims of expanding and formalizing CPTED activities, engaging in more ambitious projects, and leveraging funding to encourage sustainability of CPTED initiatives. Since the funding of this project in 2014, UACC activity and resident participation have increased significantly. Coalition membership has grown to over 100 organizations, and resident involvement has increased by 133%, with more than 2,000 residents participating in UACC activities over the last year.

Programmatic activity has similarly expanded to include a breadth of formal and informal CPTED activity. Over the course of the implementation period, we documented 377 unique CPTED activities implemented across the UACC corridor during the grant period. We describe highlights of this implementation activity below.

The UACC coalition applied CPTED principles to significantly transform the built environment through 62 major parcel changes, defined as infrastructure changes, demolition, major remodeling, new construction and major landscape changes. Significant activities include:

- **New Business Construction:** A Jimmy John's Sandwich shop was constructed at a central corridor intersection to replace a blighted and crime attracting liquor store.
- **New Organization Construction:** An Early Childhood Education Center was constructed on the grounds of the city's largest elementary school, Durant-Tuuri Mott.
- **Land Use:** Significant clearing of land paved the way for connecting the Genesee Valley trail with the Flint River Trail to increase foot traffic and recreation in the corridor.
- **Road Transformations:** Installation of a permanent 'Road Diets' transformed two major corridor roads from thoroughfares to two lane roads with bike lanes and crosswalks.
- **Disc Golf Construction:** Construction of disc golf course supported regular positive activity at the Mott Park Recreation Area.
- **Demolition Campaigns:** Extensive demolition cleared blighted structures and enhanced sightlines in corridor neighborhoods, with 32 structures demolished from 2016-2017.
- **Tree Removal:** 70 trees blocking windows were removed on the grounds of the crime attracting Sunset Village Apartment complex to improve natural surveillance and increase building security.

UACC coalition stakeholders engaged CPTED principles to secure environments through 80 minor parcel transformations, including lawn maintenance, landscaping, lighting upgrades, sidewalk improvements, structural repair and painting.

- **Service Saturdays:** Over 1,000 Kettering Students engaged in 31 Service Saturday work days to board, paint, and restore vacant or dilapidated homes and recreational spaces across the corridor.
- **Blight Squad Property Adoption:** The neighborhood-initiated Mott Park Blight Squad partnered with Kettering University to adopt more than 25 vacant properties and historic businesses by providing regular lawn care, painting, boarding, structural improvements, and ongoing maintenance.
- **Home Security Enhancements:** 300 LED home security lights, 99 driveway motion sensors, and 30 security cameras were distributed to residents across the corridor and installed through a CPTED mini grant program.
- **Street Light Assessment and Repair:** The Flint Urban Safety Corps assessed 825 corridor streetlights leading to the repair of 76 broken streetlights.
- **Sidewalk Assessments:** The City of Flint worked in partnership with the Flint Urban Safety Corps to assess all corridor sidewalks and prioritize repairs.
- **Holiday Lighting:** Two successful Annual 'Light Up the Avenue' Campaigns encouraged Holiday Lighting on residences and homes throughout the corridor to improve visibility, increase territoriality, and deter crime.

UACC stakeholders engaged corridor residents in 160 organizational events, which included meetings, workshops, communication and dissemination events focused on CPTED capacity building and strategic planning to expand and sustain CPTED efforts in the corridor.

- **UACC Coalition Meetings.** Hundreds of UACC corridor coalition members engaged in monthly meetings throughout the implementation period to network, disseminate information, and engage in strategic planning for further CPTED activity.
- **Placemaking:** Corridor residents participated in interactive placemaking processes to revitalize and repurpose critical corridor spaces, including the defunct Mott Park City golf course, the blighted Sunset Village Apartment Complex, and underutilized Durant-Tuuri Mott Elementary grounds. Residents voted on desired enhancements and created multi-phase site plans to restore the apartment complex, promote community use of the school grounds, and repurpose the golf course into a multi-use recreational area with designated trails, a disc golf course and kayak launch.
- **CPTED Training and Assessments:** Classroom trainings and field-based practicums trained over 200 community members and 30 organizations to apply principles of CPTED to secure homes and businesses. In the spring of 2016, the

program trained the 12-member Flint Urban Safety Corps Americorps Cohort team to become certified CPTED assessors.

The UACC supported 13 safety and crime prevention event activities including the formation of citizen and police patrols and the application of CPTED principles to secure homes and businesses.

- **River Watcher Patrols:** Regular golf cart patrols were initiated and formalized along the Flint River Trail to enhance use of the trail. 47 patrols were completed since the patrol's inception in 2016.
- **Bike Patrols** Regular bike patrols in the Stevenson and Mott Park neighborhoods put eyes on the street and enhanced organized surveillance to reduce illegal activity and enhance crime reporting.
- **CPTED Assessments:** Trained members of the Flint Urban Safety Corps assessed more than 40 homes and businesses to identify CPTED informed physical enhancements to secure homes and businesses across the corridor.

Finally, the UACC provided support for 62 social events to formalize opportunities for recreation and socializing across the corridor, including extensive community social and leisure events.

- **Friday Nights at University Square.** A series of summer leisure events activated the corridor's central green space, University Square, with positive activity including food trucks and lawn games.
- **Atwood Stadium Events:** Extensive community events were held at the refurbished stadium including a grand reopening event, fall high school football, community running races, movie nights, symphony nights and 4th of July fireworks.

Organizational Investment and Business Development. An additional core goal of the project was to document how the UACC coalition has evolved, with a focus on examining how coalition activities leveraged CPTED dollars to garner further organizational support and grant funding. Our implementation evaluation records indicate that formalizing and expanding CPTED activity through further funding generated momentum, inspired institutional involvement, and helped to leverage significant investment of capital in the corridor area. At the coalition's inception, 10-15 stakeholder groups were formal partners. That number expanded to 30 stakeholders by 2014 and surged to include more than 100 organizational partners by 2017, following the infusion of CDC grant funding. Expanding involvement and activity has encouraged significant investment of financial capital in the corridor area. The following major investments were leveraged by the corridor coalition during the funding period:

- \$9 Million investment to found and construct an Early Childhood Education Center on the grounds of Durant Tuuri Mott Elementary School

- \$1.9 Million from the Economic Development Administration to fund Phase 2 of the General Motors Mobility Research Center
- \$1 million for the Byrne Criminal Justice Innovation Program to fund a CPTED program focusing on blight elimination, crime reduction and community engagement
- \$1 million investment (pending) from Metro Community Development to support Housing Stabilization in a key corridor neighborhood
- \$750,000 from Kettering University for demolition of blighted and crime attracting structures
- \$500,000 to fund development of two Habitat for Humanity 'Work-Live' Sites
- Subsidized home purchases in Flint For Kettering Professors to encourage home ownership in the corridor
- \$120,000 every three years for Flint Urban Safety Corps AmeriCorps to work on blight elimination, safety and community engagement projects
- \$25,000 from Kettering University to fund construction of Disc Golf Course in the Mott Park Recreation Area

The investment of capital and improvements in the physical environment helped to support the development of several new businesses which opened in the corridor area including Tenacity Brewing (2014), The Local Grocer (2016), Jimmy John's (2017), Hey Day Coffee (2017), Blue Line Doughnuts (2017); the renovated GM Factory 1 site archives and event space (2017), and Factory 2 innovation hub and maker's space (2017).

CPTED Implementation Evaluation and Feedback. A key goal of the project was to gather implementation and outcome data on CPTED projects and to feed this data back to UACC stakeholders to guide decision-making around CPTED implementation. We developed detailed tracking systems to document implementation of CPTED activities including descriptions of projects, number of people engaged, costs, organizations involved, and CPTED principles applied. These efforts resulted in detailed documentation of 377 CPTED activities occurring across the corridor during the grant period. We provided this implementation data to coalition stakeholders during regular UACC meetings through interactive visual presentations and handout materials illustrating quarterly activity and effort. We also provided regular updates to UACC project managers during weekly check-in meetings. These updates provided a clear picture of where CPTED activity was occurring and with what intensity, which served as a project management tool to guide further implementation. We also presented outcome data during UACC meetings including property assessment data and survey data. Survey data was aggregated to the neighborhood level and included maps indicating level of social capital, neighborhood disorder, neighborhood participation, and fear of crime. Property assessment data was provided as a hot spot analysis for a composite score of lawn maintenance. This data helped to inform understanding of intervention effects and guide further implementation.

CPTED Story Map as a Tool for Participatory Implementation Evaluation.

Recognizing the highly visual, physical, and geospatial nature of the CPTED projects, we identified ArcGIS story maps as a compelling platform to document and tell the story of CPTED interventions across the corridor. In the summer of 2016, we began developing a GIS story map to highlight coalition accomplishments, while simultaneously illustrating the criminological model of CPTED and its applications in a compelling, high-need setting. Our process for making the map included extensive data collection through multiple interviews with project managers and stakeholders to select and describe intervention activities that exemplified how each CPTED principle was applied across the corridor. The process resulted in a rich narrative of CPTED in Flint, which may serve a practical tool for applying CPTED and as a record of UACC CPTED activity. Through the process we recognized the empowering effect of engaging UACC stakeholders in tracking implementation activities and shaping the narrative of CPTED intervention across the corridor. This participatory implementation evaluation process not only strengthened our relationships with our stakeholders, it also significantly enhanced our understanding of the intervention, opening the door to new research questions and our qualitative study exploring CPTED and evidence of busy streets.

B. Challenges, Resolutions, and Lessons Learned.

Sustainability. Our UACC partners reported poor return on investment when funding one-time events and emphasized the need to invest in CPTED strategies that would have ongoing benefit for the community. One project manager shared his insights regarding sustainability of CPTED programs: “We realized that we needed to be strategic in terms of how we invested. Instead of just purchasing something, how do we invest in ways that there was a multiplier effect, for example by investing in education or things that can be used multiple times versus one-offs?” Particularly successful and sustainable activities implemented by the UACC included building community capacity to critically apply CPTED principles through a train the trainer CPTED education program. This program trained over 200 community members and more than 30 organizations throughout the corridor to conduct CPTED assessments to secure homes and businesses utilizing CPTED principles. A UACC project manager noted that this program was particularly successful because it provided a common language and understanding about how to approach problem solving, along with practical tools and a low-cost methodology to advance the corridor’s mission. A second form of effective and sustainable activity was investing in long-term infrastructure changes, such as installing a disc golf course or bike share stations to support sustained use.

Finally, our partners noted benefits of intentionally aligning CPTED activity in the University Avenue Corridor Area with City of Flint master plan. The master plan called for leadership, buy-in, and investment from the corridor’s many anchor institutions, such as Kettering University and Hurley Hospital, and set forth a vision for the physical appearance, infrastructure and engagement in the University Corridor area. Alignment with the master plan enhanced intentionality of CPTED planning and implementation in

accordance with the community's established vision and allowed UACC-driven CPTED activity to enjoy a high degree of community investment and institutional buy-in.

Shifting Priorities in the Face of Crisis. A significant challenge in the area of implementation was shifting priorities and political will to accomplish previously identified CPTED objectives in the face of the Flint water crisis. While the CPTED program had initially called for a strong focus on infrastructure changes such as improving streetlights and sidewalks, many of these plans became untenable in the face of the weightier priorities of responding to the water crisis. Falling property values also meant that many residents were less incentivized to invest in CPTED-informed structural upgrades to their homes. Other planned interventions, such as sidewalk improvements were made impractical due to the need to repair pipes. UACC leadership and stakeholders responded with a high degree of ingenuity and adaptability, highlighting the need for dexterity, flexibility, and responsiveness in tailoring CPTED solutions to both the physical and political context of the intervention. CPTED organizers responded by strengthening their focus on low-cost placemaking activities, such a temporary community art installations, pop-up restaurants and parks, and temporary road changes. These low-cost, less invasive strategies encouraged community problem solving and investment in improving community spaces, while paving the way more permanent solutions and investments.

Balancing Priorities of Multiple Audiences. One challenge we faced in the process of creating the Story Maps was balancing the priorities of our diverse audiences and stakeholders engaged in the mapmaking. Our partners were interested in a product that would tell the story of coalition achievements, yet we were also interested in highlighting the conceptual principles of CPTED. An important lesson of the story map-making process was clarifying expectations with stakeholders early on through a transparent process to identify goals, collectively shape the story, and ensure the needs of multiple stakeholders and audiences were met. We learned the importance of checking in early and often with our partners to gather their input on the story. This was particularly important when making significant data collection demands on our community stakeholders to support creation of the story map. We found that engaging in a transparent and participatory goal-setting process led to a product that was meaningful and useful to multiple stakeholders.

Tracking CPTED Activity. We initially proposed to track every CPTED occurring in the corridor, but had not accounted for the high volume of activity generated by the coalition's more than 100 partners. To account for the sheer volume of activities occurring in the corridor, we developed a system of prioritization to categorize and track projects. Our first priority was to track physical change CPTED activities including major and minor parcel changes, next we tracked significant organizational events including establishment of new businesses, formation of patrols, CPTED trainings and workshops, safety assessments, and informational sessions. Our third priority was to track social events, including community and youth events.

As many activities passed through the corridor but were not directly related to coalition activities, a second challenge was to define meaningful CPTED-related activity that was generated by coalition stakeholders. We developed a 4-tier ranking system to identify the degree of UACC involvement in initiating, funding, and implementing CPTED activities. The tier system enabled us to track and examine activities that were coalition-generated.

Determining the ways in which CPTED was uniquely applied in each project setting presented a final challenge for our team. To develop a more comprehensive picture of the application of CPTED principles at each project, we developed a rating system and engaged a project manager as an expert rater to determine which CPTED principles were applied through each activity. Tracking the sheer volume of activities and gathering meaningful information about CPTED application was a learning curve for our team, and developing these systems provided a way to focus our observation.

Breakdown of 4-condition design. A significant challenge we encountered in our outcome evaluation was a changing implementation environment that precluded our original proposed 2X2 outcome evaluation design. Originally we had proposed a 2X2 design comparing a total of four conditions: CPTED only, CPTED plus the MI-YVPC intervention area, the MI-YVPC intervention area only, and neither intervention area (comparison area). This proposed design was intended to explore how environmental design interventions and multilevel ecological interventions may complement one another to facilitate reductions in crime and violence. We hypothesized that combining multi-level ecological interventions and crime prevention through environmental designs strategies in three crime hot spots would enhance intervention effects on violent crime and injury in the CPTED+MI-YVPC area. However, in 2015 the 5-year MI-YVPC project that overlapped with the CPTED area ended, and the newly funded YVPC project did not occur in overlapping geographic areas with the CPTED implementation. Therefore, only 2 conditions (CPTED only and the neither) remained. We addressed this design change by taking advantage of a serendipitous funding of a Byrne Criminal Justice Innovation grant in 2014 that we were simultaneously evaluating in the area. The Byrne project featured intensive CPTED activity paired with community engagement and formal policing strategies in three crime hotspot areas that overlapped with parts of the CPTED project area. The addition of the Byrne project in parts of the CPTED area facilitated comparison of three conditions: CPTED only, CPTED+Byrne, and neither. This design supported us to explore whether intensive CPTED intervention paired with community engagement and policing strategies would augment the effects of Crime Prevention Through Environmental Design strategies implemented corridor-wide (the CPTED intervention area).

C. Recommendations for Further Research

CPTED Strategy Combinations and Intensities. While evidence exists to support the effectiveness of physical CPTED strategies, few researchers have studied the

independent influence of specific physical CPTED strategies or the interactive effects of these strategies on violence and crime outcomes (Marzbali, Abdullah, Razak, & Tilaki, 2012). Cozens and Love argue that the use of access control and surveillance can enhance territoriality (2015). Talen reported that intensive forms of territoriality, such as opaque walls, gates and fencing may undermine opportunities for natural surveillance on surrounding streets (1999). More research is needed to understand the interactions between CPTED strategies and the relative effects of their groupings and intensities on crime and violence across distinct structural contexts. Future research should examine interaction of physical CPTED strategies, their intensity and combinations in addressing crime needs at distinct study sites in an urban environment experiencing significant violent crime. This would be a significant new direction for CPTED research because most researchers have evaluated CPTED as a monolithic effort, as if all CPTED strategies are implemented with equal intensity across all sites. In our current CPTED work, however, we have learned that CPTED projects vary considerably in terms of the number of strategies implemented and the intensity of application. Few researchers have decomposed CPTED to understand which strategies or combinations of strategies may be most necessary to reach a tipping point for crime and youth violence prevention. Future research should examine this heretofore unstudied research question.

Exploring a Potential Moderating Role of Social CPTED. Recent developments in CPTED theory emphasized the importance of community engagement or ‘social CPTED strategies’ in enhancing the effectiveness of physical CPTED strategies (Cozens & Love, 2015; Saville & Cleveland, 2013). Saville & Cleveland argued that social or community engaged CPTED represents a “second generation” of CPTED theory and highlight the importance of social intervention strategies that engage community leadership in the CPTED process and promote defensible space to deter crime (2013). Jane Jacob’s conceptualization of “eyes on the street” emphasized the need to build cohesive and connected communities such that neighbors not only have clear sightlines to observe crime, but care enough about what they observe to intervene (1961). Reynald found that both physical CPTED strategies and community-engaged social CPTED dimensions were associated with guardianship behaviors to monitor and intervene on neighborhood activity (2011). Despite the hypothesized importance of enhancing community ownership and guardianship in the CPTED process, the role of community-engaged or social CPTED strategies have not yet been rigorously evaluated in a systematic manner and its claims are founded on limited case studies and logical assumptions.

Future research should examine how community-engaged CPTED may moderate effects of physical CPTED strategies on crime, injury, and neighborhood perceptions. To advance the evidence base for CPTED strategies, we propose that future research examine the direct and indirect effects of physical and social CPTED activities on youth violence rates in geographic regions (e.g., block groups, street segments) that vary in their implementation of physical and social CPTED activities. Additionally, future research should explore the level or intensity of community engagement in CPTED

projects and explore the potential moderating effect of community engagement and resident leadership in the CPTED process for enhancing the effectiveness of physical CPTED strategies.

Cost-Effectiveness of CPTED. Researchers are beginning to recognize blight elimination efforts as cost-effective strategies to deter violence. Branas et al. found that inexpensive treatments for abandoned buildings and vacant lots were associated with significant reductions in firearm assaults and over \$200,000 in costs to society averted per building and lot (2016). Other researchers have also highlighted the relatively low costs of CPTED (Atlas, 2013; Carter, Carter, & Dannenberg, 2003; Ramsay, 2013), but there have been few systematic cost-effectiveness studies of CPTED strategies. Carter found that CPTED may reduce law enforcement costs (2003). Ramsay notes that modifying the physical environment costs less than technology and policing solutions that require ongoing investment (2013). Atlas argues that different facets of CPTED interventions may result in variable cost-efficiency; that is, modifying natural elements in the built environment to enhance surveillance and territoriality is relatively low-cost and non-invasive, while mechanical CPTED interventions that require technology or equipment purchases may have higher upfront costs (Atlas, 2013; Clarke, 1989). Atlas argues that context-specific crime prevention interventions are the most cost-effective (2013).

While scholars and practitioners consider CPTED a cost-effective strategy, few researchers have studied the association between the relative cost of CPTED strategy combinations and intensities and outcome variables of crime, violence and injury. Future research could examine the relative cost-effectiveness of a variety of context-responsive CPTED strategy combinations for the key outcomes of reductions in youth violence, injury, and crime. Findings from a cost-effectiveness analysis of CPTED could help to identify and disseminate scalable strategy combinations that are most promising and cost-effective for achieving meaningful reductions in youth violence. Cost-effectiveness studies should not only examine effects for violence prevention but also for community revitalization and redevelopment, including the degree that investments in CPTED programming are associated with further investment and new business growth.

CPTED & Community Empowerment. Preliminary findings from our qualitative research study indicate an association between participation in implementing CPTED strategies and empowered outcomes, including increased collective efficacy, social capital to meet individual and collective objectives, and behavioral action to improve neighborhood conditions. Future research should seek to triangulate findings with quantitative research. Additionally, as we found that residents who were closely engaged in CPTED activity reported empowered outcomes, future research should examine the type of involvement in CPTED implementation and dosage of involvement that may be associated with empowerment outcomes. Additionally, residents reported that support from institutions was critical for advancing resident-driven CPTED projects and enhanced resident self-efficacy to achieve shared objectives. Future research

should explore the role of community coalitions and institutional support, and establish best practices for institutions to engage with residents groups to advance CPTED objectives and enhance empowered outcomes.

V. Publications, Presentations, Media Coverage or Other Products Resulting from Project Activities

A. Key Collaborations and Benefits.

A critical accomplishment of the CPTED project was the establishment of effective structures for collaboration, the removing of silos, and the development of synergistic collaborations between institutional partners and community resident groups that facilitated the coalition's work. The UACC took a leadership role in identifying ways for anchor institutions of the corridor such as Kettering University, U of M Flint Police Department to support resident-driven CPTED initiatives. Over the course of the implementation period, UACC leadership recognized that resident-driven CPTED projects often benefited from people power, but lacked sufficient resources and materials. The coalition learned the value of investing in training and supplies to remove resource barriers to resident-driven CPTED activity. Notable collaborations forged during the project period include the collaboration of Kettering University and the neighborhood-initiated Mott Park Blight Squad, which supported motivated neighborhood residents with training and tools to expand their role as first responders for blight and quality of life concerns. Another notable collaboration occurred between the Flint Urban Safety Corps, University of Michigan Flint Police Department, and the residents of Stevenson neighborhood who collaborated on projects to ameliorate blight, form a neighborhood association, and organize a series of community building events. Residents interviewed through our qualitative study noted that these collaborations with institutions reduced a sense of isolation, created a sense of balanced ownership for problem solving, and encouraged greater collective efficacy to engage in neighborhood improvement efforts. Such collaborations also encouraged resident participation in activities such as placemaking and networking that enabled residents to vocalize their needs and participate in intentional CPTED transformation of community spaces. A significant accomplishment of this proposal was identifying and establishing these structures and models for effectively supporting resident-driven action.

The project was also successful in heightening the commitment and level of involvement of anchor institutions, such as Hurley Hospital. Anchor institutions that were supportive but less involved have begun to recognize their potential for leadership and seek a more central role in coalition activities. For example, after engaging with the UACC on a lighting initiative, Hurley Hospital is now examining how it may make more sweeping contributions to the revitalization of the corridor and physical sites surrounding the hospital campus above and beyond its existing role as a key center for responding to medical needs and acute trauma care. The expanding commitment of major institutional players will continue to enhance synergistic collaboration and build a web of

support for revitalization activities, fueling and fortifying resident driven efforts. Such collaborations will also help to ensure that CPTED activity will be sustained and built into the physical and social fabric of the University Avenue Corridor.

B. Products Developed.

Publications.

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, 42*(2), 137–147. <https://doi.org/10.1177/1090198114558590>

Farrell, A. D., Henry, D., Bradshaw, C., & Reischl, T. (2016). Designs for Evaluating the Community-Level Impact of Comprehensive Prevention Programs: Examples from the CDC Centers of Excellence in Youth Violence Prevention. *The Journal of Primary Prevention, 37*(2), 165–88. <https://doi.org/10.1007/s10935-016-0425-8>

Heinze, J. E., Reischl, T. M., Bai, M., Roche, J. S., Morrel-Samuels, S., Cunningham, R. M., & Zimmerman, M. A. (2016). A Comprehensive Prevention Approach to Reducing Assault Offenses and Assault Injuries among Youth. *Prevention Science: The Official Journal of the Society for Prevention Research, 17*(2), 167–176. <https://doi.org/10.1007/s11121-015-0616-1>

Krusky, A. M., Heinze, J. E., Reischl, T. M., Aiyer, S. M., Franzen, S. P., & Zimmerman, M. A. (2015). The effects of produce gardens on neighborhoods: A test of the greening hypothesis in a post-industrial city. *Landscape and Urban Planning, 136*, 68–75. <http://doi.org/10.1016/j.landurbplan.2014.12.003>

Morrel-Samuels, S., Bacallao, M., Brown, S., Bower, M., & Zimmerman, M. (2016). Community Engagement in Youth Violence Prevention: Crafting Methods to Context. *The Journal of Primary Prevention, 1*–19. <https://doi.org/10.1007/s10935-016-0428-5>

Reischl, T. M., Krusky, A. M., Zimmerman, M. A., Aiyer, S. M., Kruger, D. J., Franzen, S. P., & Lipton, R. (2016). Assessing Physical Disorder in Urban Neighborhoods: Reliability and Validity of the Parcel Maintenance Observation Tool. *Journal of Community Psychology, 44*(1), 7–21. <https://doi.org/10.1002/jcop.21730>

Presentations.

Rupp, L., Alberts, J., (November 2017). Revitalizing Community Spaces Through Environmental Design: Telling the Story of Revitalization in Flint, Michigan. Invited presentation at 2017 GIS Day Conference, Dearborn, Michigan.

Kruger, D. J., Crichlow, V. J., Hollis, M. E., McGarrell, E. F., Jefferson, B. M., Reischl, T. M., & Zimmerman, M. A. (2014, May). *Violent crime density, trust in police, and*

intentions to contact police. Poster presented at the Association for Psychological Science's Annual Convention, San Francisco, CA.

Morrel-Samuels, S, Zimmerman, M.A., Reischl, T., Cunningham, R., Roche, J. (2014, November) Community-level youth violence prevention: What does it take to move the needle? Presented at the Annual Meeting of the American Public Health Association.

Zimmerman, M.A. (March 2014). Adolescent Resiliency and Violence Prevention. Invited presentation at the 2014 Conference on Adolescent Health, Ann Arbor, MI.

Zimmerman, M.A. (September 2017). Greening Vacant Properties: An Innovative Approach to Youth Violence Prevention. Methods presented at Society For Advancement of Violence and Injury Research. Ann Arbor, Michigan.

Other Products.

Rupp, L., Forman, A., Wyatt, T., Stock, J., Alberts, J., & Grodzinski, A. (2016). Crime Prevention Through Environmental Design in Flint, MI. [Online ESRI Story Map]. <http://yvpc.sph.umich.edu/>. *Date Accessed*.

Papers in Progress.

Rupp, L., Zimmerman, M.A, Building Busy Streets: A Qualitative Study of Community-Engaged CPTED and Empowered Processes in Flint Neighborhoods

Bushman, G., Zimmerman, M.A, Radiating Effects of Crime Prevention Through Environmental Design Projects in Flint's University Avenue Corridor

Media Coverage.

[Service Saturdays Continue to Grow](#) – Kettering University Press Release, June 5, 2014

[Tenacity Brewing wants to be Flint's Community Brewer](#) – MLive, October 13, 2014

[Stop the Silence 3-on-3 Basketball Tournament Set for Downtown Flint](#) – MLive, June 24, 2015

[Atwood Stadium Returns as Anchor of Flint Community with Grand Reopening](#) – MLive, August 28, 2015

[Kettering University Students, Staff Helping Light Up University Avenue for the Holidays](#) – Kettering University Press Release, December 6, 2015

[Recovery Efforts Lead to Flint's First Restaurant Week, Starting Today](#) – MLive, May 17, 2016

[Construction Begins on New Early Childhood Education Center in Flint](#) – Charles Stewart Mott Foundation Press Release, January 23, 2017

[County Eyes Connecting Genesee County Trails along Flint River](#) – MLive, January 25, 2017

[Flint Blight Squad Works to Make Neighborhood ‘Something to be Proud of’](#) – NBC25, March 26, 2017

[GM Opens Renovated ‘Factory One’ in Flint](#) – The Detroit News, May 1, 2017

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