Changes Within The Urban Environment And Their Effect On Crime And The Criminal Justice System

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Abstract
Comprised of three papers, this dissertation examines how changes within the urban environment affect crime and the criminal justice system. Collectively, these three papers address policy-relevant issues for urban communities that include police-community relations, the caretaking role of the police, firearm-related violence, blighted and vacant land, the opioid epidemic, and access to treatment for opioid use disorder.

The first paper assesses the place-based effects of outpatient methadone maintenance treatment facilities on crime in Philadelphia. The analysis in this paper uses spatial and temporal variation in OMMT facility presence during an eleven-year period (2007-2017) to determine these effects. Within a 200-meter radius, the presence of an OMMT facility caused a significant decrease in property and total crime but a significant increase in drug and violent crime. There were no significant effects on crime outside of the 200-meter radius.

The second paper evaluates the effect of randomized vacant lot remediation on the frequency of shootings that result in serious injury or death. The analysis in this paper uses data from a 2013 randomized controlled trial conducted in Philadelphia involving 541 vacant lots. Some vacant lots were remediated, other vacant lots received a lesser level of remediation, and the remainder received no remediation. Over a 60-month period, remediating lots significantly reduced shooting incidents; there was no evidence that the interventions displaced shootings into adjacent areas.

The third paper tests whether a high-profile death-in-police-custody incident in Baltimore affected community reliance on the police, as measured through citizen calls requesting police assistance for non-criminal caretaking matters. This paper presents a Negative Community-Police Relationship Index Score that operationalizes the risk of a negative community-police relationship for a given location within Baltimore based on factors such as the percentage of residents living in poverty and the percentage of vacant residential housing units. Even in high-risk sections, the death-in-police-custody incident did not significantly affect community reliance on the police for non-criminal caretaking matters.

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CHANGES WITHIN THE URBAN ENVIRONMENT AND THEIR EFFECT ON CRIME AND THE CRIMINAL JUSTICE SYSTEM

Ruth Ann Moyer

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ABSTRACT

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PREFACE

Common metaphors for cities – “ecosystems,” “organisms,” “problems in organized complexity,” or “life at its most complex or intense” – attempt to convey the inherent intensity and intricacy of the urban environment (McGreevy & Wilson, 2017; Batty, 2012; Kennedy, Pincetl, & Bunje, 2011; Jacobs, 1961). As some empirical research has estimated, doubling population size may increase many positive (e.g., economic productivity) and negative (e.g., incidence of crime) aspects of the human experience by more than 10% (Bettencourt, Lobo, Strumsky, & West, 2010; Bettencourt, Lobo, Helbing, Kühnert, & West, 2007).

The three papers in this dissertation evaluate how changes to the urban environment affect crime and the criminal justice system. The intricacy and intensity of cities motivate criminological research for two reasons. First, the intricacy and intensity of cities can create pressing problems involving crime and the criminal justice system that are unique to the urban environment.¹ Research concerning these problems may provide analyses that are generalizable to other cities. Second, the intricacy and intensity of cities render issues about crime and the criminal justice system more visible; in this sense, the urban environment can bring attention to important criminological concerns that also exist, albeit less obviously, in rural or suburban areas.² This research may provide analyses that are generalizable to not only other cities but to rural and suburban areas as well.

SUMMARY OF PAPERS

Urban areas such as Philadelphia have not been immune to the current opioid epidemic. The epidemic has created in many communities a growing demand for treatment, including outpatient methadone maintenance treatment (OMMT) facilities. The introduction of an OMMT facility constitutes an epidemic-related change to the physical environment.

Given the link between offending (particularly property crimes) and opioid use disorder, it is possible that OMMT facilities may be criminogenic because they provide

¹ Some crime and criminal justice-system related challenges are more prevalent in urban areas than in non-urban areas. To illustrate, firearm deaths are more likely to be homicides in urban areas and suicides or accidents in non-urban areas (Nance, Carr, Kallan, Branas, & Wiebe, 2010; Branas, Nance, Elliott, Richmond, & Schwab, 2004). Moreover, crime hotspots in suburban areas tend to be much more clustered together compared to those in a city (Gill, Wooditch, & Weisburd, 2017). It is possible that because they are more bureaucratized, urban courts, relative to rural courts, have less potential for disparities based on extralegal factors such as race (Hagan, 1977).

² Urban areas may experience crime and criminal justice system-related challenges that are not completely dissimilar from those in rural or suburban areas. For example, regardless of urbanization-level, many communities throughout the United States are struggling with the opioid epidemic (Wagner, et al., 2019). Additionally, as with urban areas, in suburban areas, crime tends to be concentrated in small hotspot spatial areas (Gill, Wooditch, & Weisburd, 2017). In both urban and rural areas, a negative correlation exists between tree cover and crime (Troy, Grove, & O'Neil-Dunne, 2012).
spaces that are uniquely conducive for would-be offenders to cluster and socially interact, learning or reinforcing negative behaviors. Many communities resist the introduction of OMMT facilities because of the perception that they attract criminogenic elements. Alternatively, however, clinical research has found that OMMT can reduce drug-related offending. Therefore, it is possible that OMMT facilities may reduce community-level crime because they provide access to much-needed treatment.

Between 2007 and 2017 in Philadelphia, three OMMT facilities closed, and six new OMMT facilities opened. Using this variation in OMMT facility presence at these nine locations, Paper 1 estimates the effect of OMMT facilities on place-based crime. Within a 200-meter radius, the presence of an OMMT facility causes a significant decrease in property (-28.8%) and total (-17.8%) crime but a significant increase in drug (30.8%) and violent (7.0%) crime. There are no significant effects on crime outside of the 200-meter radius. The effects of an OMMT facility on property, violent, and total crime decrease with increasing distance from the OMMT facility, consistent with a causal effect.

Besides the problem of opioids and illegal drugs, many cities have struggled with firearm violence as well as vacant and blighted land. As previous researchers have noted, vacant and blighted properties, often concentrated in low-income areas, are hazardous to the health and safety of urban residents (MacDonald, 2015; Branas, et al., 2018).

Paper 2 uses data collected from a previous cluster randomized controlled trial in which 541 randomly selected vacant lots in Philadelphia were assigned to 110 geographically contiguous clusters; these clusters were then randomly assigned to a greening intervention, a less-intensive mowing and trash cleanup intervention, or a no-intervention control condition (Branas, et al., 2018). This random assignment occurred in April and June 2013 and lasted until March 2015. Paper 2 assesses whether the two treatment conditions relative to the control condition reduced firearm shootings around vacant lots.

Over a sixty-month period, the greening intervention significantly reduced shootings by -6.8%, and the mowing and trash cleanup intervention significantly reduced shootings by -9.2%. There is no evidence that the interventions displaced shootings into adjacent areas. Remediating vacant land with these inexpensive and scalable interventions significantly reduces shootings that result in serious injury or death.

In addition to causes of crime such as vacant lots and illegal drug use, many urban areas have also recently had to grapple with issues concerning police-community relations. Citizens’ reluctance to contact the police may suggest disruptions in the social contract between a government and its citizens. Paper 3 tests whether a death-in-police-custody incident, Freddie Gray’s April 2015 death while in Baltimore Police Department (BPD) custody, affected community reliance on the police. This reliance is measured through citizen calls requesting police assistance for non-criminal caretaking matters. The police frequently engage in a broad range of activities that are distinct from enforcing the law and combatting crime; the non-criminal caretaking role of the police includes checking on the welfare of elderly residents and responding to behavioral health crises.

Paper 3 uses BPD incident-level call data (2014-2017). Counts of non-criminal caretaking calls are aggregated by week for each of 279 unique sections derived from census-tract and police district boundaries. Paper 3 also devises a Negative Community-Police Relationship Index Score that, as a spatial matter, operationalized the risk of a negative community-police relationship for each of these sections. Even in high-risk sections, the
death-in-police-custody incident did not significantly affect community reliance on the police for non-criminal caretaking matters.

**Commonalities**

Although these three papers assess discrete problems, several themes unify them. Using data from two Northeastern cities, Papers 1, 2, and 3 assess criminological issues that are interconnected and that are relevant to much of urban America. Additionally, these three papers evaluate some dimension of place. Papers 1, 2, and 3 address or recognize issues relevant to community wellness – namely firearm violence, blighted land, the opioid epidemic, and the growing caretaking role of the police. Furthermore, these three papers evaluate questions that are pertinent to crime and the criminal justice system, but that, as a temporal matter, have relevancy well before the commission of any crimes. Collectively, Papers 1, 2, and 3 aim to provide empirical support for generalizable policy interventions that will make communities safer and that ensure equity and justice for all citizens.3

**Interconnected Issues: Vacant Land, Firearm Violence, the Opioid Epidemic, Police-Community Relations, and the Police Caretaking Role**

The three papers in this dissertation address problems in urban environments that are interrelated. Illegal drug trafficking, an inevitable component of the current opioid epidemic, is associated with firearm violence in many cities (Friedman, et al., 2019; Sevigny & Allen, 2015). In cities such as Baltimore and Philadelphia, firearm violence and the opioid epidemic have influenced police behavior. Police officers are now responsible for caretaking functions that include administering naloxone to individuals suffering from opioid overdoses (Davis et al., 2014). In Philadelphia, police officers transport more than one-quarter of firearm shooting victims to the hospital through “scoop and run” (Band, et al., 2014).

Additionally, citizens’ sense of collective efficacy within their communities can improve their perceptions of the police (Nix, Wolfe, & Kaminski, 2015); in many cities, factors such as concentrated poverty decrease collective efficacy and increase cynicism toward institutions, such as the police (Sampson, 2016). Blighted urban land is associated with illegal drug use and firearm violence; remediating blighted urban land in disadvantaged neighborhoods can contribute to collective efficacy (Branas, et al., 2018). Consistent with previous research about the negative effects of vacant land, the Negative Community-Police Relationship Index Score in Paper 3 uses the percentage of residential housing units that are vacant as a factor predictive of strained police-community relationships.

**The Dimension of Place**

Papers 1, 2, and 3 address some dimension of place. Admittedly, most things relevant to crime or the criminal justice system have to occur somewhere. Police-citizen interactions, prosecutions, drug treatment centers, vacant land, and shootings do not exist or occur in a universe devoid of a spatial dimension. Yet, for all three papers, this dimension of place is more than merely incidental. The concept of place can encompass the social context

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3 Besides this potential for external validity, all three papers use methods that attempt to have internal validity (Ridgeway, 2019). Paper 2 has the benefit of data from a previous randomized controlled trial whereas Papers 1 and Papers 3 use quasi-experimental designs.
of a geographic location as well as the physical environment (MacDonald, Branas, & Stokes, 2019; Sherman, Gartin, & Buerger, 1989; Klinenberg, 2018).

The places relevant to Paper 1 and Paper 2 are outpatient methadone maintenance treatment facilities and vacant lots, respectively. In Paper 3, a key methodological consideration was quantitatively defining the risk of a negative police-community relationship for any given geographic location within Baltimore. Place and policing are not readily disentangled, particularly in urban environments; contemporary policing often centers on spatially-based factors, including the recognition that crime is typically concentrated in hotspot areas (Gill, Wooditch, & Weisburd, 2017; Braga, Papachristos, & Hureau, 2014; Sharkey, 2018). Additionally, community perceptions of the police often spatially vary among neighborhoods within a city (MacDonald, Stokes, Ridgeway, & Riley, 2007).

Defining place is often dependent on the empirical question that needs to be answered. Paper 1 assigns concentric 200-meter, 400-meter, and 800-meter buffers around outpatient methadone maintenance treatment facilities. Paper 2 calculates a kernel density estimate of the monthly rate of shootings per square kilometer at the centroid of each vacant lot cluster; this method provides a smoothed estimate of the monthly shootings per kilometer. Paper 3 divides a city into 279 unique spatial sections based on census tract and police district boundaries; this method enables the linkage of demographic information to a given location in a city.

Relevancy of Community Wellness

All three papers address some aspect of community wellness, demonstrating the profound relevancy of public health to crime prevention and proper criminal justice system functioning (Branas, et al., 2018; McGinty, Siddiqi, Linden, Horwitz, & Frattaroli, 2019). Paper 1 assesses the effect of outpatient methadone maintenance treatment facilities on crime; outpatient methadone maintenance treatment is an important tool for combatting opioid use disorder in many communities. Paper 2 evaluates whether remediating vacant land can reduce shooting incidents.

Paper 3 measures public willingness to rely on the police through calls for non-criminal community caretaking matters; these matters include behavioral health crises and wellbeing checks on the elderly. Use of police officers for these matters transcends a traditional law enforcement role, presenting important consequences not only for police-community relations (Alpert, Dunham, & Stroshine, 2015) but for public health as well (Greenberg & Frattaroli, 2018). Police responsibilities increasingly include caretaking functions such as administering naloxone to individuals suffering from opioid overdoses (Davis et al., 2014) and transporting severely victims to the hospital through “scoop and run” policies (Band, et al., 2014).

Generalizability for Urban America

Not all cities are the same (Sampson, 2016). Some cities struggle with gentrification, homelessness, racially disparate court systems, or pollution whereas other cities struggle with strained police-community relations and unemployment. Nonetheless, even if a city is not completely identical to other cities, empirical research about a challenge in one city may be instructive for other cities experiencing that same challenge.

Papers 1 and 2 assess the effect of changes to the urban environment on crime and the criminal justice system in Philadelphia, and Paper 3 assesses this effect in Baltimore. The
historical narratives of both cities are in some ways similar – port cities founded in colonial America, locations of pivotal (or, at a minimum, deeply symbolic) moments in America’s development from a collection of English colonies to an independent nation, and products of the industrialization-fueled urban growth of the nineteenth and early twentieth centuries. (Hanlon, Short, & Vicino, 2010).

Philadelphia, a city of nearly 1.6 million, has an unemployment rate of 4.9%, and Baltimore, a city of approximately 620,000, has an unemployment rate of 7.0%. In both cities, approximately 1 in 4 residents live in poverty, and many disadvantaged neighborhoods suffer from abandoned buildings and vacant lots, a tangible manifestation of deindustrialization and suburbanization during the second half of the twentieth century.

Unlike Baltimore, Philadelphia has largely evaded any high-profile police-use-of-force or death-in-police-custody incidents that have the pernicious potential to undermine citizens’ trust in their government. Nonetheless, many neighborhoods in both cities struggle with strained police-community relations (Carr, Napolitano, & Keating, 2007; Crime and Justice Institute, 2019). Additionally, both Baltimore and Philadelphia are experiencing increased levels of firearm violence – in 2019, Baltimore had 348 homicides and Philadelphia had 356 homicides. And neither city has been immune to the opioid epidemic. In 2017, Baltimore and Philadelphia experienced 761 and 1,217 overdose deaths, respectively.

Although firearm violence (Branas, et al., 2016; Kondo, South, Branas, Richmond, & Wiebe, 2017; Wiebe, et al., 2016) and vacant land (MacDonald, Branas, & Stokes, 2019; Kondo, Keene, Hohl, MacDonald, & Branas, 2015; Branas, et al., 2011) are of particular concern for urban areas, these issues are not completely inconsequential for rural and suburban areas. For example, abandoned homes, factories, and shopping malls throughout rural and suburban America are salient reminders of foreclosures and other economic strains during the first two decades of the 2000’s (Shane, 2019; HUD Office of Policy Development and Research, 2014; Hanlon, Short, & Vicino, 2010). Likewise, non-urban areas, as well as urban areas, have struggled with the opioid epidemic (Wagner, et al., 2019).

Policy-Relevant Questions

These three papers evaluate questions that, as a temporal matter, have relevancy well before the commission of any crimes. Access to medication-assisted treatment for opioid use disorder, remediating vacant and blighted land, and encouraging positive police-community relationships are prophylactically related to crime and the criminal justice system. Empirical research has indicated the benefits of similarly preventive interventions, such as providing street lighting and tree cover as well as the removal of boarded-up windows (Kondo, Keene, Hohl, MacDonald, & Branas, 2015; Chalfin, Hansen, Lerner, & Parker, 2019; Kondo, South, Branas, Richmond, & Wiebe, 2017).

Papers 1, 2, and 3 aim to provide empirical support for evidence-based policy interventions that can inform, for example, policymakers’ decisions about zoning for drug treatment centers, training for police officers, and funding for remediating blighted urban land. Questions about crime and the criminal justice system are often difficult, even uncomfortable, to answer. They sometimes antithetically implicate individual liberties and the guarantees of a civilized and ordered society. Decisions made in the criminal justice system inherently have enormous consequences for both individuals and communities. In addressing the immense challenges of crime and the criminal justice, empirical research can help make neighborhoods, cities, and our nation safer and more just places.
BIBLIOGRAPHY


THE EFFECT OF OUTPATIENT METHADONE MAINTENANCE TREATMENT FACILITIES ON PLACE-BASED CRIME

ABSTRACT

This study evaluates the effect of outpatient methadone maintenance treatment (OMMT) facilities on crime in surrounding areas. Between 2007 and 2017 in Philadelphia, three OMMT facilities closed, and six new OMMT facilities opened. The variation in OMMT facility presence at these nine locations provides an opportunity to estimate the place-based effect of OMMT facilities on crime. We use Poisson regression to estimate the percentage change in crime relative to OMMT facility proximity. We also compare those effects relative to crime trends around OMMT facilities that were continuously open throughout the study period.

Within a 200-meter radius, the presence of an OMMT facility causes a significant decrease in property and total crime but a significant increase in drug and violent crime. There are no significant effects on crime outside of the 200-meter radius. The effects of an OMMT facility on property, violent, and total crime decrease with increasing distance from the OMMT facility, consistent with a causal effect. OMMT facilities appear to influence crime in their surroundings. The areas around OMMT facilities experience reduced total crime and property crime; nonetheless, these areas might benefit from further assessment of violent crime risk.

4 A version of this paper was published as R. Moyer and G. Ridgeway (2018). The Effect of Outpatient Methadone Maintenance Treatment Facilities on Place-Based Crime. Journal of Experimental Criminology (https://doi.org/10.1007/s11292-018-9347-1).
INTRODUCTION

The United States is currently experiencing a severe opioid epidemic that has affected urban, suburban, and rural areas (Darakjy et al. 2014; Hedegaard et al. 2017; Furst and Balletto 2012; Kanouse and Compton 2015; Monnat and Rigg 2015; Green 2017). There is some debate as to whether this opioid epidemic has increased crime (Burke 2016; Szalavitz and Rigg 2017). For example, it is possible that the epidemic has intensified drug market activity and increased the homicide rate (Rosenfeld et al. 2017). Very little empirical research has examined the effect of the current opioid epidemic on crime at the neighborhood or place-based level.

Philadelphia has not been immune to the current opioid epidemic (Philadelphia Department of Public Health 2017). In 2017, Philadelphia had over 1200 drug overdose deaths; according to Philadelphia Department of Public Health estimates, 88% of these deaths involved opioids (Philadelphia Department of Public Health 2018). The Kensington neighborhood in Philadelphia contains one of the largest open-air heroin markets in the United States; the heroin sold there is particularly lethal because it frequently contains fentanyl (Hertzler 2017; Gunter 2017; Lewis et al. 2017).

The precise causal effects of the opioid epidemic on crime in a community may be difficult to determine. Factors such as poverty or unemployment place a community at risk for both crime and opioid abuse. Yet, high-crime areas may be more susceptible to the epidemic, or, conversely, epidemic-affected areas may be more susceptible to crime.

Regardless, the epidemic has created in many communities a growing demand for treatment, including outpatient methadone maintenance treatment (OMMT) facilities (Vestal 2016). The introduction of an OMMT facility is an epidemic-related change to the physical
environment in a neighborhood. This study assesses whether this change has any effect on property crime, violent crime, incivility-based crimes (e.g., loitering), or drug crime. We assess this effect within a “close” zone 0–200 meters (m) from an OMMT facility, a “nearby” zone 200–400 m from an OMMT facility, and a “distant” zone 400–800 m from an OMMT facility. We therefore contribute to place-based literature within the context of the current opioid epidemic. More specifically, we build on existing literature by using the change in OMMT presence at a given location during different time periods as an identification strategy.

**BACKGROUND**

According to medical research, medication-assisted treatment (MAT) can be an effective means of overcoming an opioid use disorder (OUD) (Kertesz 2017; Green 2017). MAT most commonly includes the use of medication such as methadone, buprenorphine, or naltrexone (Jones et al. 2015; Gordon et al. 2017; Vestal 2016; Connery 2015).

Physicians have used methadone maintenance therapy (MMT) as an effective OUD treatment since the mid-twentieth century (Vestal 2016). A long-acting opioid, methadone prevents users from craving other opioids such as heroin; however, without proper medical supervision, methadone can be illegally diverted or abused (Matusow et al. 2013; Raz 2017). Consequently, under both federal and Pennsylvania law, when methadone is used to treat OUD, it is available only at highly regulated licensed facilities. To receive MMT, patients, with very limited exceptions, must make a daily visit to an outpatient MMT (OMMT) facility (Matusow et al. 2013; Vestal 2016; NIDA 2017). By contrast, other (newer and generally more expensive) MAT, such as buprenorphine or naltrexone, can be prescribed in a physician’s office (Vestal 2016; NIDA 2017).
Many communities resist the introduction of OMMT facilities because of the perception that these types of place-based structures attract criminogenic elements (Boyd et al. 2012; Smith 2010; Klinenberg 2018). For example, in Philadelphia, neighborhood associations unsuccessfully challenged the opening of at least two OMMT facilities within the past 5 years; these same “NIMBY” sentiments may threaten the continued existence of an OMMT facility in the rapidly gentrifying Market East neighborhood of Philadelphia (Sapatkin 2013; Gammage 2015). According to anecdotal evidence, OMMT patients congregate, loiter, and engage in drug transactions outside facilities (Brey 2014). More generally, it is possible that the daily interactions with other OUD patients at OMMT centers may encourage negative behaviors (Matusow et al. 2013).

**Prior Literature**

The question of whether OMMT facilities have an effect on crime in surrounding areas draws upon two distinct areas of prior criminological research: (1) the effect of place and (2) the relationship between substance abuse and criminal offending. Some locations may generate crime because they inherently attract large amounts of people (would-be victims) or because they inherently attract would-be offenders (Bernasco and Block 2011; Haberman et al. 2013; MacDonald 2015; Blair et al. 2017). This view of criminogenic “places” comports with routine activities theory, which posits that motivated offenders, desirable targets, and the absence of effective controllers are collectively criminogenic (MacDonald et al. 2013; Groff 2011). In the problem analysis triangle conceptualization of routine activities theory, these effective controllers may include people who monitor specific spaces; examples of such place managers include bar bouncers or landlords (Madensen 2010).
As an additional matter, visible signs of physical and social disorder, such as littering or graffiti, can eventually lead to more serious crimes. Perceptible disorder and attendant incivilities can engender feelings of detachment among law-abiding residents and can encourage would-be offenders to engage in further disorder and incivilities, including criminal behavior (MacDonald et al. 2013; McCord et al. 2007).

The social interaction dimension of a given place may also be relevant. The sociological concept of place can refer to the social organization of behavior at a certain physical location (Sherman et al. 1989). Some environmental features may be criminogenic because they constitute physical and temporal spaces that are uniquely conducive to learning or reinforcing negative behaviors or that provide opportunities for offender convergence.

According to the concept of offender convergence, certain settings, particularly those with little outside supervision, provide would-be co-offenders with the opportunity to meet and collaborate on future offending (Hoeben and Weerman 2016). Common examples of these settings include school steps in late afternoon or a street corner at nighttime (Felson 2003; Madensen and Eck 2012). Other possible offender convergence settings may also include a health care clinic waiting room or a criminal courtroom—places where would-be offenders must sit and wait for long periods of time in the company of other offenders.

More broadly, a differential association dimension to a given place may also be relevant. According to differential association theories, criminal behavior may be learned through social interaction (Pratt et al. 2010; Akers 1996; Matsueda 1988). This differential association of negative behaviors does not necessarily require co-offending. Instead, it may simply be the casual sharing of knowledge of how to, for example, successfully commit a burglary or purchase controlled substances without detection.
As an additional matter, according to the “iron law of troublesome places,” a small proportion of potentially criminogenic facilities produces a large share of the crimes. To illustrate, among bars, only a few have high levels of crime, and most have comparatively low levels (Wilcox and Eck 2011; Eck et al. 2007). These skewed distributions may be due to factors such as poor management or a particular clientele (Bowers 2014; Madensen and Eck 2012).

Regardless of underlying theories, place-based criminological research has addressed the effect of environmental features such as schools (Willits et al. 2013; MacDonald et al. 2018); casinos (Johnson and Ratcliffe 2016); public housing complexes (Haberman et al. 2013); bars (Ratcliffe 2012; Morrison et al. 2016); and checkcashers and payday lenders (Kubrin and Hipp 2016).

Some place-based literature has effectively used changes to the environment as a means of isolating the causal effects of environment on crime. These types of studies have found, for example, that the introduction of public rail transit does not cause any change in neighborhood-level crime (Ridgeway and MacDonald 2017). Likewise, some research has used changes in liquor availability laws to determine that alcohol outlets may increase property crimes but not the overall volume of violent crime (Humphreys et al. 2013; Han et al. 2016). Other place-based research has found that esthetic improvements, such as the removal of boarded-up windows or the greening of vacant lots, can reduce crime (Kondo et al. 2015; Branas et al. 2011). In turn, our study uses a place-based change—the introduction of an OMMT facility—to assess the causal relationship between an OMMT facility and crime.

To purchase their drugs, those suffering from OUD may engage in drug trafficking or in property crimes such as shoplifting, burglary, or fraud (Maher et al. 2002; Felson and Staff 2017; Koehn et al. 2015; Bukten et al. 2011; van der Zanden et al. 2007; Singh et al. 2013; Pierce et al. 2017). Also, illegal drug users may be more likely to be victimized than members of the general population (Jessell et al. 2017). Among drug users, those who are homeless, involved in prostitution, or mentally ill may be especially vulnerable (Stevens et al. 2007).

Existing literature involving the relationship between desistence and OUD treatment has largely been individual-level cohort studies, (e.g., Metrebian et al. 2014; Gottfredson et al. 2008; Gossop et al. 2005; Magura et al. 2009). More specifically, research has found that MMT can effectively encourage desistence (e.g., Rastegar et al. 2016; Schwartz et al. 2009; Oliver et al. 2010; Krebs et al. 2014; Bell et al. 1997; Russolillo et al. 2017). To illustrate, an Australian study analyzing the court records for 8154 people enrolled in a public MMT program found that, after adjusting for time spent in custody, offending rates were significantly lower during MMT periods than during non-MMT periods (Lind et al. 2005).
To that extent, research about the effect of OUD treatment on crime has been on the clinical level—and not on the place-based level. Scant literature has addressed the effect of OMMT facilities on crime in surrounding areas.\footnote{Some literature has addressed other drug-related interventions on neighborhood-level crime. For example, research has found that the implementation of over-the-counter syringe sales in pharmacies is not associated with crime increases (Stopka et al. 2014). Another study did not find clear evidence that heroin-assisted treatment sites either increased or decreased crime (Lasnier et al. 2010).}

Nonetheless, a 2012 study, using data predating the current opioid epidemic (1999–2001), found that Baltimore methadone facilities were not geographical focus points of crime, relative to other environmental features such as convenience stores (Boyd et al. 2012). Our research builds upon this 2012 study by analyzing specific crime types and by using variation in OMMT facility presence to determine what effect, if any, a facility has on crime at a particular location.

More broadly, criminological literature has instead largely addressed the effect of “drug treatment centers,” which do not necessarily provide any MAT (or, more specifically, OMMT). A study assessing the effect of publicly funded drug-treatment centers on violent crime in Baltimore concluded that crime levels were similar to that associated with liquor stores but less than that associated with corner or convenience stores (Furr-Holden et al. 2016). Drug treatment centers may be associated with increased property and incivility offenses within 400 feet but not at further distances (Groff and Lockwood 2014); also, treatment facilities are not necessarily associated with increased drug market activity (McCord and Ratcliffe 2007). One study concluded that areas of high socio-economic status and high treatment center intensity had higher crime but that areas of low socio-economic status and high treatment center intensity had lower crime (Taniguchi and Salvatore 2012).
Additionally, a recent study, using counties as the unit of analysis, addressed the effect of substance abuse treatment facilities on crime in the United States (Bondurant et al. 2018). The study used temporal variation in the number of facilities within counties to isolate the effect of the facilities on crime during the period between 1999 and 2012. The study found that an additional facility in a county significantly reduced crimes such as homicide, burglary, aggravated assault, robbery, and motor vehicle theft.

Nonetheless, although access to facilities may decrease crime in the larger community, as Bondurant et al. (2018) show, the facilities still might adversely affect crime in the immediate vicinity. Additionally, OMMT and other MAT facilities may have different effects on crime than substance abuse treatment facilities do more generally.

As our study hypothesizes, it is possible that OMMT facilities, may, in fact, increase crime around them. If people with OUD are more likely to commit certain types of offenses, it is reasonable to expect an increase in those crimes proportionate to the concentration of those with OUD in a certain location—namely, around an OMMT facility. Also, an OMMT facility may cause visible signs of physical and social disorder such as loitering, which may lead to more serious offending. As the routine activities theory suggests, the concentration of drug users, a population prone to victimization, may increase crime around OMMT facilities. Furthermore, consistent with offender convergence and differential association theories, OMMT facilities may be environmental features that provide the necessary spaces in which negative behaviors, such as OUD-related criminal offending, are planned, learned, or reinforced.

Alternatively, however, clinical research has found that OMMT reduces opioid use and opioid-related offending. Thus, the introduction of OMMT facilities may be a positive
change to the built environment that provide those suffering from OUD with easier access to treatment, causing desistence—and less crime. Also, as the routine activities theory suggests, an OMMT facility may constitute an effective place-based guardian that prevents crime—or that is more likely to report crime to the police.

**DATA AND METHODS**

Detailed Philadelphia Police Department incident-level data contain offense type, as well as the corresponding date, latitude, and longitude (Philadelphia Police Department 2017). We grouped offense types into the following categories: “All,” “Total Violent,” “Property,” “Incivilities,” and “Drug.”

Besides our main analyses, we additionally grouped all assaults into the category “Assaults” and all robberies in the category “Robberies.” This disaggregated analysis allowed us to more carefully examine whether these specific violent offense types experienced any changes. Surrounding OMMT facilities, assaults constitute approximately 70% and robberies constitute approximately 20% of all violent offenses.

This analysis focused on only facilities offering methadone for OMMT—and not for short-term detoxification, pain management, or in-patient treatment. The Substance Abuse and Mental Health Services Administration (SAMSHA) provides archived versions of the annual National Directory of Drug and Alcohol Abuse Treatment Facilities; these directories

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6 The “Property” category includes burglary, embezzlement, fraud, forgery/counterfeiting, motor vehicle theft, receiving stolen property, recovered stolen motor vehicles, theft from vehicle, and thefts. The “Incivilities” category includes disorderly conduct, gambling violations, liquor law violations, prostitution/commercialized vice, public drunkenness, vagrancy/loitering, and vandalism/criminal mischief. The “Total Violent” category includes aggravated assault, other assaults, sex offenses, homicide, rape, and robbery. The “Drug” category includes any drug offenses. The “All” category includes all of the above offenses as well as weapons offenses, arson, driving under the influence, and miscellaneous, or unknown, offense types.
list the locations of substance abuse treatment facilities in the United States in a given year and indicate whether a facility provides OMMT (SAMHSA 2017).

Also, the Pennsylvania Department of Health provides a list of outpatient maintenance facilities in Philadelphia, as well as licensing dates (Pennsylvania Department of Health 2017). The Drug Enforcement Administration, per a Freedom of Information Act request, also provided a list of methadone maintenance providers in Philadelphia (Drug Enforcement Administration 2018). Where the DEA, Pennsylvania Department of Health, or SAMHSA information conflicted or was unclear, we directly contacted the facility, contacted the Pennsylvania Department of Health, or searched for online information, such as newspaper accounts.

Table 1 is a list of OMMT facility locations in Philadelphia that existed at some point between 2007 and 2017. Of the 19 locations, the first nine locations (without shading) experienced a change in OMMT facility presence between 2007 and 2017. Three facilities opened, and three facilities moved to new locations, closing the previous locations. Each of the nine locations that experienced some change in OMMT facility presence inherently has its own control group—the same place during time periods without an OMMT facility.

Additionally, we assigned each of the 19 facilities to one of five large geographic groups, northeast, northwest, center, west, and north. The nine “non-constant” OMMT facility locations were in only northeast, center, and north.
Table 1: Outpatient Methadone Maintenance Treatment Facility Locations

<table>
<thead>
<tr>
<th>ID</th>
<th>Facility</th>
<th>Address</th>
<th>Years open</th>
<th>Geographic Part of City (“Group”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Addiction Medicine</td>
<td>928 Market Street 19107</td>
<td>2009-2017</td>
<td>Center</td>
</tr>
<tr>
<td>2</td>
<td>Addiction Medicine</td>
<td>1200 Walnut Street 19107</td>
<td>2007-2008</td>
<td>Center</td>
</tr>
<tr>
<td>3</td>
<td>Jefferson Family Center</td>
<td>1233 Locust Street 19107</td>
<td>2008-2017</td>
<td>Center</td>
</tr>
<tr>
<td>4</td>
<td>Jefferson Family Center</td>
<td>1201 Chestnut Street 19107</td>
<td>2007</td>
<td>Center</td>
</tr>
<tr>
<td>5</td>
<td>Kensington Hospital</td>
<td>136 West Diamond Street 19122</td>
<td>2007-2015</td>
<td>North</td>
</tr>
<tr>
<td>6</td>
<td>Kensington Hospital</td>
<td>2100 Front Street 19122</td>
<td>2016-2017</td>
<td>North</td>
</tr>
<tr>
<td>7</td>
<td>SOAR Corporation</td>
<td>9150 Marshall Street 19114</td>
<td>2008-2017</td>
<td>Northeast</td>
</tr>
<tr>
<td>8</td>
<td>Healing Way</td>
<td>7900 Frankford Avenue 19136</td>
<td>2014-2017</td>
<td>Northeast</td>
</tr>
<tr>
<td>9</td>
<td>NET Steps 2</td>
<td>7520 State Road 19136</td>
<td>2015-2017</td>
<td>Northeast</td>
</tr>
<tr>
<td>10</td>
<td>ACT I</td>
<td>5820 Old York Road 19141</td>
<td>2007-2017</td>
<td>Northeast</td>
</tr>
<tr>
<td>11</td>
<td>ACT II</td>
<td>1745 North 4th Street 19122</td>
<td>2007-2017</td>
<td>North</td>
</tr>
<tr>
<td>12</td>
<td>Consortium</td>
<td>451 South University Avenue 19104</td>
<td>2007-2017</td>
<td>Center</td>
</tr>
<tr>
<td>13</td>
<td>Girard Medical Center</td>
<td>801 West Girard Avenue 19122</td>
<td>2007-2017</td>
<td>North</td>
</tr>
<tr>
<td>14</td>
<td>JFK Behavioral Health</td>
<td>907 North Broad Street 19123</td>
<td>2007-2017</td>
<td>North</td>
</tr>
<tr>
<td>15</td>
<td>Parkside Recovery</td>
<td>5000 Parkside Avenue PA 19131</td>
<td>2007-2017</td>
<td>West</td>
</tr>
<tr>
<td>16</td>
<td>Philadelphia VA Medical Center</td>
<td>3900 Woodland Avenue 19104</td>
<td>2007-2017</td>
<td>Center</td>
</tr>
<tr>
<td>17</td>
<td>Jefferson Addiction Narcotic</td>
<td>South 21st Street and Washington Avenue 19146</td>
<td>2007-2017</td>
<td>Center</td>
</tr>
<tr>
<td>18</td>
<td>Parkside Recovery Germantown</td>
<td>5429 Germantown Avenue 19144</td>
<td>2007-2017</td>
<td>Northwest</td>
</tr>
<tr>
<td>19</td>
<td>Northeast Treatment Centers</td>
<td>2205 Bridge Street 19137</td>
<td>2007-2017</td>
<td>Northwest</td>
</tr>
</tbody>
</table>
The map in Figure 1 shows all OMMT facility locations that existed in Philadelphia at some point between 2007 and 2017. The solid dots indicate the nine “non-constant” locations, and the open dots indicate the ten “constant” locations.

**Figure 1: Location of OMMT Facilities in Philadelphia 2007-2017**

*Sources: SAMSHA National Directory of Drug and Alcohol Abuse Treatment Facilities; Pennsylvania Department of Health; Drug Enforcement Administration*

As a descriptive matter, it appears that some geographic groups tend to have more crime around OMMT facilities than do other geographic groups. Also, within a geographic group, some OMMT facility locations tend to have more crime relative to the other OMMT facility locations—indeed, independent of whether any OMMT facility is operational at a given location. For example, Figure 2 is a time series plot of the annual total crime count for each of the four facilities that opened or closed in the Center part of Philadelphia. The top panel
shows the crime trends within 200 m of the facility; the bottom panel shows the crime
trends in the area 200 m to 400 m from the facility. The large year-points indicate years when
the OMMT facility was open; the corresponding small year-points indicate years when the
OMMT facility was closed. No visually obvious trend emerges – as most trends seem
unrelated to the opening or closing of the OMMT facility.

**Figure 2: Total Crime Count for OMMT Facilities in the Center of Philadelphia**

![Graph showing crime count for OMMT facilities in the center of Philadelphia.]

*Note: Large year-points refer when a facility is open; small year-points refer to when a facility is closed.*

Similarly, Figure 3 is a time series plot of the annual total crime count for each the
five facilities that opened or closed in the north or northeast parts of Philadelphia. The top
panel shows the crime trends within 200 m of the facility; the bottom panel shows the crime
trends in the area 200 m to 400 m from the facility. Again, no visually obvious pattern
emerges that would signal a relationship between crime and the opening or closing of an OMMT facility.

**Figure 3: Crime Count for North and Northeast Facilities**

Note: Large symbols refer when a facility is open; small symbols refer to when a facility is closed.

These descriptive numbers do not control for overall crime trends in these regions of Philadelphia or in a given year. Consequently, we conducted the following analysis. First, we constructed three Euclidean distance buffer zones around each of the nine “non-constant” OMMT facility locations: a “close” zone within 200 m, a “nearby” zone between 200 and 400 m, and a “distant” zone between 400 and 800 m. These Euclidean distances make no assumptions about land use or transportation patterns (Groff 2011; Kim 2015; MacDonald et al. 2018).
Some of the buffer zones from different OMMTs overlapped. We therefore separated the buffer zones into 156 non-overlapping sections and labeled their proximity to an OMMT facility based on the most proximate OMMT facility if there was an open OMMT facility within 800 m. These non-overlapping sections are the units of analysis in this study. We also assigned each of the 156 sections to its corresponding geographic group (i.e., close, nearby, distant).

The following Poisson regression model assessed whether an OMMT facility had any effect on crime:

$$\log(\lambda_{it}) = \beta_0 + \beta_1 \text{CloseOMMT}_{it} + \beta_2 \text{NearbyOMMT}_{it} + \beta_3 \text{DistantOMMT}_{it} + \gamma_{\text{group}(i),t} + \alpha_i$$

The outcome, $\lambda_{it}$ represents the expected crime count in section $i$ in year $t$. $\gamma_{\text{group}(i),t}$ captures the time trend separately within each of the geographic regions (“Group”). The $\alpha_i$ are the fixed effects for each of the sections. These fixed effects capture all area-specific features that are stable within section $i$ over time.

Of primary interest are the parameters $\beta_1$, $\beta_2$, and $\beta_3$. In years when section $i$ has no OMMT facility within 800 m, the indicators $\text{CloseOMMT}_{it}$, $\text{NearbyOMMT}_{it}$, and $\text{DistantOMMT}_{it}$ are all set to 0. As a result, $\exp(\beta_1)$, $\exp(\beta_2)$, and $\exp(\beta_3)$ represent the multiplicative change in crime attributable to being close (0-200 m), nearby (200-400 m), or distant (400-800 m) from an active OMMT facility location compared to having no OMMT facility. Each of the nine locations that experienced some change in OMMT facility presence between 2007 and 2017 inherently has its own control group – the same place during time periods without an OMMT facility. If the facility has no effect, then we should observe no consistent patterns in crime for the areas with 200 m, within 400 m, or within 800 m.
However, if the opening or closing of an OMMT facility consistently generates a change within 200 m of the facility – particularly if the change is greater than the changes beyond 200 m – then this pattern would be consistent with the facility having an effect on crime. We will be specifically looking for a $|\beta_1| > |\beta_2| > |\beta_3|$ pattern. We estimate the percentage change in crime as $100 \left( e^{\beta} - 1 \right)$.

Generally, significance tests based on regression models, such as the one used in this analysis, make distributional assumptions that may not always be tenable, such as the absence of spatial and temporal correlation (Ridgeway and MacDonald 2017). Permutation tests provide a non-parametric alternative that generates a reference distribution for the parameters of interest (Ludbrook 1994) and have been applied in other criminological research, particularly where it is necessary to overcome possible spatial or temporal correlation (e.g., MacDonald et al. 2016; Johnson et al. 2007). Our null hypothesis is that $\beta_1$, $\beta_2$, and $\beta_3$ are all 0, indicating that crime is independent of presence and proximity of an OMMT facility.

To generate a reference distribution for the statistics of interest, we randomly shuffled 1000 times, per a Monte Carlo simulation, the treatment assignment labels (close, nearby, distant) within each OMMT facility location. For example, if a given section was within 200 m in 2014, it might be randomly assigned a label of 400–800 m for one of the permutations. We recomputed the Poisson regression for each permutation of the labels. This process simulated what the distribution of the treatment effects would look like under the null hypothesis that crime is independent of proximity to an OMMT facility. The estimated $p$-value is the fraction of the results from the permuted data that is as or more extreme than the coefficient derived from the Poisson regression model using the original
data. The resulting permutation test $p$-values account for spatial correlation and non-independence for overlapping buffer zones.

As an additional matter, we repeated the analysis using all 19 OMMT facility locations; this analysis had 220 non-overlapping sections. These non-overlapping sections are the units of analysis. Since the additional 10 “constant” OMMT facilities were open throughout the study period, they offer no information on the treatment effect. Nonetheless, they do help estimate overall long-term crime trends around OMMT facilities, thus indicating the robustness of any finding as to the nine “nonconstant” OMMT facility locations.

**RESULTS**

An OMMT facility produces mixed effects on crime within its immediate vicinity—a significant decrease in total and property crime, but a significant increase in drug and violent crime. These situational-level effects are strongest immediately around an OMMT. A robustness check supports these findings.

First, the analysis using the nine “non-constant” OMMT facility locations demonstrated that within 200 m of an OMMT facility, there is a significant decrease in total crime and property crime, but a significant increase in violent crime and drug crime. Total crime and property crime decreased by approximately 18% and 29%, respectively. By contrast, within that same distance, violent crime and drug crime increased by approximately 7% and 31%. As to offense types responsible for the increase in violent crime, robberies experienced a 10% increase, and assaults experienced a 9% increase. There was no significant change in incivility crimes within 200 m. Table 2 shows the results of the analysis using the nine OMMT facilities that opened or closed during the study period along with
their permutation test \( p \)-values. To indicate the practical significance of the estimated effects, we include in the second column the average number of crimes per year within 200 m of any continually open OMMT facility.

**Table 2: Percent change in crime (and permutation test \( p \)-value) associated with having an open OMMT facility by distance from the facility, estimated using the nine Philadelphia OMMT facilities that opened and closed during the study period**

<table>
<thead>
<tr>
<th>Category</th>
<th>Average number of crimes per year within 200 m of OMMT Facility</th>
<th>0-200 m</th>
<th>200-400 m</th>
<th>400-800 m</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>4037</td>
<td>-17.8% (0.01)*</td>
<td>-8.6% (0.38)</td>
<td>-3.8% (0.89)</td>
</tr>
<tr>
<td>Property</td>
<td>1936</td>
<td>-28.8% (0.001)*</td>
<td>-11.4% (0.33)</td>
<td>-5.5% (0.97)</td>
</tr>
<tr>
<td>Incivilities</td>
<td>513</td>
<td>12.1% (0.56)</td>
<td>10.4% (0.84)</td>
<td>7.0% (0.56)</td>
</tr>
<tr>
<td>Total Violent</td>
<td>667</td>
<td>7.0% (0.001)*</td>
<td>-5.2% (0.43)</td>
<td>-9.8% (0.54)</td>
</tr>
<tr>
<td>Assaults</td>
<td>469</td>
<td>8.7% (0.001)*</td>
<td>-4.4% (0.33)</td>
<td>-10.7% (0.55)</td>
</tr>
<tr>
<td>Robberies</td>
<td>157</td>
<td>10.3% (0.04)*</td>
<td>-0.3% (0.35)</td>
<td>-8.8% (0.80)</td>
</tr>
<tr>
<td>Drug</td>
<td>158</td>
<td>30.8% (0.03)*</td>
<td>-11.1% (0.62)</td>
<td>-6.1% (0.79)</td>
</tr>
</tbody>
</table>

*Note: Percentage change computed as \( 100 \left( e^{\hat{\beta}j} - 1 \right) \). Values in parentheses are the permutation test \( p \)-values. \( P \)-values that are less than 0.05 are marked with an asterisk.*

Although not significant, the effects on crime between 200 m and 800 m support the existence of a causal relationship between OMMT facilities and crime. Several characteristics of a statistical association may reasonably support a causal interpretation (Wakeford 2015). For example, a causal relationship may exist where an effect tends to be greater as the level of exposure increases. The results demonstrate a largely consistent gradient effect. For the “All,” “Property,” and “TotalViolent” categories, the strongest effects are within 200 m, and
the weakest effects are beyond 400 m; the 200–400 m area experienced effects in between that of the 0–200 m area and the 400–800 m area.

Table 3 provides estimates with all 19 facility locations. These results support the robustness of the analysis that used only the nine locations. For all 19 locations within 200 m, there was a significant 22% decrease in property crime and a significant 18% increase in violent crime. As for violent crime, there was a significant 19% increase in assaults, but no significant increase in robberies. Estimated effects for all other crime categories were null. The estimates for the 200–400 m area are in the same direction, but the results are not statistically significant.

Table 3: Percent change in crime (and permutation test p-value) associated with having an open OMMT facility by distance from the facility, estimated using all 19 Philadelphia OMMT facilities that were open at some point during the study period

<table>
<thead>
<tr>
<th></th>
<th>0-200 m</th>
<th>200-400 m</th>
<th>400-800 m</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>-8.3%</td>
<td>0.8%</td>
<td>3.3%</td>
</tr>
<tr>
<td></td>
<td>(0.13)</td>
<td>(0.77)</td>
<td>(0.80)</td>
</tr>
<tr>
<td>Property</td>
<td>-22.0%</td>
<td>-4.3%</td>
<td>0.3%</td>
</tr>
<tr>
<td></td>
<td>(&lt;0.01)*</td>
<td>(0.54)</td>
<td>(0.99)</td>
</tr>
<tr>
<td>Incivilities</td>
<td>16.0%</td>
<td>13.3%</td>
<td>9.0%</td>
</tr>
<tr>
<td></td>
<td>(0.40)</td>
<td>(0.72)</td>
<td>(0.58)</td>
</tr>
<tr>
<td>Total Violent</td>
<td>17.9%</td>
<td>6.1%</td>
<td>-1.6%</td>
</tr>
<tr>
<td></td>
<td>(&lt;0.01)*</td>
<td>(0.39)</td>
<td>(0.50)</td>
</tr>
<tr>
<td>Assaults</td>
<td>19.0%</td>
<td>6.5%</td>
<td>-3.0%</td>
</tr>
<tr>
<td></td>
<td>(&lt;0.01)*</td>
<td>(0.25)</td>
<td>(0.46)</td>
</tr>
<tr>
<td>Robberies</td>
<td>15.5%</td>
<td>7.6%</td>
<td>-3.5%</td>
</tr>
<tr>
<td></td>
<td>(0.10)</td>
<td>(0.37)</td>
<td>(0.66)</td>
</tr>
<tr>
<td>Drug</td>
<td>40.8%</td>
<td>-2.6%</td>
<td>7.3%</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(0.51)</td>
<td>(0.81)</td>
</tr>
</tbody>
</table>

Note: Percentage change computed as $100(e^{\hat{R}_j} - 1)$. Values in parentheses are the permutation test p-values. P-values that are less than 0.05 are marked with an asterisk.
As a falsification test, we randomly selected nine of the ten OMMT facilities that operated continuously during the study period. We took the nine OMMT facilities used in our actual analysis (OMMT facility locations that were “open” some years and “closed” in others) and applied their open/closed time series to the randomly selected continuously operating OMMT facilities. That is, even though an OMMT facility was continuously operating between 2007 and 2017, we acted as if there were discontinuities in their operation. We then analyzed only the falsified data (9 OMMT facilities truly open throughout, but analyzed as if their status changed) using the same methodology used on the genuine data to produce Table 2. We repeated this process 300 times, collecting the 15 p-values (for All, Property, Incivilities, Total Violent, and Drug categories) analogous to those shown with the nine-location analysis.

Under the null hypothesis, p-values have a Uniform(0,1) distribution. The heavy curve in Figure 4 shows the quantile-quantile plot comparing the p-values from the nine-location analysis from Table 2 to the quantiles of a uniform distribution.
Figure 4: Quantile-quantile plot comparing the falsification $p$-values and observed $p$-values to the uniform distribution

Note: Heavy line is the quantile-quantile plot from the real data. The four dots mark the four $p$-values less than 0.05. The diagonal line marks what we would expect if $p$-values had a Uniform(0,1) distribution. The grey areas give pointwise 95% regions (light grey) and 80% regions (darker grey) of the quantile-quantile plots from the falsification analysis.

If OMMT facilities had no effect, then this curve should follow the light diagonal line. However, the smallest four $p$-values we observed in our data, shown with dots, are substantially lower than the diagonal line. The lighter gray area shows the pointwise 95% region where the quantile-quantile plots of our 300 replications of the falsification test were. The darker region shows the pointwise 80% region for the quantile-quantile plots. The four smallest $p$-values observed in our actual data fall outside the region of $p$-values that we observe when applying the same method to OMMT facilities that, in truth, had no change in
operational status. This is further evidence that our observed effect is actually due to the opening of an OMMT facility.

**DISCUSSION**

Using Philadelphia data, this study set out to determine the effect that OMMT facilities exert on crime on a place-based level. Within 200 m of an OMMT facility, there is a significant decrease in total crime and property crime, but a significant increase in violent crime and drug crime. Specifically, within 200 m, total crime and property crime decreased by approximately 18% and 29%. By contrast, within 200 m, violent crime and drug crime increased by approximately 7% and 31%. There was no significant change in incivility crimes within 200 m. Given that all effects occur within 200 m, the effects are on a situational level—rather than a community level.

Several considerations may explain these results. Previous research has found that opioid addiction may prompt individuals to engage in property crime to financially support their addictions, but that OMMT reduces OUD-related offending. Our results on the place-based level are consistent with this previous clinical research.

These empirical results appear to support anecdotal evidence of drug dealing outside OMMT facilities. Admittedly, our analysis used incident-level data, rendering any increase in drug offenses potentially attributable to more intense policing and citizen reporting of drug offenses around OMMT facilities. Yet, intensified policing and citizen reporting would perhaps also have resulted in increased incivility offenses such as prostitution, vagrancy, and littering – but no such increase occurred.

The slight but significant increase in violent crimes in the 0–200 m area is notable. There is a significant increase in both robberies and assaults. It may be that the repeated and
daily social interactions among patients potentially create interpersonal conflicts, which lead to offenses such as assaults. Or, consistent with the routine activities theory, it is possible that patients in transit to OMMT are more likely robbed, assaulted, or otherwise victimized.

Importantly, however, this study used incident-level data. Compared to other bystanders, OMMT facility medical personnel and security staff may simply be more inclined to report any violent (or potentially violent) conduct to the police for the wellbeing of their patients and the community. Therefore, as the routine activities theory and the problem analysis triangle would suggest, OMMT facility personnel may function as effective situational-level guardians or “place managers” (Madensen and Eck 2012). Future research should explore the reasons for this increase.

Nonetheless, total crime significantly decreased within 200 m. Admittedly, this analysis does not address the effect on crime in all of Philadelphia; instead, it addresses only the crime effect in the specific areas around OMMT facilities. Yet, from a place-based criminological perspective, OMMT facilities are not necessarily criminogenic. Instead, consistent with previous clinical-level research, OMMT facilities may reduce OUD-related offending because they provide OUD sufferers with access to much-needed treatment. Also, because OMMT facilities are subject to intense governmental regulation, they may be less criminogenic than one might presume. This intense governmental regulation requires OMMT facility staff to be effective place managers, perhaps causing, as an ancillary matter, total crime reductions around OMMT facilities.

The analysis in this paper should be replicated in other large cities, as well as in suburban and rural areas that have experienced the introduction or closure of an OMMT facility. Also, an increasing number of physicians’ offices have begun offering non-
methadone MAT such as buprenorphine, for OUD; thus, some geographic areas may have a
greater density of these physicians’ offices than do other areas, controlling for factors such as
relative OUD severity. The question of whether the density of these providers exerts any
effect on crime merits further inquiry.

As a final consideration, other opioid-epidemic-related-environmental changes, such
as mobile syringe exchange programs, comprehensive user engagement sites, and the cleanup
of encampments frequented by the OUD homeless, have recently emerged. These
developments merit empirical exploration of what effect, if any, they have on crime in
surrounding areas. This study will hopefully provide a starting point for future research.

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ABSTRACT

This study evaluates whether remediating blighted vacant urban land reduced firearm shooting incidents resulting in injury or death. We use data collected from a previous cluster randomized controlled trial in which we assigned 541 randomly selected vacant lots in Philadelphia, Pennsylvania, to 110 geographically contiguous clusters and randomly assigned these clusters to a greening intervention, a less-intensive mowing and trash cleanup intervention, or a no-intervention control condition. The random assignment to the trial occurred in April and June 2013 and lasted until March 2015. In a difference-in-differences analysis, we assessed whether the two treatment conditions relative to the control condition reduced firearm shootings around vacant lots.

During the trial, both the greening intervention, $-6.8\%$ (95% confidence interval (CI) $= -10.6\%, -2.7\%$), and the mowing and trash cleanup intervention, $-9.2\%$ (95% CI $= -3.2\%, -4.8\%$), significantly reduced shootings. There was no evidence that the interventions displaced shootings into adjacent areas.

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8 This trial was registered with the International Standard Randomized Controlled Trial Number (study ID ISRCTN92582209; [http://www.isrctn.com/ISRCTN92582209](http://www.isrctn.com/ISRCTN92582209)). (American Journal of Public Health, 2019; 109:140–144. doi:10.2105/AJPH.2018.304752). This study was funded in part by the National Institutes of Health (grant R01AA020331) and the Centers for Disease Control and Prevention (grant R49CE002474).
Remediating vacant land with inexpensive, scalable methods, including greening or minimal mowing and trash cleanup, significantly reduced shootings that result in serious injury or death. Cities should experiment with place-based interventions to develop effective firearm violence-reduction strategies.

**INTRODUCTION**

Firearms are responsible for three quarters of all homicides in the United States (UCR, 2016). Homicides committed with firearms are among the leading causes of death in large central metropolitan areas for males aged 15 to 34 years (CDC, 2016). In urban areas, such as Philadelphia, Pennsylvania, firearm violence is often concentrated in impoverished neighborhoods (Beard et al., 2017; Branas et al., 2016). Philadelphia had a homicide rate of 17.86 per 100,000 in 2015, higher than the homicide rates of Los Angeles, California; New York, New York; Phoenix, Arizona; and Houston, Texas. (UCR, 2015). Between 2011 and 2015, there were more than 6,000 shooting incidents in Philadelphia, and approximately one-fifth of these incidents resulted in the victim’s death (Philadelphia Police Department, 2018).

Vacant and blighted land in US cities is often concentrated in the same neighborhoods that are at greatest risk for firearm violence (Garvin et al., 2018). Like many older deindustrialized cities in the United States (Pearsall et al, 2014), Philadelphia suffers from unkempt vacant lots in impoverished neighborhoods. Approximately one in thirteen Philadelphia blocks are 50% or more vacant land (OpenDataPhilly, 2017). Consistent with other urban areas (Weisburd, 2015; Braga et al., 2010), gun violence is disproportionately concentrated over time in a small number of Philadelphia blocks.

Between 2011 and 2015, approximately 30% of shootings in Philadelphia occurred in only 6% of city block groups (112 of 1816). In a systematic review of quasi-experimental
research, Kondo et al. found that remediating vacant land may be an effective approach to addressing the hyperconcentration of gun violence in cities (2018). Additionally, in a citywide cluster randomized controlled trial of vacant land remediation in Philadelphia, Branas et al. found that gun assaults were reduced after lots were treated (2018). However, most gun assaults do not result in an actual shooting that causes serious injury or death. We extended the cluster randomized controlled trial of vacant land restoration by estimating the effect of remediating vacant lots on firearm shootings that resulted in serious injury or death during the trial.

**METHODS**

We used data from a vacant lot cluster randomized controlled trial (Branas et al. 2018) and the Philadelphia Police Department (Philadelphia Police Department, 2018) to conduct a difference-in-differences analysis of the effect of vacant land remediation on firearm shooting incidents. We compiled a master list of vacant lot data from Philadelphia administrative records in January 2011 (Branas et al., 2018). We randomly selected 541 vacant lots that were “blighted” per municipal ordinance for the randomized controlled trial. Eligible lots were included if they (1) exhibited actual signs of distress, such as illegal dumping, abandoned cars, or unmanaged vegetation; and (2) had been abandoned, as confirmed through contact or nonresponse from the owner of record. The city owned some of the lots in the randomized controlled trial. We excluded lots that had insufficient blight, had an area greater than 510 square meters, or were paved parking lots. The sample size was determined on the basis of detecting a small effect size with power at 0.80, a set to 0.05, and an anticipated within-lot intraclass correlation coefficient (ICC) of 0.20 (Branas et al. 2018).
The observed within-lot and within-cluster ICCs were 0.24 and 0.25, respectively, with an actual power of 0.86 power at $\alpha$ set to 0.05.

Vacant lot clusters served as the intervention unit. We separated the 541 lots into 110 clusters; lots within a cluster were geographically proximate to one another. We randomly assigned each of the 110 clusters to one of three study arms: (1) a greening intervention (“greening”), (2) a less-intensive mowing and trash cleanup intervention (“mowing”), or (3) no intervention (“control”). The greening intervention involved removing trash and debris, grading the land, planting new grass and a small number of trees to create a parklike setting, installing low wooden perimeter fences, and regularly maintaining the lot (Branas et al., 2018). The mowing intervention involved mowing existing grass and weeds, removing trash and debris, and regularly maintaining the lot.

A repeat randomization procedure ensured that the clusters were balanced on potential confounding variables, including the total area and mean separating distance of the vacant lots, the resident population, and the number of Summary Reporting System Part I serious violent and property crimes, such as robbery and burglary. We used the random assignment of treatment by cluster to guard against potential spillover and contamination effects across the three (3) study arms. Of the 110 vacant lot clusters, we randomly assigned 37 (206 lots) the greening intervention, 36 (174 lots) the mowing intervention, and 37 (161 lots) the no-intervention control. We randomly assigned vacant lots to these conditions between April and June 2013 (post). All lots remained in the trial until March 2015. Starting in April 2015, the control lots were scheduled to receive remediation in the future (all treated) (Branas et al., 2018).
The Philadelphia Police Department provided data for all recorded (n= 6093) shooting incidents that occurred in the city between January 2011 and December 2015, excluding officer-involved shootings (Philadelphia Police Department, 2018). Data for 2015 were accessible from the Philadelphia Open Data Web site; we obtained the 2011 to 2014 data through an informal “right-to-know” request. The data included the date, time, and address of the shootings. We geocoded the addresses of shootings to exact latitude–longitude coordinates for all but two of the recorded shootings. Victims in the data were wounded in the head (n=915; 15.0%), limb or shoulder (n=2333; 38.3%), pelvic area (n = 287; 4.7%), torso (n=1041; 17.1%); or multiple locations (n=1517; 24.9%). Approximately 81% (n=4907) of shootings were nonfatal. The shooting incidents that the police collected are consistent with records found in hospital data for Philadelphia (Branas et al. 2008).

We calculated point-based and area-based geographic metrics for shootings. We used the latitude–longitude locations of each shooting to calculate a kernel density estimate of the monthly rate of shootings per square kilometer at the centroid of each lot, using a bandwidth of 500 meters (m). The kernel density provides a smoothed estimate of the monthly shootings per kilometer around each vacant lot. This approach assigns more weight to shootings that occur closer to a vacant lot (Waller & Gotway, 2004) and provides a lot-specific estimate of shootings. To measure area-based metrics of monthly shootings, we created buffers around each of the 110 vacant lot clusters. We created 2 buffer zones. The first zone encompassed 300 m around each cluster and captures the effect of the vacant land remediation on shootings in the nearby areas. The second zone encompassed the area 300 m to 600 m from the cluster (the area within 300 m surrounding the first zone). The second
zone is where we might observe nearby displacement if the greening or mowing interventions pushed shootings into nearby areas.

Figure 5 shows the geographic placement of the interventions by cluster and the kernel density of shooting incidents per year before randomization (January 2011 through March 2013).

**Figure 5: Average location of vacant lot clusters and shooting density: Philadelphia, PA, January 2011-March 2013**

We relied on a difference-in-differences mixed-effects regression model to estimate the effect of the greening and mowing interventions. We used two regression models: one
for the point-based (kernel density per lot) estimate of shootings and one for the area-based (within 300 m of each cluster) number of shootings.

For each regression model, we analyzed the relationship between the treatments and the timing of the treatments on either the point-based kernel density estimate of the shooting rate or the area-based number of shootings in lot \( i \) in studymonth \( t \) (\( Y_{it} \)). In each regression model, we included terms for each treatment arm to control for pretreatment differences relative to the no-intervention (control) study arm (\( \beta_1 \) and \( \beta_2 \)), terms to capture differences in the shooting rate for all lots in the trial period (\( \beta_3 \)) and after the trial ended (\( \beta_4 \)), and interaction terms whose coefficients provide the difference-in-differences estimate of the effect of the greening and mowing interventions during the trial period (\( \beta_5 \) and \( \beta_6 \), respectively) and after the trial ended (\( \beta_7 \) and \( \beta_8 \)) relative to the preperiod. The difference-in-differences estimate of the greening and mowing interventions during the trial (\( \beta_5 \) and \( \beta_6 \), respectively) are the causal estimates of the treatment. Each regression model is estimated as:

\[
Y_{it} = \beta_0 + \beta_1 \text{Greening}_i + \beta_2 \text{Mowing}_i + \beta_3 \text{Post}_t + \beta_4 \text{AllTreated}_t + \beta_5 \text{Greening}_i \times \text{Post}_t + \beta_6 \text{Mowing}_i \times \text{Post}_t + \beta_7 \text{Greening}_i \times \text{AllTreated}_t + \beta_8 \text{Mowing}_i \times \text{AllTreated}_t + \alpha_m(t) + \delta_{s(i)} + \xi_{c(i)} + \epsilon_{it}
\]

The regression models also included controls for seasonal trends using indicator terms, \( \alpha_m(t) \), where \( m(t) \) denotes the month \((1, \ldots, 12)\); differences by region of the city using indicator terms, \( \delta_{s(i)} \), where \( s(i) \) denotes the index of lot \( i \)’s geographic region \((1, \ldots, 4)\). The regression model controls for dependence caused by cluster randomization by including a group-level random effect term, \( \xi_{c(i)} \), where \( c(i) \) denotes the cluster index for lot \( i \) \((1, \ldots, 110)\). For point-based estimates, we used a linear regression model because the kernel density are weighted counts and not integers. For the area-based analysis, we estimate a Poisson
regression model, as the outcome is a count of shootings. For ease of interpretation, we converted coefficients into the percentage change in shootings.

**RESULTS**

Table 4 shows the descriptive statistics for the average monthly rate of shootings per square kilometer for the greening, mowing, and control conditions in the pretreatment, posttreatment, and all-treated periods, as well as the estimates from the difference-in-differences regression models. The greened lots tended to have a slightly higher average shooting rate in the baseline period (pre), which we accounted for in the regression estimates. Shooting rates were lower during the trial period (post) for all groups during the trial, but the largest decreases occurred in the greening and mowing interventions. All groups experienced a rise in shootings in the period after the trial ended (all treated), consistent with the 6-month citywide increase in shootings of 77% between May and October 2015.

The results from the difference-in-differences estimates show that the monthly shootings per square kilometer during the trial (post) relative to the baseline period (pre) was $-6.8\%$ (95% confidence interval (CI) = $-10.6\%, -2.7\%; p < 0.01$) lower for the greening intervention and $-9.2\%$ (95% CI = $-13.2\%, -4.8\%; p < 0.001$) lower for the mowing intervention. A Wald test (Judge et al. 1985) of the difference-in-differences estimates during the trial (post) for the greening and mowing interventions were jointly significant ($p < 0.001$), further corroborating that the vacant lot remediation caused reductions in shootings. The results for the area-based analysis show a significant reduction in the monthly number of shootings in the treatment zone (0–300 m buffer) around clusters that received the greening intervention by $-10.6\%$ (95% CI = $-20.2\%, 0.2\%$) during the trial (post). For lots that received the mowing intervention, there was a nonsignificant, $-8.4\%$ (95% CI = $-19.1\%$,
3.8%), reduction in the treatment zone during the trial (post). The analysis of the displacement zone (300–600 m) shows that shootings were non-significantly lower by −3.3% (95% CI = −11.6%, 5.8%) in the areas adjacent to the greening intervention and were significantly lower by −13.6% (95% CI = −22.1%, −4.2%) in areas adjacent to the mowing intervention during the trial. These results suggest spillover benefits of vacant lot remediation rather than displacement.

Table 4: Descriptive Statistics and Difference-in-Differences Results on Shooting Outcomes: Philadelphia, PA, January 2011–December 2015

<table>
<thead>
<tr>
<th>Group</th>
<th>N=</th>
<th>Pre</th>
<th>Post</th>
<th>% Change Post-Pre vs. Control (95% CI)</th>
<th>p-value</th>
<th>All Treated</th>
<th>% Change Treated-Pre vs. Control (95% CI)</th>
<th>All vs. Control (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point-based (per square kilometer)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greening</td>
<td>12,360</td>
<td>1.25</td>
<td>0.98</td>
<td>-6.8% (-10.6%, -2.7%)</td>
<td>&lt;0.01</td>
<td>1.25</td>
<td>-9.7% (-13.5%, -5.5%)</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Mowing</td>
<td>10,440</td>
<td>1.20</td>
<td>0.91</td>
<td>-9.2% (-13.2%, -4.8%)</td>
<td>&lt;0.001</td>
<td>1.15</td>
<td>-13.7% (-17.6%, -9.3%)</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>9,660</td>
<td>1.09</td>
<td>0.89</td>
<td></td>
<td></td>
<td>1.22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment zone (0-300 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greening</td>
<td>12,360</td>
<td>0.33</td>
<td>0.26</td>
<td>-10.6% (-20.2%, 0.2%)</td>
<td>0.05</td>
<td>0.34</td>
<td>-16.2% (-27.3%, -3.5%)</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>Mowing</td>
<td>10,440</td>
<td>0.26</td>
<td>0.21</td>
<td>-8.4% (-19.1%, 3.8%)</td>
<td>0.17</td>
<td>0.25</td>
<td>-22.1% (-33.5%, -8.8%)</td>
<td>≤0.001</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>9,660</td>
<td>0.25</td>
<td>0.23</td>
<td></td>
<td></td>
<td>0.32</td>
<td></td>
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<td>Displacement zone (300-600 m)</td>
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<td></td>
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<tr>
<td>Greening</td>
<td>12,360</td>
<td>0.54</td>
<td>0.46</td>
<td>-3.3% (-11.6%, 5.8%)</td>
<td>0.47</td>
<td>0.57</td>
<td>-13.3% (-22.6%, -2.9%)</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>Mowing</td>
<td>10,440</td>
<td>0.36</td>
<td>0.28</td>
<td>-13.6% (-22.1%, -4.2%)</td>
<td>0.01</td>
<td>0.35</td>
<td>-21.2% (-30.8%, -10.2%)</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>9,660</td>
<td>0.38</td>
<td>0.34</td>
<td></td>
<td></td>
<td>0.48</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Note: N= number of lots in each study arm (greening=206, mowing=174, no-intervention=161) × 60 months. Pre=pre-period (27-29 months); Post=post-period (21-23 months); All-treated=9-month period after trial ended when control lots were scheduled for remediation.
**DISCUSSION**

To our knowledge, this is the first citywide randomized controlled trial to assess whether vacant land remediation reduced firearm shootings that result in injury requiring medical treatment or death. The remediation of vacant land through greening or mowing and trash pickup significantly reduced shooting incidents around lots. These findings provide strong causal evidence in support of place-based initiatives that remediate the built environment as an effective gun violence–reduction strategy (Branas et al. 2016; Kondo et al. 2017).

Several mechanisms may explain the reductions in shootings. In ethnographic research from the randomized controlled trial, we found that newly greened vacant lots encourage residents to venture outside their homes for recreation and socialization and that previously unkempt lots were often used for illegal activities, including drug dealing (Branas et al. 2018). Routine activities theory posits that predatory crime is most likely to occur when a motivated offender, a desirable target, and a lack of effective guardians converge in time and place (Cohen et al. 1979). The increased presence of residents using these spaces may have provided effective guardianship and reduced the opportunities for altercations and shootings associated with drug dealing (Nanney et al. 2015; Sevigny et al. 2015; Hohl et al. 2017; Strom et al. 2007) or other negative outside behaviors.

Consistent with a theory of collective efficacy, the remediated vacant lots may have also promoted a sense of social cohesion and a willingness to act for the common good, thus normalizing nonviolent behavior in these spaces (Sampson et al. 1997). The removal of trash and debris and the maintenance of these vacant lots reduced the physical signs of disorder and, consistent with the broken windows theory, may have promoted a greater
sense of social order and control of these vacant spaces and adjoining areas (Kelling & Wilson, 1982).

**Limitations**

Several study limitations prevented us from knowing the causal mechanisms that produced the reductions in shooting incidents. Although we were able to randomly assign vacant lot clusters to remediation, this random assignment does not account for other activities that the remediation of vacant land could have facilitated. For example, law enforcement may have been able to more effectively police gun “hot spots” because of better lines of sight once vacant lots were remediated. Similarly, the remediation of vacant land may have empowered civilian-based efforts, such as those of block captains, to organize more neighborhood events, pick up trash on the streets, and increase community initiatives to maintain safe and healthy blocks.

Additionally, we were able to isolate the effect of vacant land remediation only during the trial period. After the trial ended, control lots became eligible for remediation, and other lots in the areas nearby could have been remediated. This limits what we can say after the trial ended. The fact that remediated vacant lots did not experience as large an increase as control lots during a time when shootings increased citywide, however, suggests that the intervention produced lasting gun violence–reduction benefits.

**Conclusions**

Firearm violence exacts a substantial financial toll on urban communities. By conservative estimates, between 2006 and 2014, the cost of initial hospitalizations for firearm-related injuries averaged more than $700 million annually, creating financial burdens for government insurance programs and low-income paying patients (Spitzer et al. 2017).
These financial estimates do not include the social and emotional costs that firearm violence exacts on gunshot victims, their families, and communities (Taichman et al. 2015). Remediating unkempt vacant lots with inexpensive, scalable methods significantly reduced firearm shooting incidents in Philadelphia. Other cities should experiment with similar place-based interventions to develop effective firearm violence–reduction strategies.

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THE EFFECT OF A DEATH-IN-POLICE-CUSTODY INCIDENT ON COMMUNITY RELIANCE ON THE POLICE

ABSTRACT

This study tests whether a death-in-police-custody incident, Freddie Gray’s April 2015 death while in Baltimore Police Department (BPD) custody, affected community reliance on the police, as measured through citizen calls requesting police assistance for non-criminal caretaking matters. This study used BPD incident-level call data (2014-2017) concerning non-criminal caretaking matters (N=237,657). Counts of non-criminal caretaking calls were aggregated by week for each of 279 unique sections derived from census-tract and police district boundaries.

This study also devised a Negative Community-Police Relationship Index Score that operationalized the risk of a negative community-police relationship for each of the sections. A Poisson regression model assessed whether the death-in-police-custody incident affected the volume of non-criminal caretaking calls to the police and whether that effect was strongest in sections at high-risk of a negative community-police relationship. A falsification test used pocket-dialed emergency calls to verify that any observed trends were not the result of overall telephone usage.

There was no statistical evidence that the death-in-police-custody incident produced any changes in community reliance on the police for non-criminal caretaking matters, even in high-risk sections. A supplemental analysis using calls for criminal matters yielded similar results. As the falsification test demonstrated, the observed trends were not the result of overall telephone usage. Despite a divisive death-in-police-custody incident, citizens were
still willing to enlist police assistance. To that extent, the caretaking role of the police may be an important mechanism to strengthen public trust in the police, particularly in marginalized neighborhoods vulnerable to strained community-police relations.

**INTRODUCTION**

An individual’s race, age, socio-economic status, neighborhood, prior police interactions, and awareness of negative police-citizen encounters can influence his or her attitudes towards the police (MacDonald, Stokes, Ridgeway, & Riley, 2007; Carr, Napolitano, & Keating, 2007; Weitzer & Tuch, 2005; Jefferis, Kaminski, Holmes, & Hanley, 1997). It is reasonable to expect that these attitudes affect an individual’s willingness to seek police assistance (Bennett, 2004; Baumer, 2002). To that extent, highly publicized negative police-citizen interactions may decrease community willingness to report criminal activity to the police (Desmond, Papachristos, & Kirk, 2016) or may have no effect (Zoorob, 2019).

It is possible, however, that any changes in this willingness to report criminal activity to the police may also be the product of other (endogenous) factors, such as crime increases, shifts in how law enforcement reacts to crime, and generalized social norms antithetical to governmental authority (*e.g.*, stop snitching). In short, when community reporting of criminal activity to the police is the outcome measure, it may be difficult to disentangle the relationships among police behavior, community attitudes and actions, and other factors that are endogenously related to a community’s willingness to rely on the police for assistance.

By contrast, community reliance on the police for non-criminal caretaking services may provide a measure of community willingness to seek police assistance that is more independent of these endogenous factors. These non-criminal caretaking services include,
for example, disabled vehicles, wellbeing checks on elderly residents, or assisting pets locked in vehicles.

As an additional matter, a divisive high-profile event, such as a high-profile death-in-police-custody incident, may create a sudden adverse shift in community attitudes (Weitzer, 2002); but see (White, Weisburd, & Wire, 2018). A divisive high-profile event may also affect willingness to rely on the police (Desmond, Papachristos, & Kirk, 2016); but see (Zoorab, 2020). The inherently “pre-and-post” nature of these events creates a temporary disruption of the status quo relationship between the police and the community, providing a means for researchers to isolate the effect of police conduct on community perceptions and behavior.

This study assesses whether a highly-publicized death-in-police-custody incident affected community willingness to request police aid, with calls for non-criminal caretaking services as the primary outcome measure. In April 2015, a Baltimore resident, Freddie Gray, died in Baltimore Police Department custody, prompting two weeks of civil unrest and directing national scrutiny towards Baltimore policing practices. Thus, this quasi-experiment takes advantage of a single death-in-police custody event that constituted an intense manifestation of police-community discord.

If, as prior research has concluded, Google searches for phrases such as “police brutality” are measures of public preoccupations with issues of police behavior (Gross & Mann, 2017), then Gray’s death and the resulting unrest were certainly far from inconsequential events for Baltimore residents. In a decade of Google Trends data dating as far back as January 2008, searches in the Baltimore area for the phrases “police brutality” and “Baltimore police” were at their highest point in April 2015. As qualitative research concerning police perceptions revealed, BPD officers reported that after the 2015 unrest,
community-police relationships deteriorated, particularly in some areas of Baltimore and among younger residents (Crime and Justice Institute, 2019).

Previous studies (Desmond, Papachristos, & Kirk, 2016; Zoorob, 2019) of citizen willingness to request police assistance in the aftermath of high-profile use-of-force controversies have relied on incidents that predate the second decade of the twenty-first century. Certainly, controversies surrounding police behavior, especially within the context of race, have existed in American society throughout much of the twentieth and early twenty-first centuries. The 1967 President’s Crime Commission report noted difficulties with police-community relations, particularly in marginalized urban neighborhoods (President's Commission on Law Enforcement and Administration of Justice, 1967). Incidents such as the beating of Rodney King (1991) and the fatal shooting of Amadou Diallo (1999) ignited intense public discourse concerning police abuse of force against minorities in the 1990s. Yet, since 2010, social media and the increasing presence of social-media supportive technology (e.g., smartphones with improved video-recording capabilities) facilitated an instantaneous and contagion-like dissemination of ideas, visual images, and emotions in a way traditional media, including online news sources, had been inherently incapable of doing (Gallagher, Reagan, Danforth, & Dodds, 2018; Bejan, Hickman, Parkin, & Pozo, 2018; Ince, Rojas, & Davis, 2017; Bock, 2016; Brown G., 2015).

Also, through its use of calls to the police for non-criminal caretaking matters, this study implicitly addresses a function of the police that is distinct from law enforcement. This non-criminal caretaking aspect of policing has remained underexplored in existing empirical research. As some researchers have hypothesized, the non-criminal caretaking role of police may strengthen police-community relationships and, more generally, create positive
community perceptions of the police (Furstenberg & Wellford, 1973). Given the importance of community-oriented policing strategies in twenty-first century policing (Mastrofski & Willis, 2010), empirical assessments of the non-criminal caretaking functions of the police may therefore be especially valuable.

Additionally, although American policing has historically entailed a non-criminal caretaking dimension (President's Commission on Law Enforcement and Administration of Justice, 1967), this dimension continues to evolve, now encompassing responsibilities such as administering opioid reversal drugs (Davis, Ruiz, Glynn, Picariello, & Walley, 2014) and transporting severely injured violent crime victims to the hospital (Band, et al., 2014). Thus, societal use of police officers that transcends a traditional law enforcement role presents important consequences not for social order and public health (Wood, Taylor, Groff, & Ratcliffe, 2015).

This study assesses whether a highly-publicized death-in-police-custody incident affected community willingness to request police assistance, with calls for non-criminal caretaking matters as the primary outcome measure. If these calls decreased, then it would demonstrate that the incident prompted a loss of public willingness to seek police assistance. If no change or an increase in the frequency of these calls occurred, then it would suggest that the public, despite the strained community-police relationship, were still willing to enlist police assistance.

**BACKGROUND**

On the morning of Sunday, April 12, 2015, Baltimore Police Department (BPD) officers arrested Gray, a twenty-five-year-old black male, for allegedly possessing a switchblade (Department of Justice, 2017). Six police officers from the Western District, one
of Baltimore’s nine police districts, were involved in Gray’s arrest. By the end of an approximately 40-minute ride in a police van, Gray was unconscious, suffering from severe spinal cord injuries; he remained hospitalized until his death on April 19. Meanwhile, on April 18, Baltimore residents began protesting against the police, with demonstrations spreading to the area outside Baltimore City Hall (Cox, Alexander, & Halsey, 2015; Hurdle & Slotnik, 2015).

By April 25, however, the protests had turned violent (Stolberg & Babcock, 2015). Throughout West Baltimore and downtown areas, crowds destroyed property, looted stores, and injured police officers (Wen, et al., 2015; Fenton & Green, 2015; Harris, 2015). The Maryland governor called in the National Guard, and the City of Baltimore imposed a curfew (Stolberg, 2015; Morgan & Pally, 2016). The protests and riots in Baltimore had largely subsided towards the end of the first week of May. On May 1, the Baltimore State’s Attorney Office charged all six officers with offenses that included homicide (Department of Justice, 2017). Yet, by the summer of 2016, these charges resulted in acquittals or dismissals.

In response to the events of spring 2015, the U.S. Department of Justice conducted an investigation of the BPD. Issuing a report in August 2016, DOJ determined that the BPD had engaged in a pattern and practice of unconstitutional conduct (City of Baltimore, 2018; Department of Justice, 2016). Thus, the BPD underwent some remediation efforts in 2016 and 2017. For example, in April 2017, the City of Baltimore and DOJ entered into a consent decree, requiring that the BPD had to work on reforms such as building community trust and ensuring professional conduct during behavioral health crises. The DOJ investigation had revealed that BPD officers responding to behavioral health crises had not received proper training, often creating situations involving unnecessary and disproportionate
physical force against individuals with behavioral health challenges (Department of Justice, 2016)

According to some observers, the BPD, post-2015, has engaged in de-policing, as measured by a reduction in officer-initiated actions (Heath, 2018; Rector, 2017; Oppel, 2015). Police officers generally learn about criminal activity through either their own observations or if a citizen reports it to them (Black, 1973). Although BPD officers have continued to answer citizen requests for service, the number of officer-initiated actions has markedly decreased (MacGillis, 2019). According to anecdotal evidence in the DOJ Report, BPD officers have engaged in de-policing in black neighborhoods but not in white neighborhoods (Department of Justice, 2016). As the acting BPD Commissioner acknowledged in July 2018, “In all candor, officers are not as aggressive as they once were, pre-2015.” (Heath, 2018).

Concomitantly, arrests declined in Baltimore in the aftermath of the Gray’s death providing some support for the de-policing narrative (Morgan & Pally, 2016). Nonetheless, as researchers have indicated, no empirical support has yet established a connection between de-policing and increased crime.

Finally, given the well-established relationship between demographic factors and attitudes towards the police, it is possible that the effects of a high-profile death-in-police-custody incident on community reliance on the police may have been differentially present in certain areas of Baltimore. The demographic heterogeneity of Baltimore that emerged during the twentieth century is still very much present (Taylor R., 2001; White, Weisburd, & Wire, 2018); at both the census-tract and police district levels, Baltimore markedly varies in terms of characteristics such as racial composition and poverty levels. The Baltimore Police
Department Monitoring Team, formed pursuant to the consent decree, yielded a July 2019 report; according to qualitative research about police officers’ perceptions, the state of community-police relations varies by geographic area of the city (Crime and Justice Institute, 2019).

**Prior Literature**

Contacting the police provides an indication of civil engagement and collective efficacy (Sampson, 2017; Taylor, Holleran, & Topalli, 2009). A lack of reliance on the police, even for non-criminal caretaking matters, may suggest disruptions in the social contract between a government and its citizens, and, as a long term consequence, may promote social disorder. The police require public support to maintain legitimacy and efficacy (Kochel, Parks, & Mastrofski, 2013; Tyler, 2004). How the police exercise their authority influences public perceptions of the police (Tyler & Wakslak, 2004). Citizen calls requesting police assistance with non-criminal caretaking matters can provide a useful empirical measure of whether police conduct affects the willingness of citizens to seek police assistance.

**Police Caretaking Function**

As researchers hypothesized as early as the 1970’s, public confidence in the police could potentially increase “if the police began to measure, and thus make more visible” their non-criminal caretaking role that “account[s], to a great extent, for the positive aspects of the police image.” (Furstenberg & Wellford, 1973, p. 394). At the same time, however, the public may develop a negative perception of the police if officers fail to effectively fulfill their non-law enforcement role (Johnson, Misner, & Brown, 1981).

The police role in a community inherently involves activities that are distinct from enforcing the law and combatting crime (Hudson, 2013; Schaefer, 2001; Paoline, 2001; Call,

Police responsibilities often include checking on the welfare of elderly residents, assisting stranded motorists (Dimino, 2009), rescuing animals from dangerous highways (Johnson, Misner, & Brown, 1981); warning residents about a leak of hazardous materials; or reuniting unattended children with their parents (Decker, 1999). In many communities, including Baltimore, the police are primary resource for immediate responses to emergency behavioral health situations; for example, the family member of a person experiencing an emergency behavioral health situation may call 911, requesting that the police help escort the person to a hospital for an evaluation (Department of Justice, 2016; Lamb, Weinberger, & DeCuir, 2002; Wood & Watson, 2017). Police in many jurisdictions are now also responsible for administering opioid reversal drugs to individuals suffering from an overdose (Davis, Ruiz, Glynn, Picariello, & Walley, 2014). Some police departments have policies that allow the police to transport gunshot or stabbing injury victims to the hospital (Band, et al., 2014).

In short, police departments are frequently the sole government agency available to address citizens’ requests for help or information, regardless of the time of day or day of the week (Laimin & Teboh, 2016; Schafer, 2001). Through their community caretaking role, the police ensure the safety and welfare of the community (Decker, 1999; Wood, Taylor, Groff, & Ratcliffe, 2015).
Factors Affecting Citizen Attitudes Towards Police

Consistent with the concept of procedural justice, citizens will have less satisfaction with the police where they perceive that the police, as governmental authorities, fail to act in a just and fair manner (Haberman, Groff, Ratcliffe, & Sorg, 2016). More specifically, dissatisfaction with the police is associated with public perceptions that, for example, the police engage in racially-biased conduct (Weitzer & Tuch, 2002), use excessive force (Jefferis, Kaminski, Holmes, & Hanley, 1997), treat citizens with disrespect, fail to prevent crime and neighborhood disorder (Taylor, Wyant, & Lockwood, 2015), or are untrustworthy (MacDonald & Stokes, 2006) or illegitimate government actors (Tankebe, 2013).

Additionally, a variety of demographic and environmental factors can influence a citizen’s attitudes towards the police (Brown & Benedict, 2002; Taylor & Lawton, 2012; Reisig & Parks, 2000; Shjarback, Nix, & Wolfe, 2018). These factors include age, race, socio-economic status, neighborhood conditions, and prior experiences with law enforcement (Weitzer, 2002; Schuck, Rosenbaum, & Hawkins, 2008; Taylor, Wyant, & Lockwood, 2015; Weitzer, 1999; Tyler, 2005; Ridgeway & MacDonald, 2014). To illustrate, within violent crime hot spots, factors such as youth, perceptions of procedural injustice, and fears of crime are associated with citizen dissatisfaction with the police (Haberman, Groff, Ratcliffe, & Sorg, 2016).⁹

Young residents of high-crime neighborhoods often report adverse views of the police based on prior negative interactions and aggressive policing, despite a desire for more

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⁹ Additionally, a citizen is more likely to be satisfied with a police encounter where the police are perceived as fair, polite, and communicative (Skogan, 2005). As a recent randomized controlled trial found, positive police-citizen interactions in the form of brief door-to-door non-law enforcement visits significantly improved citizens’ attitudes towards the police (Peyton, Sierra-Arevalo, & Rand, 2019).
police-community engagement (Carr, Napolitano, & Keating, 2007; Brunson, 2007; Brunson & Miler, 2006). Nonetheless, research has found that hot spots policing activity that can reduce crime does not have any significant effect on community perceptions of crime and disorder, perceived safety, satisfaction with police or procedural justice (Ratcliffe, Groff, Sorg, & Haberman, 2015).

Also, compared to white citizens, non-white citizens may hold less favorable perceptions of the police (Kaminski & Jefferis, 1998; Weitzer & Tuch, 2004). Compared to white urban residents, black urban residents are more likely to perceive that police misconduct is a problem in their neighborhoods (Weitzer, Tuch, & Skogan, 2008). Black-white differences in perceptions of the police also hold even when neighborhood context is taken into account (MacDonald, Stokes, Ridgeway, & Riley, 2007).

Knowledge about another person’s encounter with the police can also influence an individual’s perception of the police (Rosenbaum, Schuck, Costello, Hawkins, & Ring, 2005). To that extent, mass media reports on police abuse may increase the likelihood that citizens will have negative perceptions of the police and increase black-white disparities in distrust of the police (Weitzer & Tuch, 2004; Weitzer & Tuch, 2005; Jefferis, Kaminski, Holmes, & Hanley, 1997; Chermak, McGarrell, & Gruenewald, 2006; Lasley, 1994).

Given this vicarious influence on citizen attitudes, some research has explored whether highly publicized episodes of police violence or misconduct affects public perceptions of the police (Kaminski & Jefferis, 1998). At least one survey-based study has indicated that high-profile events may have little immediate effect on public views of police legitimacy and procedural justice. White, Weisburd, & Wire (2018) surveyed Baltimore crime hot-spot residents older than 20 years old and found that Gray’s death produced
insignificant changes as to their sense of obligation to obey the law or their perceptions of police trustworthiness and fairness.

Nonetheless, other research has reached the opposite conclusion. As one study found, the Los Angeles Police Department Rampart Division scandal and two New York Police Department fatal-use-of-force incidents adversely affected public attitudes in a national poll, with the largest effects occurring among blacks (Weitzer, 2002).

**Willingness to Seek Police Assistance**

In democratic societies, citizen requests for police assistance are, to a certain extent, statements about how the public perceives the police – and what the public believes that the police function should be (Bennett, 2004; Berg & Rogers, 2017; Black, 1973). Importantly, research has found that in urban areas, increased calls for service may be an indicator of decreased informal resident control over a location (Kurtz, Koons, & Taylor, 1998).

To that extent, the decision to report a crime to the police is the product of individual-level, incident-level, and community-level factors (Schnebly, 2008). As a general matter, urban residents and individuals of low socio-economic status may be especially likely to call the police when they have been crime victims (Avakame, Fyfe, & McCoy, 1999; Baumer, 2002). It is possible that low socio-economic status crime victims rely on the police because they lack alternatives that may be available to wealthier people such as private security or family members who can intervene.

At the same time, reporting crime to authorities or cooperating with criminal investigations may be broadly disfavored in economically disadvantaged neighborhoods (Brunson & Wade, 2019). This “stop snitching” norm largely reflects a distrust of the criminal justice system as a whole rather than a specific distrust of the police (Anderson,
In a qualitative study, street-level offenders reported that they would never call the police under any circumstances (Rosenfeld, Jacobs, & Wright, 2003). Others acknowledged that they would call the police only for very limited situations such as immediate danger to a family member or a very heinous offense such as murder.

In deciding whether to report crimes to the police, victims may rationally weigh the costs and benefits attendant to reporting, such as the likelihood that an offense will be “solvable” (Skogan, 1976) or the harm to them or the offenders (Felson, Messner, Hoskin, & Deane, 2002). As a further consideration, a survey-based study in Chicago found that on average, citizens are more likely to report serious violent crimes, such as shootings, that occurred at greater distances from their residences relative to similarly distanced but less serious violent crimes, such as fights (Wisnieski, Bologeorges, Johnson, & Henry, 2013).

Some researchers have explored how attitudes towards the police affect the willingness of citizens to seek police assistance. Desmond, Papachristos & Kirk (2016) examined whether the 2004 police beating of an unarmed black male in Milwaukee that received media coverage affected community willingness to call the police for criminal matters. As the study found, although calls had been increasing before the beating story, subsequent to reports of the beating, calls decreased significantly in both black and white neighborhoods. Within a year, these effects eventually diminished in white neighborhoods, but not in black neighborhoods. The study also assessed whether citizen crime reporting in Milwaukee decreased in response to three other publicized controversies about police behavior against unarmed black males, two of which occurred outside Milwaukee; the three incidents happened between 2006 and 2009. In two of the three cases, the study found an
association between the incidents and a short-term relative drop in crimes reported to the police. Importantly, however, other research suggests that the effects in Desmond et al. were the product of an outlier – and that no changes in citizen call behavior occurred (Zoorob, 2019).

Additionally, using Los Angeles data, a recent study explored whether officer-involved shootings that resulted in a civilian death had any effect on emergency 911 and nonemergency 311 calls to municipal government (Cohen, et al., 2019). Comparing the frequency of calls during the 30-day period before a shooting with the frequency of calls during the 30-day period after the shooting, the study found that these shootings did not alter citizen’s reliance on municipal government for assistance. Using New York City 311 service calls to municipal government as a measure of community engagement, another study found that the concentration of police stops generally was associated with increased community engagement (Lerman & Weaver, 2014). Nonetheless, stops that did not involve arrests but that involved searches or use of force, reduced community engagement.

**Motivations for Current Study**

In contrast to previous research, this study uses citizen calls for police assistance with non-criminal caretaking matters as a measure of community reliance on the police. Within a large city such as Baltimore, citizen calls to the police for criminal matters may be endogenously related to crime increases, de-policing behaviors, and pre-existing “stop-snitching” norms (Crime and Justice Institute, 2019).

More precisely, in Baltimore, it is possible that Gray’s death, the subsequent rioting, social unrest, and continuing anti-police sentiments caused an increase in criminal offending.
An increase in citizen calls reporting criminal activity may simply reflect an increase in criminal activity—rather than greater citizen reliance on the police.

Also, consistent with de-policing, it is possible that an increase in citizen calls concerning crime did not result from a greater community reliance on the police or an increase in crime. Instead, under this de-policing theory, the BPD had seemingly shifted their observational and crime reporting burdens onto Baltimore residents. The public were increasingly calling the police to report crime not because of improved trust in the police or because of more crime—but rather because they had no other choice.

As an additional matter, some communities in urban areas broadly view the government role in the criminal justice system with distrust. These communities may therefore be indisposed to report crime to authorities or cooperate with criminal investigations. Notably, the now-nationwide “stop snitching” movement first gained momentum in Baltimore in the early 2000’s (White T., 2005). The distrust inherent in the “stop snitching” norm encompasses all governmental actors in the criminal justice system, including, but not limited to, the police (Anderson, 1994; Clampet-Lundquist, Carr, & Kefalas, 2015; Slocum, Taylor, Brick, & Esbensen, 2010). A reliance on the police for non-criminal matters is disassociated from the effects of a “stop snitching” street code. Consistent with prior research (Rosenfeld, Jacobs, & Wright, 2003), concern about a missing elderly neighbor or a disabled vehicle may transcend generalized antipathy towards governmental authority.

To that extent, this analysis uses caretaking calls as a means to assess community reliance on the police independent of factors such as de-policing, overall crime trends, and “stop snitching” norms. As an ancillary matter, the non-criminal caretaking function of
policing has remained underexplored in existing criminological research. Given the importance of community-oriented policing strategies in twenty-first century policing (Mastrofski & Willis, 2010), empirical assessments of the non-criminal caretaking functions of the police may be especially valuable. Community-oriented policing encourages officers to collaboratively work with residents to identify and solve problems (Reisig, 2010; Parks, Mastrofski, DeJong, & Gray, 1999). Although community policing may not necessarily reduce crime (MacDonald, 2002), it may improve citizen perceptions of police legitimacy (Gill, Weisburd, Telep, Vitter, & Bennett, 2014; Peyton, Sierra-Arevalo, & Rand, 2019). As has long been hypothesized, the non-criminal caretaking role of the police may engender positive public perceptions of the police (Furstenberg & Wellford, 1973).

Importantly, the negative police-citizen encounters and call data used in prior research predate the post-2010 convergence of several high-profile fatal police-citizen encounters, social media, and social-media supportive technology, such as smartphone video-recording capabilities. This convergence rendered social media a powerful public forum to disseminate photographs, visual recordings, ideas, and emotions in response to high-profile fatal police-citizen incidents (Bejan, Hickman, Parkin, & Pozo, 2018; Ince, Rojas, & Davis, 2017; Gallagher, Reagan, Danforth, & Dodds, 2018; Brown G., 2015; Bock, 2016). Some evidence has suggested that younger Baltimore residents, who are more likely to form perceptions of the police through social media, can develop more negative perceptions of the police, relative to older residents (Crime and Justice Institute, 2019). This study therefore attempts to build on prior research by measuring community willingness to seek police assistance, including racial dimensions of this willingness, in a contemporary context.
As a final consideration, this study uses data as to incidents that have already occurred – calls for service – to measure actual citizen behavior. Thus, in contrast to survey-based research, this study does not use individuals’ predictions about what their future behavior might be in a given situation. As other researchers have noted (Desmond, Papachristos, & Kirk, 2016; Kochel, Parks, & Mastrofski, 2013; Skogan, 1984), it may be more useful to measure individual behavior based on actual past behavior. More broadly, calls for service are an important and efficient means of information exchange between the public and the police (MacDonald, Manz, Alpert, & Dunham, 2003) – and therefore constitute a useful indicator of the public-police relationship.

DATA AND METHODS

This study uses incident-level Baltimore Police Department 911 call data that range in date from January 1, 2014 through December 31, 2017. In 2015, the BPD began online posting of this data as part of a transparency effort (Rentz, 2015). Baltimore residents, after the events of April 2015, had complained about the long wait times for many 911 calls. The data contain information such as a brief reason for the 911 call, the census tract and police district from which the call originated, the call date, and the call priority. (Baltimore Police Department, 2018).

For its main analysis, this study uses non-criminal caretaking matters to test whether the events around Gray’s death impacted citizen reliance on the police.¹⁰ These matters include the following call categories: “Adult Wellbeing Check,” “Individual, Child, or Pet

¹⁰ The total data from the BPD website contained over 7,000 distinct call reasons that could be separated into nearly 50 separate categories. Besides the non-criminal community caretaking categories, these categories included, for example: “Death,” “Custody/Visitation,” “Elopement/Medical Facility Problems,” “Noise/Animal or Vehicle Disturbance,” and “Dangerous Driving/Road Rage.”
Locked Out of/In Vehicle or Home,” “Homeless,” “Accident,” “Behavioral Health,” “Disabled or Abandoned Vehicle,” “Person Walking on a Highway,” and “Lost or Stranded Adult.”11 These are non-criminal caretaking matters in which a citizen-caller has discretion to (1) call the police or, alternatively, (2) engage in some form of self-help. For example, where a child is locked inside a car, instead of calling the police, the caller could break a window or contact a friend or family member for assistance.

Any vehicle accident calls that included a death or injury are excluded from the non-criminal caretaking categorization. The majority of the remaining accident calls would likely include requests for police assistance with the peaceful transfer of insurance information or documenting property damage for insurance claim purposes.12 Calls that likely originated from an institution, such as a medical facility, are excluded. Also, all calls where a 911 caller would likely primarily expect a medical or fire response rather than a police response are excluded.

Importantly, community reliance on the police in a given geographic location may be a function of the demographic characteristics of that location. Baltimore is comprised of 200 census tracts and nine (9) police districts (City of Baltimore, 2010). Of the 200 census

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11 This category excludes lost or missing children, runaways, or adults reported as “missing.”

12 According to 2016 Maryland Department of Transportation data, 77.3% of motor vehicle accidents in Baltimore involved only property damage; 22.7% percent involved an injury, and less than 1% involved a fatality (Maryland State Police, 2017). Given that it is more likely that Maryland DOT will be aware of accidents resulting in a death or injury relative to accidents resulting in only property damage, it is reasonable to conclude that the majority of accidents result in only property damage. Compared to other accidents, in these property-damage-only accidents, motorists likely have more discretion as to whether they contact the police. As an additional matter, prior research about motor vehicle accidents in Baltimore City has found that no association between socioeconomic variables of accident locations and accident incident density (Dezman, et al., 2016).
tracts, 59% (N=118) have borders that are completely within only one police district, whereas the remainder have borders that extend into two or more districts.

Approximately 99% of the non-criminal caretaking call incidents had both an identifiable census tract and an identifiable police district. As a result, the call incidents were distributed among 279 unique sections based on census tract boundaries and police district boundaries. To illustrate, where a census tract extended into three police districts, the census tract was divided into three unique sections. These sections are the spatial unit of analysis for this study. The use of both census tract and police district boundaries captures both tract-level demographic characteristics as well as district-specific policing characteristics.

All told, this study uses N=237,657 calls to the police that report a non-criminal caretaking matter in Baltimore between 2014 and 2017. Seventy-two percent of these calls involved an accident (N=171,864), 3% involved a disabled vehicle (N=8192), 12% involved a behavioral health matter (N=28746), 11% involved a wellbeing check (N=26304), and the remainder of calls involved lock-ins or lock-outs involving an individual, child or pet (N=1,581), a homeless person (N=247), an adult stranded or lost (N=677), or a person walking along a highway (N=46).

As an additional matter, pocket-dialed calls (N=725,078) provide a useful proxy for overall phone usage. These “Pocket-Dialed” calls include those call incidents in the data were described with phrases such as “911/No Voice” or “911/Hangup.” Also, for comparative purposes, this study assesses whether any effects occurred as to citizen calls to the police that report criminal matters (N=1,316,116). The criminal matters include reports of animal cruelty, arson, armed individuals, assault, burglary, robbery, theft, property
destruction, unauthorized use of motor vehicles, prostitution, threatening or harassing behavior, trespassing, shooting/firearm discharge, suspicious persons/loitering, and weapons.

Figure 6 is a time series plot showing the average weekly amount of calls for assistance with non-criminal caretaking, criminal, and pocket-dialed matters at the section level over the 212-week period between 2014 and 2017.

Notably, during the first week of the resulting civil unrest (Week 70), there is an approximately 34% increase in calls reporting criminal matters, relative to the preceding week (Week 69). Both a slight overall increase in calls to the police for assistance for non-criminal caretaking matters and a slight overall increase in calls reporting criminal activity appear to occur over the 212 weeks; also, an overall decrease in pocket-dialed calls is apparent.

For this study, all of 2014 and the first sixteen weeks of 2015 (before Gray’s death and the resulting civil unrest) are the Pre-Period. The two weeks between April 19, 2015 and May 2, 2015 (Weeks 70 and 71) that had rioting, protests, or some form of civil unrest are the Unrest-Period. The next sixteen (16) weeks (Weeks 72 through 87) are the Immediate-Post-Period (May 3, 2015-August 22, 2015). The remaining weeks of 2015, all of 2016, and all of 2017 are the Post-Period.
It is reasonable to hypothesize that, relative to the Pre-Period, negative public sentiment towards the police increased during the Unrest-Period. Yet, the infrastructural chaos attendant to the civil unrest that followed Gray’s death may have also prompted greater dependence on the police, particularly for non-criminal caretaking matters. To that extent, the time period most of interest for this study is the Immediate-Post-Period, the aftermath of the civil unrest. During this period, despite the restoration of social order,
negative public sentiment towards the police likely existed. The period after the Immediate-Post-Period, the Post-Period, provides a measure of long-term effects.

Besides temporal considerations relative to Gray’s death and the resulting civil unrest, geographic or demographic factors within Baltimore also may affect community reliance on the police. As prior research has explained (Weitzer, 2002; Weitzer & Tuch, 2004; Schuck, Rosenbaum, & Hawkins, 2008; Taylor, Wyant, & Lockwood, 2015; Weitzer, 1999; Tyler, 2005), attitudes towards the police may be adversely affected by demographic characteristics. These characteristics may include the percentage of the population that is black or that is young (e.g., aged 12-25 years). Relevant neighborhood-level factors include the percentage of vacant housing units or the percentage of the population that is unemployed or lives in poverty.

When considered collectively, these demographic characteristics can create a measure of the risk of a negative community-police relationship. Each of the unique 279 geographic sections in this study were linked to demographic data from the 2016 Five-Year American Community Survey; the data addressed the following demographic indicators: (1) percentage of the population that is black; (2) percentage of the population aged 12-25; (3) percentage of the population that lives in poverty; (4) percentage of the population that is unemployed; and (5) percentage of residential housing units that are vacant (U.S. Census Bureau, 2016). These demographic indicators were selected because, as prior literature instructs, black citizens, young citizens, and residents of disadvantaged urban neighborhoods are more likely to have negative perceptions of the police – relative to the rest of the population; additionally, where aggressive policing occurs, these populations are often the most likely to

13 For two of the 279 sections, some demographic indicators were missing. Census data from 2010 was therefore used (City of Baltimore, 2010).
encounter it (Carr, Napolitano, & Keating, 2007; Brunson, 2007; Brunson & Miler, 2006; Weitzer, Tuch, & Skogan, 2008).

A composite measure of the predicted risk of a negative community-police relationship for each section was calculated; the method for calculating this measure borrows from the approach that neighborhood disadvantage literature has used to calculate a concentrated disadvantage composite index, e.g., (Boardman, Finch, Ellison, Williams, & Jackson, 2001; Sampson & Bartusch, 1998; Clear, Rose, Waring, & Scully, 2003; Morenoff, Sampson, & Raudenbush, 2001). For each section, the five individual demographic indicators were standardized by subtracting the city-wide mean and dividing by the city-wide standard deviation. For each of the 279 sections, the five standardized scores (one for each demographic indicator) were summed to create an overall index of a predicted negative community-police relationship. The mean of the resulting Negative Community-Police Relationship Index Score is 0.00, and the standard deviation is 3.43. The index ranges from -8.63 to 10.32; namely, the section at the most risk of a negative community-police relationship scored the highest, 10.32, on the index, and the section that was at the least risk scored the lowest, -8.63, on the index. In

As a preliminary matter, a factor analysis was conducted to determine to extent to which these five demographic indicators are correlated with each other, thereby loading on the same factor (Sampson, Raudenbush, & Earls, 1997). A factor analysis sets out to determine the relationship among observed, correlated variables with the recognition that at least some of these variables together may constitute a single latent or unobserved factor (or, at a minimum, a smaller number of factors) (Maruyama & Ryan, 2014).

The resulting correlation coefficients among the five indicators were (Black=0.76, Poverty=0.72, Residential Housing Units That Are Vacant=0.63, Unemployed=0.87, and Aged 12-25= 0.08). The Aged 12-25 indicator is not strongly correlated with the other indicators. Nonetheless, it is retained in calculating the risk index score; even if the remaining four indicators are more strongly correlated with each other (and, in the aggregate, constitute a factor), it possible that age is still relevant to the risk of a negative relationship with the police. As a robustness check, an alternate index score was computed and the full analysis was re-run with the age indicator completely omitted from the index score.
short, this Index Score operationalizes the risk of a negative community-police relationship in a given section.

Table 5 demonstrates the variation in the average weekly number of non-criminal caretaking calls per section given both the temporal period and the Negative Community-Police Relationship Index Score. Figure 7 shows the geographical distribution of the section-level Index Scores.

Table 5: Average Number of Non-Criminal Caretaking Calls Per Week Per Section Given Index Score, With Change Relative to Pre-Period

<table>
<thead>
<tr>
<th>Negative Community-Police Relationship Index Score Range</th>
<th>Pre-Period</th>
<th>Unrest-Period</th>
<th>Immediate-Post-Period</th>
<th>Post-Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely Low Risk (N=4) -3 standard deviations</td>
<td>2.50</td>
<td>3.12 (0.62)</td>
<td>3.59 (1.09)</td>
<td>4.35 (1.85)</td>
</tr>
<tr>
<td>Very Low Risk (N=34) -2 standard deviations</td>
<td>3.34</td>
<td>3.81 (0.47)</td>
<td>4.20 (0.86)</td>
<td>4.44 (1.10)</td>
</tr>
<tr>
<td>Slightly Low Risk (N=80) -1 standard deviation</td>
<td>4.86</td>
<td>4.69 (-0.17)</td>
<td>5.30 (0.44)</td>
<td>5.64 (0.78)</td>
</tr>
<tr>
<td>Slightly High Risk (N=84) +1 standard deviation</td>
<td>3.31</td>
<td>3.43 (0.12)</td>
<td>3.84 (0.53)</td>
<td>3.99 (0.68)</td>
</tr>
<tr>
<td>Very High Risk (N=71) +2 standard deviations</td>
<td>2.64</td>
<td>3.11 (0.47)</td>
<td>3.10 (0.46)</td>
<td>3.21 (0.57)</td>
</tr>
<tr>
<td>Extremely High Risk (N=6) +3 standard deviations</td>
<td>1.36</td>
<td>2.00 (0.64)</td>
<td>2.25 (0.89)</td>
<td>1.99 (0.63)</td>
</tr>
</tbody>
</table>

For both the above table and Figure 7, the sections were divided into six categories according to how many standard deviations from the mean it scored on the Negative Community-Police Relationship Index Score. The number in parentheses is the change in the average number of weekly caretaking calls during a temporal period relative to the Pre-Period. On average, all sections, regardless of Index Score, experienced an increase in non-criminal caretaking calls during both the Immediate-Post-Period and the Post-Period.
Nonetheless, these descriptive numbers do not control for finer geographic or temporal trends. The following Poisson regression model assesses whether Gray’s death and the ensuing anti-police sentiment had any effect on the willingness of Baltimore residents to call the police for assistance with non-criminal caretaking matters:

\[
\log(\lambda_{it}) = \beta_0 + \beta_1 Unrest_t + \beta_2 ImmediatePost_t + \beta_3 Post_t + \beta_4 t + \beta_5 t^2 \\
+ \gamma_{season(t)} + \beta_6 Score_i + \beta_7 Score_i Unrest_t \\
+ \beta_8 Score_i ImmediatePost_t + \beta_9 Score_i Post_t
\]

The main outcome of interest in this study is the weekly number of non-criminal caretaking calls in each of the 279 unique sections, indexed by \(i\). The outcome, \(\lambda_{it}\),
represents the expected weekly call count for non-criminal caretaking matters in section \( i \) for week \( t \). When exponentiated, the coefficients \( \beta_1, \beta_2, \) and \( \beta_3 \) indicate the multiplicative change in number of calls per week per section attributable to having occurred during the Unrest-Period, Immediate-Post-Period, or the Post-Period, relative to the Pre-Period. \( Unrest_t, Immediate Post_t, \) and \( Post_t \) are 0/1 indicators of in which period week \( t \) occurs. \( \beta_4 t + \beta_5 t^2 \) captures any linear or quadratic trend in crime over the study period. \( \gamma_{Season(t)} \) is a fixed effect for season.

The variable \( Score_t \), the Negative Community-Police Relationship Index Score for a given section, operationalizes predicted negative relationships between the police and the public. This model includes interaction terms where each Index Score for a section is interacted with each of the discrete temporal categories. These interaction terms model the change in the number of calls based on the index score during each of the discrete temporal categories. It is reasonable to expect that any effects on community reliance on the police in response to Gray’s death in a section may be dependent on the predicted community-police negative relationship in that section, as measured by the Index Score.

Significance levels are calculated through permutation tests. Standard significance tests produced by the regression model alone inherently rely on distributional assumptions such as the absence of spatial and temporal correlation (Ridgeway & MacDonald, 2017). With many quasi-experimental designs, these assumptions may be incorrect. For example, the Immediate-Post-Period in this study occurred during the spring and summer of 2015. Any effects observed during this period may be correlated with seasonal conditions – rather than with the temporal proximity (within 16 weeks) of this period to Gray’s death and the attendant civil unrest.
Permutation tests provide a non-parametric alternative that generates a reference distribution for the parameters of interest (Ludbrook, 1994) and have been applied in other criminological research (MacDonald, Fagan, & Geller, 2016; Johnson, et al., 2007; Ridgeway & MacDonald, 2017). The null hypothesis in this study is that the number of calls per week in a given section is independent of the interaction between the Negative Community-Police Relationship Index Score, $Score_i$, and the temporal “nearness” to the events of April 2015.

Thus, to generate a reference distribution for the statistics of interest, the permutation test altered the start of the Unrest-Period, while maintaining the temporal pattern of the original data. This pattern consists of more than one week of a Pre-Period, two weeks of an Unrest-Period, sixteen weeks of an Immediate-Post-Period, and more than one week of a Post-Period. Using all 212 weeks, a total of 207 permutations was possible. For example, Week 120 is the Post-Period in the original data. In one of the permutations, it is assigned as the first week of the “Unrest-Period,” Week 121 is assigned as the second week of the “Unrest-Period,” all weeks before Week 120 are assigned as the “Pre-Period,” the sixteen weeks after Week 121 are assigned as the “Immediate Post-Period,” (Weeks 122-137), and all weeks after Week 137 as the “Post-Period.”

The Poisson regression for each permutation of the labels was recomputed. This process simulated what the distribution of the treatment effects would look like under the null hypothesis that the number of calls is independent of temporal proximity to the Unrest-Period. The estimated $p$-value is the fraction of the results from the permuted data that is as or more extreme than the coefficient derived from the regression model using the original data.
Additionally, given that vehicle accidents constitute 72% of the caretaking calls, the analysis is re-run with vehicle accidents excluded as a test of the robustness of the results. Furthermore, it is possible that any observed effects are the result of overall phone usage; as a falsification test, this analysis uses pocket-dialed calls, which provides a proxy for overall phone usage. With pocket-dialed calls substituted for non-criminal caretaking calls, the Poisson regression model produces the relevant estimates. As an additional comparative matter, calls for criminal matters are substituted for calls for non-criminal caretaking matters.

**RESULTS**

The divisive Freddie Gray death-in-police-custody incident largely did not produce any effect on community reliance on the police, as measured through calls for non-criminal caretaking matters. The temporal periods, Unrest-Period, Immediate-Post-Period, and Post-Period did not experience any significant change in the number of non-criminal caretaking calls relative to the Pre-Period. When the temporal periods are interacted with the Negative Community-Police Relationship Index Score, a significant increase in the number of non-criminal caretaking calls occurred only during the Unrest-Period relative to the Pre-Period. During the Unrest-Period (relative to the Pre-Period), each unit increase in the Index Score was associated with a significant 1.5% increase in calls. Otherwise, there were no significant effects associated with the Index Score and temporal period interaction.\(^\text{15}\) Table 6 presents these results.

\(^\text{15}\) A factor analysis showed that the Aged 12-25 indicator was not strongly correlated with the other four demographic indicators. Nonetheless, it was retained in calculating the risk index score. As a robustness check, an alternate index score was computed and the full analysis was re-run with the age indicator completely omitted from the index score. The significance levels do not change. As for the only significant effect, the Unrest-Period x Index Score interaction, the estimate is 2.0% (\(p=0.04\)) instead of 1.5% (\(p=0.04\)).
Table 6: Percentage change in number of calls for assistance with non-criminal caretaking matters

<table>
<thead>
<tr>
<th></th>
<th>Percentage Change in Non-Criminal Caretaking Calls</th>
<th>Percentage Change in Non-Criminal Caretaking Calls (Accidents Excluded)</th>
<th>Percentage Change in Pocket-Dialed Calls</th>
<th>Percentage Change in Criminal Calls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unrest-Period</td>
<td>-4.5% (0.50)</td>
<td>-9.4% (0.41)</td>
<td>8.9% (0.78)</td>
<td>21.5% (0.06)</td>
</tr>
<tr>
<td>Immediate-Post-Period</td>
<td>7.0% (0.32)</td>
<td>-2.7% (0.97)</td>
<td>31.9% (0.09)</td>
<td>9.3% (0.06)</td>
</tr>
<tr>
<td>Post-Period</td>
<td>13.0% (0.13)</td>
<td>-3.3% (0.86)</td>
<td>37.1% (0.49)</td>
<td>9.9% (0.02)*</td>
</tr>
<tr>
<td>Negative Community-Police Relationship Index Score</td>
<td>-4.6% (0.93)</td>
<td>-3.5% (0.52)</td>
<td>-1.0% (0.30)</td>
<td>1.8% (0.29)</td>
</tr>
<tr>
<td>Unrest-Period x Negative Community-Police Relationship Index Score</td>
<td>1.5% (0.04)*</td>
<td>0.6% (0.69)</td>
<td>-0.9% (0.33)</td>
<td>0.7% (0.32)</td>
</tr>
<tr>
<td>Immediate-Post-Period x Negative Community-Police Relationship Index Score</td>
<td>0.3% (0.46)</td>
<td>-0.5% (0.51)</td>
<td>-1.8% (0.15)</td>
<td>-0.7% (0.20)</td>
</tr>
<tr>
<td>Post-Period x Negative Community-Police Relationship Index Score</td>
<td>-0.2% (0.71)</td>
<td>-0.1% (0.54)</td>
<td>-0.6% (0.40)</td>
<td>-0.1% (0.73)</td>
</tr>
<tr>
<td>Average Number of Weekly Non-Criminal Caretaking Calls Per Section During Pre-Period= 3.5</td>
<td>Average Number of Weekly Non-Criminal Caretaking Calls (Accidents Excluded) Per Section During Pre-Period= 1.0</td>
<td>Average Number of Weekly Pocket-Dialed Calls Per Section During Pre-Period=12.9</td>
<td>Average Number of Weekly Criminal Calls Per Section During Pre-Period=20.7</td>
<td></td>
</tr>
</tbody>
</table>

Note: Percentage change computed as $100(e^\beta - 1)$. Values in parentheses are permutation test $p$-values. $P$-values that are less than 0.05 are marked with an asterisk (*).
The falsification test replaced non-criminal caretaking calls with pocket-dialed calls to assess whether any observed effects may simply be the result of overall phone usage. However, this falsification test largely yielded non-significant results. As an additional matter, this analysis substituted calls for police assistance with non-criminal caretaking matters with calls for police assistance with criminal matters. When the Index Score is interacted with temporal periods, there are no significant effects.

**DISCUSSION**

Using Baltimore data, this study assessed whether a high-profile death-in-police-custody incident affected community reliance on the police. Drawing intense national scrutiny and provoking two weeks of civil unrest, the death of Freddie Gray created a temporal disruption where it would be reasonable to expect a pronounced shift in citizens’ attitudes toward the police – and their reliance on the police based on these attitudes. This reliance was measured through calls to the police for assistance with non-criminal caretaking services. Overall, it appears that Gray’s death and the ensuing unrest exerted little effect on community reliance on the police.

Prior literature has suggested that distrust of the police may render citizens less willing to seek police assistance (Bennett, 2004; Baumer, 2002; Desmond, Papachristos, & Kirk, 2016). Thus, willingness to seek police assistance provides, albeit indirectly, some measure of public trust in the police. Yet, Gray’s death, an extreme manifestation of strained community-police relationships, largely did not have any significant effect on the willingness of the public to rely on the police.

As a preliminary matter, this study had several limitations. For example, this study used one divisive incident in a single urban area to empirically assess whether a death-in-
police-custody incident that provoked intense public outrage affected community reliance on the police. Future research should replicate this study in other large cities that experience divisive high-profile police-citizen incidents to see whether they impact community reliance on the police for assistance.

Additionally, it is possible that any negative police-citizen incidents that had preceded Gray’s death had already brought the call rate to a very low level so that by April 2015, the call rate could not have decreased any more than it had. Nonetheless, this study did avoid confounding factors inherent to analyses using calls to the police for assistance with criminal matters – namely, de-policing, crime increases, and pre-existing anti-governmental norms.

Furthermore, in urban areas, it is reasonable to expect that individuals, as part of their daily activity patterns, often travel outside of the neighborhoods in which they reside (Kim & Hipp, 2019; Wiebe, et al., 2016; Hurvitz, Moudon, Kang, Fesinmeyer, & Saelens, 2014; Hipp & Boessen, 2013; Basta, Richmond, & Wiebe, 2010; Sampson, Morenoff, & Gannon-Rowley, 2002). To that extent, a call from a particular section in this study might not necessarily originate from an individual who resides in that section; instead, the call might originate from a non-resident who, as a result of his or her daily activity pattern, happens to temporarily be in that section for some transitory purpose such as work or recreation. Yet, within a given section, it is likely that the proportion of calls from non-residents remained constant during the temporal periods of interest (e.g., the Immediate-Post-Period relative to the Pre-Period).

Several considerations may explain the results of this study. Certainly, if any incident in Baltimore in recent years were to precipitate intense distrust of the police and reduce
citizens’ willingness to rely on the police, Gray’s death would have been the most likely to have done so. At a minimum, the incident prompted intense coverage, through both traditional media and social media, likely galvanizing already existing public discontent with law enforcement practices in Baltimore. Yet, even in sections most likely to have experienced heightened distrust of the police, there was no significant decrease during either the Immediate-Post-Period or the Post-Period in calls to the police for assistance with non-criminal caretaking matters.

During the Unrest-Period, relative to the Pre-Period, there was a significant 1.5% increase in calls for non-criminal caretaking matters for each unit increase in the Negative Community-Police Relationship Index Score. It is possible that the infrastructural chaos of the Unrest-Period may have prompted greater dependence on the police, particularly for non-criminal caretaking matters. For example, during the civil unrest, these calls possibly increased because individuals living in sections with a high Index Score could not safely leave their homes to assist with a neighbor’s lock-out or to travel across the city to check on an at-risk elderly neighbor.

Consistent with prior research, marginalized neighborhoods may be particularly dependent on police assistance, including for non-criminal caretaking matters (Baumer, 2002; Avakame, Fyfe, & McCoy, 1999). More broadly, the caretaking role of the police may be an important mechanism through which the police can develop stronger community-police relations, particularly in marginalized neighborhoods susceptible to feelings of distrust between the police and the public. If the public perceives that the police are willing to assist them with issues such as a missing elderly neighbor or a child locked in a vehicle, then the public may develop more favorable perceptions of the police (Furstenberg & Wellford,
Prospective research should empirically assess whether positive interactions between the community and the police for non-criminal caretaking matters can, in fact, improve community perceptions of the police.

It is possible that although Gray’s death may have increased community distrust of the police throughout Baltimore, the public disengaged this distrust from their behavior. Despite the anger and frustration that Baltimore residents felt towards the BPD as a result of Gray’s death, they may have compartmentalized these sentiments from their actual behavior. Thus, if they needed assistance during the two weeks of civil unrest or the period immediately after this civil unrest, Baltimore residents would still contact the police – even if they did so reluctantly. To that extent, these findings in this study are somewhat reassuring in that they suggest that citizens did not engage in complete “de-citizing”; and, the social contract (Kochel, Parks, & Mastrofski, 2013; Tyler, 2004) between the government and the citizens was not completely broken because citizens continued to exercise their rights to appropriate police assistance.

In the Immediate-Post-Period and Post-Period, mid-2015 through the end of 2017, Baltimore residents may have gradually gained some level of trust in governmental authority. By this point, the Baltimore District Attorney’s Office had charged the six officers involved in Gray’s death. Additionally, DOJ conducted a widespread investigation of BPD practices, releasing an August 2016 report critical of the BPD behavior.

Importantly, in Baltimore, the caretaking role of the BPD, prior to Gray’s death and the DOJ investigation, had suffered from the same problems that had plagued the law enforcement role of the BPD. For example, the DOJ investigation had revealed that the BPD had a history of using unnecessary and disproportionate force during behavioral health
crises. Most callers in sections that were at risk for strained police-community relations were likely well aware that any interaction with the police – even if the interaction began as a request for assistance with an elderly neighbor or a child locked in a vehicle – had the volatile potential to escalate into a negative, if not violent, situation between the police and a Baltimore resident. To that extent, calls to the police for assistance with non-criminal caretaking matters provide a useful measure of public willingness to engage the police.

In the near future, the non-law enforcement function of the police may become increasingly important – not only in the context of community-oriented policing – but public welfare (Galva, Atchison, & Levey, 2005). In communities with a large population of at-risk residents, such as the elderly or those with behavioral health or substance abuse problems, positive relationships between the police and the community may enable the police to better serve community needs. Incidentally, as prior researchers have noted, many Baltimore neighborhoods, including the neighborhood in which Gray had lived, experience overall poor health outcomes, including substance abuse and preventable hospital stays (Wen, et al., 2015).

The events of April 2015 constituted a harsh culmination of issues that have troubled Baltimore – and the rest of urban America – for decades. These issues encompass strained community-police relations, racial tensions, and impoverished and blighted neighborhoods. As this study finds, the events of April 2015 appeared to have had no significant effect on the willingness of Baltimore residents to seek police assistance, as measured through community reliance on the police for non-criminal caretaking matters.
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