

This report was commissioned before the Crime and Justice Policy Lab was formed at UPenn and the underlying work has not been reviewed for accuracy by Crime and Justice Policy Lab's directors—the lab directors did not have input into the methods, process, writing, or editing of the evaluation. However, our lab thought it was valuable to publish this work because it is the only evaluation that has been done of Philadelphia's latest GVI effort. The Crime and Justice Policy Lab has produced a policy brief to explain and contextualize the results, available [HERE](#).

**AN EVALUATION OF THE CURRENT
GROUP VIOLENCE INTERVENTION (GVI)
IMPLEMENTATION IN PHILADELPHIA**

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KEY FINDINGS

Between January 2020 and May 2022, at least 1,147 Group Member-Involved shootings have occurred in Philadelphia. Approximately one out of every five of these shootings results in a death (23.1%). The current implementation of Group Violence Intervention (GVI) in Philadelphia has produced significant reductions in Group Member-Involved (GMI) firearm violence at the group-unit level during the study period, January 2020 to May 2022. It has also produced significant reductions in GMI firearm violence at the census tract-level during the study period.

Importantly, due to COVID-19-related restrictions on public gatherings, the current GVI implementation in Philadelphia departed from the usual call-in meeting model. Instead, Mobile Call-In Team (MCIT) custom notification visits provided the primary means of GVI implementation. Given the results indicating a reduction in firearm violence, a GVI implementation through MCIT custom notification visits appears to maintain the effectiveness of GVI.

Post-Treatment relative to Pre-Treatment, a group-unit, on average, experienced a significant 38.6% reduction in shootings per week. Notably, receiving 2 doses of treatment relative to 0 doses of treatment produced a significant 50.3% reduction in shootings per week for a group-unit.

A census tract experienced a non-significant 25.1% reduction ($p=0.07$) in GMI shootings per week, Post-Treatment relative to Pre-Treatment. Importantly, however, where a census tract received 4 or more doses relative to 0 doses (Pre-Treatment), there was a significant 44.4% reduction ($p=0.03$) in GMI shootings per week.

The effects of GVI on individual outcomes such as victimization and offending merit further research. A longer study period in prospective research will provide an opportunity to more precisely detect the effect of GVI on individual behavior and victimization risk.

Enforcement actions were associated with a reduction in GMI shootings. Once it was subject to an enforcement action, a group experienced a significant 42.8% reduction ($p=0.04$) in shootings. Future research should identify the particular levers in an enforcement action that are most effective.

This Evaluation conducted qualitative research to inform the quantitative findings. The qualitative research components were the following: (1) informal telephone conversations with GVI recipients; (2) surveys given to Philadelphia Police Department (PPD) officers involved in MCIT custom notifications; and (3) informal surveys distributed at two Philadelphia Roadmap for Safer Communities community meetings.

EXECUTIVE SUMMARY

Group Violence Intervention (GVI) is an evidence-based strategy to combat group member-involved (GMI) firearm violence in urban communities (National Network for Safe Communities, 2016). A group “refers to any social network whose members commit violent crimes together” and includes, for example, loosely affiliated “neighborhood crews with no hierarchy or business” (National Network for Safe Communities, 2021, p. 2).

GVI relies on a multi-pronged approach: (1) offers of social services and support to at-risk group members; (2) focused deterrence messaging and law enforcement sanctions in response to violence; and (3) community-rooted messaging that sets standards and norms against violence.

In August 2020, during the COVID-19 pandemic, the City of Philadelphia initiated the current GVI implementation (City of Philadelphia, 2021). Given COVID-19-related public health restrictions, several changes to the standard GVI implementation model were necessary. For example, instead of large-scale call-in meetings that assemble group members, the implementation largely relied on door-to-door Mobile Call-In Team (MCIT) visits to the residences of at-risk group members.

In 2020, the City of Philadelphia commissioned the University of Pennsylvania to conduct an independent evaluation of the current implementation of GVI in Philadelphia. The Urban Affairs Coalition (UAC) provided the necessary funds for the Evaluation to the University of Pennsylvania; the funds were made possible through a grant awarded by the Commonwealth of Pennsylvania Department of Community and Economic Development and funded by the Pennsylvania General Assembly. The University of Pennsylvania’s independent Evaluation quantitatively assessed the impact of GVI on multiple dimensions – group, place, and individual.

Data sources for the Evaluation were maintained by the Delaware Valley Intelligence Center (DVIC), the Philadelphia Police Department (PPD), and/or the City of Philadelphia Office of Violence Prevention (OVP). The study period for the Evaluation is the 128-week (29-month) period between January 1, 2020 and May 30, 2022.

A shooting for purposes of this Evaluation is a shooting that results in some type of gunshot injury or fatality that is known to law enforcement. This analysis considered a shooting as Group Member-Involved (GMI) if (1) the victim is/was a member of a group or groups; (2) the shooter, if known, is/was a member of a known group or groups; or (3) both the victim and the shooter are/were members of a known group or groups.

The current implementation of GVI in Philadelphia has produced significant reductions in GMI firearm violence at the group-unit level and at the census tract-level during the study period, January 2020 to May 2022.

All told, there were 66 individual groups in Philadelphia that had (1) at least one member who was a shooting victim or a shooter during the study period and (2) at least one member who was a GVI recipient at some point during the study period.

The unit of interest for this analysis is a group-unit, however. There are 113 group-units that are comprised of each of the 66 individual groups or combinations of these individual groups. For a given shooting, a group-unit is comprised of only one individual group where a member of one individual group was known to be involved in a shooting as a victim or shooter. A group-unit is comprised of multiple individual groups where, for example, both the shooter and the victim were members of separate groups. Where a shooting, for example, involved Group A as the shooter and Group B as the victim, the shooting is attributable to Group-Unit AB. Of the 113 group-units, four group-units consist of three individual groups, 44 group-units consist of two individual groups, and 65 group-units consist of one individual group.

The core Evaluation question assessed the number of shootings per group-unit per week where one or more members of the group-unit was a victim and/or a known shooter. This definition of the unit of interest accounts for spillover effects of GVI from a treated group to other groups connected to that group through rivalries, alliances, or other social links (Piehl, Cooper, Braga, & Kennedy, 2003; Braga, et al., 2019; Roman, Link, Hyatt, Bhati, & Forney, 2019). Additionally, it recognizes the association between firearm violence victimization and firearm violence perpetration (Bingenheimer, Brennan, & Earls, 2005; Cunningham, et al., 2009). Treatment is defined as at least one contact between GVI and a GVI recipient who is a group-unit member.

All told, 113 group-units received GVI treatment. Post-Treatment relative to Pre-Treatment, a group-unit that received GVI treatment, on average, experienced a significant 38.6% reduction in shootings per week. Notably, receiving 2 doses of treatment relative to 0 doses of treatment produced a significant 50.3% reduction in shootings per week for a group-unit.

On the dimension of place, treatment is defined as at least one contact that physically occurred in the census tract between GVI and a GVI recipient, an influential, or both. All told, 123 census tracts, which contain approximately 31% of Philadelphia's population, received GVI treatment. This census tract-level analysis was confined to census tracts in only the Central, Northwest, South, and

Southwest Philadelphia Police Department Divisions. GVI was fully implemented in these divisions during the study period. On average, a census tract experienced a non-significant 25.1% reduction ($p=0.07$) in GMI shootings per week, Post-Treatment relative to Pre-Treatment. Importantly, where a census tract received 4 or more doses relative to 0 doses of treatment, there was a significant 44.4% reduction ($p=0.03$) in GMI shootings per week. There was no evidence of firearm violence displacement into other tracts.

All told, between August 2020 and May 2022, 276 individuals in Philadelphia received treatment through one or more direct contacts with GVI. The effects of GVI on individual outcomes such as victimization and offending merit further research. A longer study period in future evaluations with more observations will provide an opportunity to precisely detect the effect of GVI on individual behavior and victimization risk. In this Evaluation, the outcomes of interest included the average likelihoods of an individual, Post-Treatment relative to Pre-Treatment, being a shooting victim, committing an offense resulting in arrest, and committing a firearm-related offense resulting in arrest.

Assessing the relationship between social services and desistance was necessarily limited by endogeneity considerations; the individuals most likely to pursue social services were likely those individuals with other characteristics, such as family support and a self-motivation, that are positively correlated with desistance. Yet, even if social services do not directly influence conduct, it may nonetheless reduce an individual's rationalization of risky behavior (Braga & Kennedy, 2020).

Enforcement actions were associated with a reduction in GMI shootings. All told, during the study period, 26 groups were subject to an enforcement action. A group is treated once an enforcement action is initiated. Post-Treatment relative to Pre-Treatment, groups subject to an enforcement action experienced, on average, a significant 42.8% reduction in shootings. Future research should identify the particular levers in an enforcement action, such as requests for increased bail, referrals for federal prosecution, warrant sweeps, or increased patrol, that are most effective.

Additionally, this Evaluation conducted qualitative research to inform the quantitative findings. The qualitative research components were the following: (1) informal telephone conversations with GVI recipients; (2) surveys given to PPD officers involved in GVI notifications; and (3) informal surveys distributed at two Philadelphia Roadmap for Safer Communities community meetings.

Although two call-in meetings occurred during the study period, the current GVI implementation in Philadelphia, due to the COVID-19 pandemic, used MCIT custom notification

visits as the primary means of GVI implementation. A GVI implementation primarily through MCIT custom notification visits appears to maintain the effectiveness of GVI.

In conclusion, the current GVI implementation in Philadelphia has been associated with significant reductions in GMI firearm violence. The continued effectiveness of the implementation will likely depend on a range of factors, including necessary adjustments to evolving group activity and firearm violence.

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INTRODUCTION

Group Violence Intervention (GVI) is an evidence-based strategy for combatting group member-involved (GMI) firearm violence in urban communities (National Network for Safe Communities, 2016). A group “refers to any social network whose members commit violent crimes together” and includes, for example, loosely affiliated “neighborhood crews with no hierarchy or business” (National Network for Safe Communities, 2021, p. 2).¹

GVI relies on a multi-pronged approach: (1) offers of social services and support to at-risk group members; (2) focused deterrence messaging and law enforcement sanctions in response to violence; and (3) community-rooted messaging that de-normalizes violence (Roman, Link, Hyatt, Bhati, & Forney, 2019; Braga, Weisburd, & Turchan, 2018; National Network for Safe Communities, 2021).

In August 2020, the City of Philadelphia initiated the current GVI implementation (City of Philadelphia, 2021). Planning for the implementation had begun as early as 2019 (Palmer, 2019). The City of Philadelphia Office of Violence Prevention (OVP) has had primary responsibility for the implementation of GVI. The National Network for Safe Communities (NNSC) at City University of New York John Jay College of Criminal Justice has provided technical assistance and guidance to City of Philadelphia entities involved in the implementation. Besides OVP, other primary governmental entities involved in the implementation of GVI have included the Philadelphia Police Department (PPD), the Delaware Valley Intelligence Center (DVIC), Philadelphia Adult Probation and Parole Department (APPD), and the Philadelphia District Attorney’s Office (DAO).

In 2020, the City of Philadelphia commissioned the University of Pennsylvania to conduct an independent evaluation of the current implementation of GVI in Philadelphia. The Urban Affairs Coalition (UAC) provided the necessary funds for the Evaluation to the University of Pennsylvania; the funds were made possible through a grant awarded by the Commonwealth of Pennsylvania Department of Community and Economic Development and funded by the Pennsylvania General Assembly. This Evaluation provides the results of the University of Pennsylvania’s independent evaluation.

¹ Within a given city, although group members typically constitute less than 0.5% of the population, prior research estimates that group members may be linked to 60 to 70% of shootings and homicides (National Network for Safe Communities, 2016).

OVERVIEW OF THE GROUP VIOLENCE INTERVENTION STRATEGY

To combat group member-involved (GMI) firearm violence, Group Violence Intervention (GVI) uses a combined strategy of social services, community engagement, deterrence, and enforcement (Roman, Link, Hyatt, Bhati, & Forney, 2019; Braga, Weisburd, & Turchan, 2018; National Network for Safe Communities, 2021). The underlying core components of GVI are premised on decades of empirical research.

I. GVI DEFINITION

In most implementations, GVI² consists of the following key steps (Roman, Forney, Hyatt, Klein, & Link, 2020; Braga & Weisburd, 2015; Braga, Weisburd, & Turchan, 2018). Interagency partners first identify groups driving violence that would benefit from the intervention.

Where there are no COVID-19-related restrictions on public gatherings, GVI call-in meetings gather multiple group members into a large meeting area, such as a city hall reception room. The GVI call-in meeting team consists of social service providers, community members, and law enforcement representatives (Corsaro & Engel, 2015; Papachristos & Kirk, 2015; Braga & Weisburd, 2015).

At call-in meetings, the GVI team communicates to group members that the violence must cease and that the next group to commit a homicide and/or the most violent group will bring law enforcement attention to the responsible group (Kennedy, 2019; Roman, Forney, Hyatt, Klein, & Link, 2020). Emphasizing a commitment to protecting group members' safety, the team offers social services, including trauma support and removing immediate barriers to success (Kennedy, 2019; Braga, Weisburd, & Turchan, 2018). Even in the absence of a direct influence on conduct, social services may reduce an individual's rationalization of risky behavior (Braga & Kennedy, 2020). Community leaders and organizations also establish a moral voice against violence (Roman, Forney, Hyatt, Klein, & Link, 2020). To that extent, GVI seeks assistance from group members' influentials throughout the desistance process; influentials are individuals in a group member's social network, such as parents or grandparents, who can reinforce an anti-violence message (Kennedy, Kleiman, & Braga, 2017).

GVI functions on the expectation that notified groups and group members, as credible messengers, will relay the call-in directive to others at risk for violence within their social networks (Kennedy, 2019). Additionally, the call-in meeting process, although fundamentally a tool of focused

² GVI has sometimes been referred to as a "group violence reduction strategy" or GVRS (Papachristos & Kirk, 2015) or, previously, "Focused Deterrence." (Braga, Weisburd, & Turchan, 2018).

deterrence, also seeks to increase community trust in the criminal justice system (Corsaro & Engel, 2015). Namely, the call-in notifications aim to construct a procedurally just response to violence (Corsaro & Engel, 2015; Papachristos & Kirk, 2015; Braga & Weisburd, 2015).

Enforcement sanctions occur in response to groups that commit the first homicide and/or the most violent at a given time. Instead of imposing penalties across an entire population in a community, GVI focuses on the specific networks responsible for group-related violence (Sierra-Arevalo, Charette, & Papachristos, 2017; Roman, Forney, Hyatt, Klein, & Link, 2020).

A. Three Decades of GVI Implementation

During the 1990s, Boston implemented Operation Ceasefire, an innovative focused deterrence violence reduction strategy (Piehl, Cooper, Braga, & Kennedy, 2003; Brunson, 2015; Braga & Weisburd, 2015; Piehl, Kennedy, & Braga, 2000). The intervention was associated with reductions in youth homicides, shots-fired calls for service, and gun assault incidents (Braga, Kennedy, Waring, & Piehl, 2001; Braga, Hureau, & Papachristos, 2014).

Over the past two decades, many cities throughout the United States (Braga & Weisburd, 2015) such as Chicago (Papachristos & Kirk, 2015; Braga & Kennedy, 2020), East Los Angeles (Tita, et al., 2003), New Orleans (Corsaro & Engel, 2015), Cincinnati (Engel, Tillyer, & Corsaro, 2013), and Oakland (Braga, et al., 2019) have implemented GVI strategies (Braga, 2008).

To illustrate, a 2012 implementation in New Haven, Connecticut was associated with a reduction in monthly group member-involved shootings and homicides (Sierra-Arevalo, Charette, & Papachristos, 2017). Similarly, a 2012 implementation in Oakland produced reductions in shootings in treated census block group areas and treated groups; spillover effects were also present in untreated census block group areas and untreated groups (Braga, et al., 2019).

The current implementation of GVI is not the first time that Philadelphia has used focused deterrence strategies. In 2012, Philadelphia implemented a focused deterrence intervention in South Philadelphia neighborhoods that had a long history of group violence; the Philadelphia District Attorney's Office coordinated the implementation (Roman, Forney, Hyatt, Klein, & Link, 2020; Roman, Link, Hyatt, Bhati, & Forney, 2019). The implementation ended in 2016 (Hyatt, Densley, & Roman, 2021). Enforcement levers included increased community supervision, prosecution requests for higher bail, and law enforcement execution of outstanding warrants.

An evaluation of the previous Philadelphia implementation found that community rates of shootings decreased post-implementation (Roman, Link, Hyatt, Bhati, & Forney, 2019). Yet, the

implementation did not necessarily significantly reduce shootings as to treated groups (Roman, Forney, Hyatt, Klein, & Link, 2020; Roman, Link, Hyatt, Bhati, & Forney, 2019). A descriptive analysis of enforcement action tools such as arrests and case processing did not find evidence that arrest practices were overly aggressive (Roman, Forney, Hyatt, Klein, & Link, 2020). Additionally, the influence of social media usage on treated groups in Philadelphia was mixed (Hyatt, Densley, & Roman, 2021). Factors such as the overall percentage of group leaders on social media were associated with increases in group member-involved shootings; however, content-specific factors such as direct threats towards rivals were not associated with these increases.

B. Methodological Considerations in Evaluating GVI

The core evaluation question is whether GVI reduced group-involved violence (Piehl, Kennedy, & Braga, 2000; Braga, et al., 2019; Roman, Klein, & Wolff, 2018).³ A key consideration when evaluating a GVI intervention is whether the intervention meaningfully differs “from standard practice or from practice that would have been generated in the absence of the process.” (Piehl, Kennedy, & Braga, 2000, p. 71).

Evaluating complex interventions such as GVI inherently present methodological challenges (Corsaro, 2018; Brantingham, Tita, & Herz, 2021). As a practical matter, GVI implementation in most cities do not involve randomly assigned treatment and control groups; therefore, randomized controlled trials are often not a feasible evaluation option (Braga, Kennedy, Waring, & Piehl, 2001; Saunders, Lundberg, Braga, Ridgeway, & Miles, 2015; Braga, Weisburd, & Turchan, 2018; Braga & Weisburd, 2014; Weiner, et al., 2007). For example, absent a tool such as propensity score matching, a raw comparison of treated groups with untreated groups would create selection bias (Roman, Klein, & Wolff, 2018). For example, a group that receives GVI treatment is inherently different from a group that has never received GVI treatment on a range of discernable and non-discernable factors, including recent involvement in violence.

Instead, internally valid quasi-experiments will utilize some criterion other than random assignment to isolate the effect of a treatment (Welsh & Farrington, 2001; Mark & Reichardt, 2009; Roman, Klein, & Wolff, 2018; Braga, et al., 2019). For example, where the study units – such as census

³ Not all implementations occur with fidelity to the GVI model. Thus, some researchers suggest that empirical evaluations should assess process in addition to impact. Namely, a process evaluation assesses whether the implementation occurred with fidelity to the GVI model (Braga & Kennedy, 2020).

tracts – do not receive the GVI treatment at the same time, a quasi-experiment may utilize this variation to determine the effect of the GVI treatment. An internally valid quasi-experimental design must control for confounding factors that influence urban violence independent of the intervention (Butts, Roman, Bostwick, & Porter, 2015; Roman, Link, Hyatt, Bhati, & Forney, 2019), such as contemporaneous social or economic conditions.

An evaluation of a GVI implementation must also account for spillover effects from a treated group to other groups (Piehl, Cooper, Braga, & Kennedy, 2003; Braga, et al., 2019; Roman, Link, Hyatt, Bhati, & Forney, 2019). Previous research has found that an untreated group may experience a reduction in violence simply because it is connected, through rivalries, alliances, or other social networks, to a treated group (Braga, Apel, & Welsh, 2013; Braga, et al., 2019). Thus, the “stable unit treatment value assumption” – the assumption that the treatment or control condition for each unit does not influence the response of another unit – does not necessarily apply (Braga & Weisburd, 2014).

Violence prevention strategies rooted in both public health and criminal justice research anticipate aggregate-level effects at the community-level (Roman, Klein, & Wolff, 2018). At the same time, however, an evaluation analysis should avoid ecological inference fallacies (Braga, et al., 2019). Namely, violence reductions at larger spatial units such as entire cities or neighborhoods do not necessarily indicate violence reductions among treated groups; therefore, the group-level unit of analysis is vital.

As previous evaluations have found, GVI is an effective violence reduction tool (Braga, Weisburd, & Turchan, 2018; Kennedy, Kleiman, & Braga, 2017; Braga & Weisburd, 2012). Yet, more research is necessary to understand the mechanisms that make GVI effective; most evaluations have used a “black box” approach that does not ascertain which particular intervention components were key in producing the observed reduction effects (Roman, Forney, Hyatt, Klein, & Link, 2020; Braga, Weisburd, & Turchan, 2018; Weiner, et al., 2007). For example, qualitative studies of group members may help explain risk perception and group norms. Additionally, it is unclear whether GVI has an impact on individual-level decisionmaking and behavior (Braga, Hureau, & Papachristos, 2014).

Furthermore, given current challenges involving police legitimacy, community-police relations, and procedural justice, empirical evaluations should assess the perceptions and responses of the individuals subject to these interventions (Griffiths & Christian, 2015). To that extent, evaluations

should consider whether GVI may increase over-surveillance for some individuals (Roman, 2021; Webster, 2022).

II. THEORETICAL BASES AND POSSIBLE MECHANISMS

The GVI framework is premised on empirically-supported (and oft-interrelated) theories from a range of disciplines that include criminology and public health. In turn, these theories provide insight as to possible mechanisms for GVI-associated reductions in violence.

A. Spatial and Social Concentration of Violence

Firearm violence in urban areas, including Philadelphia, tends to be spatially concentrated in hot spot locations (Weisburd, 2015; Braga, Papachristos, & Hureau, 2010; Beard, et al., 2017; Jacoby, Dong, Beard, Wiebe, & Morrison, 2018; Tita, et al., 2003; Schnell, Braga, & Piza, 2017). Evidence-based violence reduction strategies, such as GVI, thus inherently have a place-based, ecological dimension.

Additionally, group member-involved urban violence is often concentrated among a small number of groups and individuals (Braga, Kennedy, Waring, & Piehl, 2001; Papachristos & Wildeman, 2014; Papachristos & Kirk, 2015; Braga & Kennedy, 2020). GVI thus conceptualizes violence as the product of group-level dynamics that are largely immune to individual-level consequences (Kennedy, 2019; Kennedy, Kleiman, & Braga, 2017). For example, merely arresting and incarcerating the shooters from the last gunfire exchange between two rival groups will likely have little effect on continued violence; the groups and the underlying grudge will persist— as well as the strong likelihood for retaliative violence (Kennedy, 2019). To that extent, peer influence and the structure of social networks might be leveraged to amplify gun violence reduction efforts (Wood & Papachristos, 2019).

Importantly, the risk of firearm violence for group members entails not only the risk of being a shooter but also a victim. Previous research has found a relationship between victimization and perpetration for many adolescents and young adults (Cunningham, et al., 2009; Dowd, 1998). As one study using propensity stratification and longitudinal data found, an adolescent exposed to firearm violence – measured as being shot or shot at or as witnessing a shooting – is twice as likely to commit serious violence over the next two years (Bingenheimer, Brennan, & Earls, 2005).

In short, urban firearm violence is often the product of risk factors related to an individual's social network and activities as well as the surrounding spatial environment (Wiebe, et al., 2016; Hohl,

et al., 2019; Branas, Culhane, Richmond, & Wiebe, 2008). GVI addresses violence within these spatial and social-based concentrations (Kennedy, 2019).

B. Focused Deterrence

According to deterrence theory, sanctions that would-be offenders perceive may discourage them from committing crimes (Loughran, Paternoster, & Weiss, 2012; Nagin, 2013; Braga & Weisburd, 2012; Braga, Weisburd, & Turchan, 2018). Specific deterrence focuses on deterring offenders from reoffending; by contrast, general deterrence attempts to dissuade the general public from committing crimes (Stafford & Warr, 1993; Braga & Weisburd, 2015). Specific deterrence is often shaped through an individual's own personal experiences and perceptions (Paternoster & Piquero, 1995; Murphy, Bradford, & Jackson, 2016).

GVI fundamentally constitutes a focused deterrence or “pulling levers” violence-reduction approach (Sierra-Arevalo, Charette, & Papachristos, 2017; Braga, 2012; Braga, 2008; Braga & Weisburd, 2015; Braga, Kennedy, Waring, & Piehl, 2001).⁴ GVI communicates to group members that certain acts of violence will result in increased attention to groups' overall legal vulnerabilities (Papachristos & Kirk, 2015; Kennedy, Piehl, & Braga, 1996). In contrast to general deterrence strategies, focused deterrence strategies such as GVI recognize that violence often is the product of concentrated social networks (Braga & Weisburd, 2015; Braga, et al., 2019).

Nonetheless, labelling GVI as merely a “focused deterrence” strategy misapprehends the purpose, mechanisms, and effects of the intervention (Kennedy, 2019; Braga & Weisburd, 2012; Kennedy, Kleiman, & Braga, 2017; Webster, 2022). Key components of GVI include providing support to high-risk individuals, strengthening communities, and increasing a community's perception of procedural justice. Furthermore, properly executed, focused deterrence within the context of violence reduction programs should respond to the oft-instantaneous situations, contexts, and interactions that prompt individuals to engage in violence (Griffiths & Christian, 2015).⁵

⁴ Focused deterrence interventions have also been used to confront other crime problems besides group-involved violence, including drug markets and repeat offenders (Braga, Weisburd, & Turchan, 2018).

⁵ Relatedly, some researchers have hypothesized that focused deterrence strategies also incorporate elements of situational crime prevention strategies (Braga & Kennedy, 2020; Tillyer & Kennedy, 2008). These strategies seek to alter the behavior of potential victims and decrease opportunities for offending within the context of the external environment.

To that extent, GVI does not deter group-related violence through merely increasing police presence or engaging in “crackdowns” (Sierra-Arevalo, Charette, & Papachristos, 2017). Instead, GVI-based focused deterrence entails selecting a specific crime problem, convening law enforcement and other relevant stakeholders, identifying key offenders, groups, and behaviors, constructing a sanction framework that seeks to deter the offenders and groups, providing social services and community resources, and explaining to offenders and would-be offenders that their safety and the safety of the larger community are paramount. (Braga, 2008; Braga & Weisburd, 2015; Saunders, Lundberg, Braga, Ridgeway, & Miles, 2015; Roman, Forney, Hyatt, Klein, & Link, 2020).

C. Procedural Justice and the Perceived Legitimacy of Governmental Actors in the Criminal Justice System

The concept of procedural justice hypothesizes that citizens will have less satisfaction with governmental entities where they perceive that these entities fail to act in a just and fair manner (Haberman, Groff, Ratcliffe, & Sorg, 2016; Kochel, Parks, & Mastrofski, 2013). When governmental entities, such as the police, act in a trustworthy manner and treat citizens with respect, citizens will view governmental authority as legitimate, thus promoting compliance with the law (Nagin & Telep, 2017; Weisburd & Majmundar, 2018; Tyler, 2017; White, Weisburd, & Wire, 2018; Kennedy & Ben-Menachem, 2019). Even offenders, who tend to have negative opinions of the law and legal authority, will be more likely to comply with the law when they believe in the legitimacy of the government and the criminal justice system (Papachristos, Meares, & Fagan, 2012; Wallace, Papachristos, Meares, & Fagan, 2016).

Strategies such as GVI seek to improve the public’s perception of procedural justice, especially in neighborhoods in which governmental entities have historically imposed overly aggressive and disparate criminal justice sanctions (Braga, 2012; Kennedy, 2019; Braga, Weisburd, & Turchan, 2018; Braga & Kennedy, 2020; Webster, 2022; Roman, 2021). By tailoring intensive crime-prevention efforts at specific individuals and groups involved in problem activities, GVI inherently differs from law enforcement strategies that indiscriminately surveil entire communities. Additionally, GVI seeks to treat group members with respect and dignity and engages the community as necessary partners in reducing violence (Brunson, 2015; Braga & Weisburd, 2015).

D. Collaboration Between Police and Community

Police strategies that are geographically focused and extend beyond standard law enforcement behaviors can be effective tools in preventing crime (Weisburd & Eck, 2004). Violence intervention programs such as GVI draw on both community-oriented policing and problem-oriented policing (Sierra-Arevalo, Charette, & Papachristos, 2017). 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). Problem-oriented policing encourages law enforcement to identify problems, work towards long-term solutions, and mobilize public and private community resources (Alpert, Dunham, & Stroshine, 2015; Braga, Kennedy, Waring, & Piehl, 2001).

Importantly, GVI requires a collaborative relationship between community members and the police (Kennedy, 2011). This collaborative relationship can contribute to a sense of procedural justice in communities at risk for both firearm violence and strained community-police relations (Brunson, 2015; Braga, Brunson, & Drakulich, 2019). More specifically, the joint collaboration of law enforcement with community outreach workers may be more effective – than law enforcement or community outreach workers working independently (Braga, 2016; Kennedy, 2011).

E. Urban Firearm Violence Is a Public Health Challenge with Public Health Solutions

Violence reduction strategies such as GVI inherently frame violence as a public health challenge (Braga, Weisburd, & Turchan, 2018; Braga & Weisburd, 2015). Within the violence prevention context, public health research and practice are action-oriented, using science to determine both the causes of problems and solutions to these problems (Braga & Weisburd, 2015; Wiebe, et al., 2016). Specifically, a public health framework focuses on prevention and uses scientific methodology to identify complex individual, situational, and neighborhood risk factors (Braga & Weisburd, 2015; Kaufman & Richmond, 2020; Webster, 2022).

For example, urban adolescents with access to firearms are more likely to report behavioral health challenges such as depression (Abaya, Atte, Herres, Diamond, & Fein, 2019). Importantly, as one study using data from Philadelphia found, individuals in possession of a firearm were significantly more likely to be shot in an assault compared to individuals not in possession of a firearm (Branas, Richmond, Culhane, Ten Have, & Wiebe, 2009). Other individual risk-factors for firearm violence

among adolescents and young adults include substance misuse, attitudes favoring firearm use and retaliatory behavior, peer possession of firearms, and increased levels of community violence exposure (Carter, et al., 2020; Schmidt, et al., 2019).

In turn, neighborhoods that confront high levels of concentrated disadvantage, household gun ownership, vacant and blighted properties, and historical and structural racism and inequities are at risk for firearm violence (Wiebe, et al., 2016; Branas, et al., 2016; Beard, et al., 2017; Jacoby, Dong, Beard, Wiebe, & Morrison, 2018; Branas, Jacoby, & Andreyeva, 2017; Moyer, MacDonald, Ridgeway, & Branas, 2019; Branas, et al., 2018; South, MacDonald, Tam, Ridgeway, & Branas, 2023).

Violence-prevention strategies rooted in public health provide services that confront the social, emotional, biological, and cognitive impacts of prior exposure to violence (Purtle, Cheney, Wiebe, & Dicker, 2015; Kaufman & Richmond, 2020). GVI inherently recognizes that many individuals at risk for committing violence have themselves experienced trauma related to witnessing repeated violence in their communities (Kennedy, 2019; Kennedy, Kleiman, & Braga, 2017).

F. Informal Social Control and Collective Efficacy

GVI is premised on concepts of informal social control and collective efficacy (Braga, Weisburd, & Turchan, 2018; Kennedy, 2019). Collective efficacy entails social cohesion among neighbors as well as a willingness to intervene on behalf of the common good (Sampson, Raudenbush, & Earls, 1997). Although some research has found no direct relationship between collective efficacy and violent crime, there is evidence to suggest an indirect relationship between violence and decreased collective efficacy (Hipp & Wickes, 2017).

Strategies such as GVI seek to enlist community members as a moral voice against violence and, by extension, reposition group members' norms. GVI also recognizes that community members, as well as law enforcement, possess a first-hand knowledge of group violence-related challenges in their neighborhoods (Kennedy, 2019).

DATA SOURCES

The quantitative outcome-based analyses in this Group Violence Intervention (GVI) Evaluation use the following main data sources: (1) GVI Notification Dataset; (2) Shooting Victim Dataset; (3) Group Member database; (4) Arrest/Offense Dataset; (5) Enforcement Action Dataset; and (6) Social Services Dataset.

The Delaware Valley Intelligence Center (DVIC) and the Office of Violence Prevention (OVP) maintain the GVI Notification Dataset. The GVI Notification Dataset was received from DVIC on July 6, 2022. This Dataset provides notification-level information about each initial contact between an individual and the GVI strategy. Information in this data include the individual's name and age, an indicator as to whether an influential was present during the contact, the individual's Police Identification Number (PID), the reason for the contact, the latitude and longitude of the notification, whether the contact occurred through a custom notification or a call-in meeting, the individual's primary group affiliation, and a narrative about the interaction.

DVIC and the Philadelphia Police Department (PPD) maintain the Shooting Victim Dataset. The Shooting Victim Dataset was received from DVIC on May 31, 2022. The Dataset is victim-level, containing information as to shootings that resulted in some type of gunshot injury or fatality. In Philadelphia, law enforcement and medical providers have historically monitored and recorded these types of shootings (Branas, Culhane, Richmond, & Wiebe, 2008). Shooting incidents where no injury or fatality occurs may not necessarily be consistently reported to law enforcement or to a medical provider. In this Evaluation, a shooting refers to some victim-level incident that resulted in an injury or a fatality known to law enforcement.

The Shooting Victim Dataset contains information such as the victim's name and, if available, police identification number, the shooter's name and police identification number, the latitude and longitude of the shooting, incident address, whether the shooting was fatal, the victim's group or groups, the shooter's group or groups, and whether DVIC categorized the shooting as "group-related."⁶

Besides the information in the Shooting Victim Dataset, this analysis also used additional data to determine if a victim or shooter was a member of a particular group or groups. DVIC maintains a Group Member Database, which lists each individual's name, PID (if available), and the group or

⁶ January 1, 2020 was the earliest date for which DVIC could provide consistently coded data.

groups affiliated with that individual. Subject to federal and state laws and department-level internal regulations, many cities throughout the United States maintain databases of individuals involved in gangs or groups (Philadelphia Police Department Police Advisory Commission, 2020). The Group Member Database was received from DVIC on June 1, 2022.

Additionally, the Offense Dataset provides information about each offense incident involving an individual who is receiving GVI. The data include information about the arrest date, the Uniform Crimes Report (UCR) offense type, and the offense date. The Offense Dataset was received from DVIC on August 15, 2022.

To evaluate the role of enforcement, this Evaluation compiled an Enforcement Action Dataset based on information that DVIC, OVP, and the Philadelphia District Attorney's Office (DAO) provided. This analysis also consulted the Social Services Dataset that OVP maintains. This Dataset contains information such as the services that GVI recipients request and their community supervision status at the time of the initial visit.

For the spatial place-based analysis, this Evaluation uses U.S. Census Bureau cartographic census tract boundary shapefiles (U.S. Census Bureau, 2022).

CURRENT GVI IMPLEMENTATION IN PHILADELPHIA

Like the rest of the global community, Philadelphia endured the immense human, economic, and social costs of the COVID-19 pandemic, which began in early 2020. Throughout 2020 and throughout much of 2021, Philadelphia imposed public health-related mandates, including limitations on large gatherings, to limit the spread of COVID-19. In August 2020, Philadelphia began implementation of Group Violence Intervention (GVI). This implementation required modifications to comply with COVID-19-related restrictions (City of Philadelphia, 2021).

The City of Philadelphia Office of Violence Prevention (OVP) has had primary responsibility for the implementation of GVI. The National Network for Safe Communities (NNSC) at City University of New York John Jay College of Criminal Justice has provided technical assistance and guidance to City of Philadelphia entities involved in the implementation. Besides OVP, other primary governmental entities involved in the implementation of GVI have included the Philadelphia Police Department (PPD), the Delaware Valley Intelligence Center (DVIC), Philadelphia Adult Probation and Parole Department (APPD), and the Philadelphia District Attorney's Office (DAO).

Additionally, during the pandemic, several tragic high-profile deaths of Black Americans during law enforcement encounters occurred in cities such as Minneapolis and Louisville. These deaths precipitated many citizens, law enforcement agencies, and other governmental entities to reexamine long-standing problems such as racial inequities in the criminal justice system and to develop necessary reforms. Therefore, in using GVI as a firearm violence reduction strategy, Philadelphia planned to avoid a simplistic approach that, in relying on only arrests and prosecutions, could potentially worsen existing inequities (City of Philadelphia, 2021; Palmer, 2020). Instead, Philadelphia sought a violence intervention in which “the community and law enforcement [delivered] a unified message to stop the violence to those who are engaged in it and offering services and support to those who want the help.” (City of Philadelphia, 2021).⁷

Philadelphia is comprised of 21 Philadelphia Police Department Districts that are divided among six geographic Philadelphia Police Department Divisions: South (Districts 1, 3, 17), Southwest

⁷ Besides affecting the mode of GVI implementation, the COVID-19 pandemic was also associated with an increase in firearm violence in Philadelphia (Afif, et al., 2022; Johnson & Roman, 2022). It is possible that the pandemic intensified existing social and structural disadvantages that are associated with urban firearm violence.

(Districts 12, 16, 18, 19), Northwest (Districts 5, 14, 35, 39), East (Districts 24, 25, 26), Northeast (Districts 2, 7, 8, 15), and Central (Districts 6, 9, 22).

During the 128-week period between January 1, 2020 and May 30, 2022, there have been 5,487 shooting victims in Philadelphia, which has approximately 1.6 million residents. The below table shows the average number of shooting victims per week for a given year in each of the six divisions.

Table 1: Average Number of Shooting Victims Per Week Per Division, January 2020-May 2022

	January 2020- December 2020 (53 weeks)	January 2021 – December 2021 (53 weeks)	January 2022- May 2022 (22 weeks)
Central Division	5.4	6.3	6.4
East Division	10.8	11.2	11.0
Northeast Division	4.2	4.1	4.9
Northwest Division	8.7	9.3	8.5
South Division	2.3	1.9	2.1
Southwest Division	11.1	11.2	8.5

Of the total 5,487 shooting victim-level incidents, 20.4% of the incidents have been fatal. The average age of the victims is 29.2 years old; 83.2% are Black, and 88.8% are male.

At least 20.9% of all victim-level shooting incidents are group member-involved (GMI) (N=1,147) in Philadelphia. Of these, 23.1% have been fatal; the average age of the victims is 26.2 years old; 92.2% are Black, and 96.5% are male.⁸

Consistent with the NNSC framework, the current GVI implementation in Philadelphia defines a “group” as any social network whose members commit violent crimes together” and includes, for example, loosely affiliated “neighborhood crews with no hierarchy or business” (National Network for Safe Communities, 2021, p. 2). This analysis considered a shooting as Group Member-Involved (GMI) if (1) the victim is/was a member of a group or groups; (2) the shooter, if known,

⁸ As for clearance rates, 20.5% (N=1,126) of all shootings result in an arrest and 29.5% (N=338) of all GMI shootings result an arrest. Yet, it is possible that GMI shootings are not necessarily more likely to be cleared than all shootings, on average. Instead, it may be shootings that result in an arrest are more likely to be discernable as GMI.

is/was a member of a known group or groups; or (3) both the victim and the shooter are/were members of a known group or groups.⁹

GVI implementation began in the Southwest Division (August 2020). Subsequently, GVI was implemented in the Central Division (January 2021), the South Division (February 2021), and the Northwest Division (March 2021). In April 2022, GVI implementation began in the 26th District of the East Division. During this study period, GVI implementation did not begin in the 24th District or the 25th District of the East Division. In September 2022, after the study period, GVI implementation began in the Northeast Division.¹⁰

The current GVI implementation has proceeded in each division with the key preliminary step of a group audit. Specifically, NNSC as well as PPD and other law enforcement personnel collaboratively conduct a group audit which identifies all violent groups in a police division, their geographic areas of operations, alliance and conflicts, and overall group size.¹¹

Once a division (and the districts within its boundaries) initiate GVI, each week, PPD Patrol Operations receives information about shootings from each police district. PPD Patrol Operations, in turn, proposes individuals to receive the GVI message. The DAO and APPD assist with this identification process. DVIC analysts next review the list of proposed candidates to ensure that selection of these candidates complies with all federal and state laws. Additionally, this review and selection process ensures that for each GVI candidate, three main criteria have been satisfied.

Under the first criteria, the individual must possess a relevant criminal history, have been a shooting victim within the past five years, or has voluntarily self-identified as a criminal group member within the past year. A relevant criminal history is defined as arrest charges for a violent crime, a

⁹ In the Shooting Victim Dataset, DVIC classified 12.0% (N=660) of shootings between January 2020 and May 2022 as “group related.”

¹⁰ Quantitative assessment of the effect of GVI on firearm violence in Philadelphia must account for these spatial and temporal variations in implementation. At the same time, however, these variations provide a basis for internally valid quasi-experimental designs to isolate what effect, if any, GVI has had.

¹¹ Weekly citywide shooting reviews and GVI meetings with implementation partners have occurred throughout the current implementation. These meetings focus on recent violence and determine who to prioritize for custom notifications and enforcement, if necessary. Beginning in late 2022, district-specific incident reviews have begun in which GVI implementation and law enforcement partners re-review shooting incidents within the past 60 days to ensure that all information about groups in that district is up-to-date.

firearms offense, or a narcotics-related offenses (not including minor narcotics possession) within the past five years.

Under the second criteria, the PPD must have documented information, within one year, which associates the GVI candidate, either directly or through a direct association to a violent criminal group. A direct association must be no more than one degree of separation. Under the third criteria, the PPD must demonstrate information that the candidate's associated criminal group is directly involved in recent firearm violence within the past year.

Between August 2020 and May 2022, a total of 1,414 attempted or completed contacts occurred. Of these, 792 were completed contacts – namely, an interaction between the GVI strategy and a group member, an influential, or both.

Importantly, this Evaluation refers to an individual as a “GVI candidate” for time periods before an interaction with the GVI strategy. Once the individual has had some interaction with the GVI strategy, this Evaluation refers to an individual as a “GVI recipient.” This Evaluation refers to an individual as a “GVI recipient” even if the individual declines any further contact with GVI.

Given COVID-19-related restrictions on large-scale call-in meetings, the City has largely implemented GVI through custom notifications - direct, in-field, individual-level contacts. On nearly every Saturday morning beginning in August 2020, a Mobile Call-In Team (MCIT) has conducted custom notifications. In planning which GVI candidates to visit on a given Saturday, the MCIT prioritized the most at-risk individuals. As the implementation progressed and staffing increased, the MCIT also considered which neighborhoods had especially high rates of GMI firearm violence and at-risk groups.

Although the individual members of the MCIT vary from week to week, an MCIT generally consists of at least one law enforcement messenger, one community moral voice messenger, and one social service messenger – consistent with the GVI framework. For example, the MCIT on a given Saturday morning might consist of two uniformed PPD officers, a GVI social services case manager, a DAO staff member, and the mother of a firearm violence victim. The MCIT travels in an unmarked City of Philadelphia van.¹²

¹² The Evaluation Project Director accompanied the MCIT on three separate Saturday mornings: July 17, 2021, November 6, 2021, and April 23, 2022.

The MCIT does not visit the residences of individuals who have not satisfied the three-pronged criteria of the review and selection process. Also, if the candidate has an open warrant, no MCIT visit will occur.

Using DVIC-sourced information about the candidate's likely residential address, the MCIT approaches the residence of a candidate. If a candidate is on county-level probation or parole, APPD officers instruct the candidate to be present for the custom notification.

During a visit, the police officers first approach the address and knock on the door. If the address appears to be unoccupied, the MCIT leaves a flyer concerning GVI and contact information. If the candidate is not present at the residence, but an influential individual, such as a parent, is present, the MCIT engages with the influential and plans a follow-up visit with the candidate. If the candidate is physically present or if the influential is able to connect the MCIT and the candidate via a telephone call, the MCIT directly engages with the candidate. The MCIT will also attempt to contact the candidate again with, if possible, updated residential address information.

Again, once a GVI candidate has some contact with the GVI strategy, he is termed a "GVI recipient" in this report. If the GVI recipient is present, law enforcement messengers communicate to him and his influentials that continued violence will subject him and his group members to enhanced attention from law enforcement, which could result in criminal justice consequences such as arrests and prosecutions. The moral voice messengers, many of whom lost a son or daughter to group-related firearm violence, share personal narratives about how firearm violence negatively impacted their lives. Appealing to a GVI recipient's concern for his family, the moral voice messenger pleads with the recipient to "put down the guns" so that he can minimize the risk of his own premature firearm-related death.

In turn, GVI social services case managers offer social services to the GVI recipients.¹³ Services include assistance with navigating administrative requirements for employment and education. Additionally, GVI recipients may be connected to employment, including through the Center for Employment Opportunities (CEO). Within a week of contact through an MCIT visit or a call-in meeting, CEO provides GVI recipients with access to paying transitional employment. This transitional employment provides GVI recipients with the opportunity to develop professional skills that can create pathways to sustainable, long-term employment. CEO also helps GVI recipients

¹³ At the beginning of the GVI implementation, the social services team consisted of one director and two caseworkers; staffing has subsequently increased as the implementation progressed.

identify job and career interests that promote desistance and assists with connecting them to potential long-term employers.¹⁴

At times, when the MCIT approaches a GVI recipient's residence, the GVI recipient may be standing on the sidewalk in the company of other known group members. The MCIT will informally engage with those other group members as well. Additionally, while in the community, the MCIT will acknowledge any residents who are outside, such as neighbors, with a polite greeting.

Social service case managers also may conduct follow-up visits to GVI recipients in-person. Additionally, a GVI recipient may tell a peer such as a sibling or a fellow group member about the social services. The peer, even if he does not meet the criteria for an MCIT visit, may contact the GVI social services case managers for services.

With the easing of the COVID-19 pandemic and pandemic-related restrictions on large public gatherings, two call-in meetings at Philadelphia City Hall occurred between August 2020 and May 2022. On Thursday, October 21, 2021, a call-in meeting for the Central and Southwest Divisions occurred; nine individuals from six groups were present. On Monday, April 4, 2022, a call-in meeting for the Southwest Division occurred with 18 individuals from 15 groups present. All individuals present were on probation and received subpoenas to secure their attendance; failure to appear at the call-in meeting without an adequate explanation could constitute a violation of probation.¹⁵

At the call-ins, GVI recipients receive the three-pronged GVI message. Speakers have included parents of deceased firearm violence victims and the GVI social services team. Government officials such as Philadelphia Mayor James Kenney, Philadelphia Police Commissioner Danielle Outlaw, Philadelphia District Attorney Larry Krasner, U.S. Attorney Jacqueline Romero, Acting U.S. Attorney Jennifer Arbittier Williams, Pennsylvania Attorney General Joshua Shapiro, and Chief APPD Officer Anthony Aner.

After the call-in meeting, the GVI social services team conducts follow-up visits with the GVI recipients to ascertain their interest in social services. It has been hypothesized that the custom notification model of implementation – relative to the call-in model of implementation – has an

¹⁴ The GVI implementation is working on finalizing a behavioral health component through CEO. It is anticipated that all GVI recipients will be eligible to receive free therapeutic sessions with a licensed clinician by the end of 2023.

¹⁵ Two additional call-in meetings occurred in 2022 subsequent to the study period – on June 1, 2022 and September 19, 2022.

inherent flexibility that enables prompt intervention to quell ongoing conflicts and retaliatory violence. Additionally, through the use of residential visits, the MCIT has engaged with key group members who are not on probation and who could therefore decline to attend a call-in meeting.

After an MCIT visit or a call-in, an individual ordinarily does not receive additional visits from the MCIT. The individual's contact with GVI will be through the GVI social services team. However, if there is information that an individual is persisting in risky behavior, the MCIT will conduct additional visits with that individual.

Between August 2020 and May 2022, 27 enforcement actions occurred involving 26 separate groups throughout eleven (11) police districts; the first enforcement action occurred in October 2020. These enforcement actions occurred in response to triggering incidents such as a shooting that members of a group participated in. An enforcement action generally begins anywhere from between one week to four weeks after the triggering incident. As a general rule, enforcement actions last thirty (30) days.

In an enforcement action, law enforcement agencies, including the PPD, APPD, and the DAO use several levers. Individual group members who are the drivers of violence within their groups receive more scrutiny. Implementation of an enforcement action may depend on the discretion of the PPD district captain and analysts as well as the specific group-involved violence dynamics. Common levers include increased patrol and targeted patrol in a group's area of operation. Additionally, the PPD district will conduct warrant sweeps during which law enforcement will execute completed arrest warrants.

If a group member is on probation and is a member of a group subject to an enforcement action, APPD officers are notified; in turn, reporting requirements, such as additional home field visits, may be increased if a group member is engaged in behavior that is driving group-related violence. APPD officers communicate to the group member that he is receiving additional scrutiny because of his behavior. APPD shares information with other law enforcement agencies, including PPD.

Between August 2020 and May 2022, the DAO made over 50 prosecution referrals to the U.S. Attorney's Office (Eastern District of Pennsylvania) during enforcement action periods.¹⁶ A request for increased bail is another common lever during enforcement action periods. In support of the bail request, a prosecutor may present evidence that an individual with an open criminal case, such as a

¹⁶ An individual who is the subject of a federal prosecution referral will likely not be aware of the referral unless, upon completing its review, the U.S. Attorney's Office pursues prosecution.

firearms violation, is driving group-related violence or posting material on social media to incite violence.

Another common law enforcement lever during an enforcement action is a referral of a group member's case to the Gun Violence Task Force (GVTF). The GVTF is a collaboration between the Pennsylvania Attorney General's Office and the Philadelphia DAO. A GVTF designation leads to a more intense investigation of criminal conduct involving firearms. The investigation, which sometimes includes the use of grand juries, may produce more arrests than a standard investigation would. Additionally, a GVTF designation often entails vertical prosecution, where the same prosecutor handles the case from its initiation through disposition.

Thus, during an enforcement action, a group member who is driving violence will become aware that he is subject to additional law enforcement scrutiny and sanctions because of his behavior. At the time, however, group members do not know when an enforcement action begins or ends.

EVALUATION OVERVIEW

This Evaluation assesses the effect of the current Philadelphia Group Violence Intervention (GVI) implementation on group member-involved firearm violence. This Evaluation involved both quantitative and qualitative components.

As outlined in Table 2, this Evaluation made the following quantitative assessments in order to isolate the effects of GVI. For each of these quantitative analyses, treatment was defined in a manner most appropriate for the analysis.

First, the Evaluation assesses the effect of GVI on group-unit-level group member-involved (GMI) shootings. This group-unit-level analysis also assesses the effect of GVI dosage on GMI shootings.

Second, this Evaluation assesses the effect of GVI implementation on all shootings and GMI shootings at the census tract-level. This census tract-level analysis also evaluates the effect of dosage on GMI shootings. Additionally, this census tract-level analysis assesses whether displacement of firearm violence occurred once a census tract received GVI treatment.

Third, this Evaluation assesses the effect of GVI on individual-level firearm violence victimization for individuals who are GVI recipients. Fourth, it evaluates whether GVI affects the likelihood that an individual receiving GVI will commit an offense that results in an arrest. Fifth, this Evaluation assesses whether enforcement actions had any effects on group-level violence.

Additionally, this Evaluation conducted qualitative research to inform the quantitative findings. The qualitative research components were the following: (1) informal telephone conversations with GVI recipients; (2) surveys given to PPD officers involved in GVI custom notifications; and (3) informal surveys distributed at two Philadelphia Roadmap for Safer Communities community meetings.

The analyses in this Evaluation use regression models to determine the effect of GVI on a given outcome. As a general matter, a regression model quantitatively produces an estimate; this estimate describes how an explanatory variable, such as whether or not a census tract has already received the GVI treatment during a given week, affects an outcome variable, such as GMI shootings per week per census tract. In this Evaluation, Poisson regression models are used where the outcome is count data, such as the number of GMI shootings per group-unit per week. Logistic regression models are used where the outcome is binary, such as whether or not an individual is shot during a given month.

Table 2: Key Quantitative Analyses

	Analysis Unit	Treatment Definition	Contact Definition			Outcome	Dosage Analysis Conducted
			In-Person Mobile Call-In Team (MCIIT) Visit	Telephone Call with No In-Person Contact	Call-In Meeting		
Group	Group-Unit Per Week	At least 1 contact between GVI and GVI recipient who is group-unit member	Yes	Yes	Yes	Shootings with Group-Unit member(s) as shooter, victim, or both	Yes
Place and Community	Census Tract Per Week	At least 1 contact that physically occurred in census tract between GVI and (1) GVI recipient or (2) an influential	Yes	No	No	Group Member-Involved (GMI) shootings	Yes
						All shootings	No
Individual	GVI recipient Per Month	At least 1 contact between GVI and GVI recipient	Yes	Yes	Yes	Shootings where GVI recipient is the victim	No
						Offenses resulting in arrest of GVI recipient	No
Group	Enforcement-Action Subject Group	Imposition of enforcement action				Shootings with Enforcement-Action Subject Group member(s) as shooter, victim, or both	No

Throughout this Evaluation, the null (working) hypothesis is that GVI is expected to have no effect on the outcomes. A null (working) hypothesis can be conceptualized as an effect of 0. For example, we can hypothesize that there will be no difference in the number of GMI shootings for a census tract before receiving GVI treatment (Pre-Treatment) and after receiving GVI treatment (Post-Treatment). But, with enough data and enough of an actual numerical difference between the Pre-Treatment average shooting counts and the Post-Treatment average shooting counts, there may be sufficient evidence to reject that null hypothesis. A significance test determines a *p-value*. A *p-value* is the probability that an observed difference in averages detected is merely is the product of numerical chance and that there is no actual difference.

In the social sciences, it is conventional to highlight estimates that have *p-values* that are less than 0.05. Where a *p-value* is less than 0.05 (5% probability), we can say that the difference is

“significant.” A *p-value* of less than 0.01 means that there’s less than a 1% chance that a difference in averages is simply a product of numerical chance.

Throughout this evaluation, for the regression model analyses, significance levels (*p-values*) were calculated through permutation tests. The estimated two-tailed *p-value* is the fraction of the results from the permuted data that is as or more extreme than the estimate derived from the regression model using the original data. A two-tailed *p-value* equally accounts for the alternative hypotheses that the effect is greater than 0 or less than 0. Thus, a two-tailed *p-value* provides a significance level that is more conservative than a significance level from only a one-tailed *p-value*.

EFFECT OF GVI ON GROUP-UNIT FIREARM VIOLENCE

As prior research has instructed, the most relevant outcome for evaluating the effectiveness of a Group Violence Intervention (GVI) implementation is firearm violence reduction for at-risk groups (Piehl, Kennedy, & Braga, 2000; Braga, et al., 2019). This component of the Evaluation assesses the effect of GVI on group member-involved (GMI) shootings at the group-unit level per week.

I. DATA AND METHODS

The data sources for the group-unit analysis are the Shooting Victim Dataset (January 2020-May 2022) and the Notification Dataset (August 2020-May 2022).

For the group-unit analysis, treatment is defined as a direct contact that an individual group member at risk of group-involved firearm violence (“GVI recipient”) experiences with the GVI strategy. The direct contact can occur either through a Mobile Call-in Team (MCIT) custom notification visit or through a call-in meeting. This direct contact does not encompass a contact between an influential and the MCIT where the GVI candidate is completely absent and is unable to be contacted through telephone.

All told, between January 1, 2020 and May 30, 2022, there were 66 individual groups¹⁷ in Philadelphia that had (1) at least one member who was a shooting victim or a shooter during the study period and (2) at least one member who was a GVI recipient at some point during the study period.

More precisely, however, the unit of interest for this analysis is a group-unit. There are N=113 group-units (*i*) that are comprised of each of the 66 individual groups or combinations of these individual groups. For a given shooting, a group-unit is comprised of only one individual group where a member of one individual group was known to be involved in a shooting as a victim or shooter. A group-unit is comprised of multiple individual groups where, for example, both the shooter and the victim were members of separate groups. Where a shooting, for example, involved Group A as the shooter and Group B as the victim, the shooting is attributable to Group-Unit AB.

This definition of the unit of interest accounts for spillover effects of GVI from a treated group to other groups connected to that group through rivalries, alliances, or other social links (Piehl, Cooper, Braga, & Kennedy, 2003; Braga, et al., 2019; Roman, Link, Hyatt, Bhati, & Forney, 2019). Of

¹⁷ Data concerning the approximate membership size of the groups was available for 58 of these 66 groups. 33 groups have 30 or fewer members as of 2022. Also, 11 groups have more than 30 members but less than 50 members; there are 13 groups with 50 or more members.

the 113 group-units, four group-units consist of three individual groups, 44 group-units consist of two individual groups, and 65 consist of one individual group.

Once a group-unit is treated, it remains treated for the remainder of the analysis. The study-period is 128 weeks (*t*) in length (January 2020-May 2022). No treatment occurred during the period between January 2020 and July 2020 (Weeks 1-30). Each of the 113 group-units received treatment during at least one week in the period between Week 31 and Week 128. A group-unit is considered treated as soon as all groups within the group-unit have had a contact with the GVI treatment either through an MCIT custom notification visit or a call-in meeting. For example, if Group-Unit AB is comprised of Group A and Group B, Group-Unit AB is treated once both Group A and Group B are treated. During the 128-week study period (January 2020-May 2022), N=676 shootings occurred involving one of 113 group-units.

Of these N=676 shootings, 12.3% (N=84) occurred in Central Division, 10.4% (N=70) occurred in East Division, 4.3% (N=29) occurred in Northeast Division, 22.6% (N=153) occurred in Northwest Division, 13.3% (N=90) occurred in South Division, and 36.7% (N=250) occurred in Southwest Division. All told, 23.5% of the shootings were fatal.

The outcome of interest for this analysis is the number of shootings per group-unit per week where one or more members of the group-unit was a victim and/or a known shooter. This outcome draws on prior research articulating the association between firearm violence victimization and firearm violence perpetration (Bingenheimer, Brennan, & Earls, 2005; Cunningham, et al., 2009). Additionally, this outcome also comports with GVI's messaging that urges group members to desist from violence to prevent harm to themselves as well as to others.

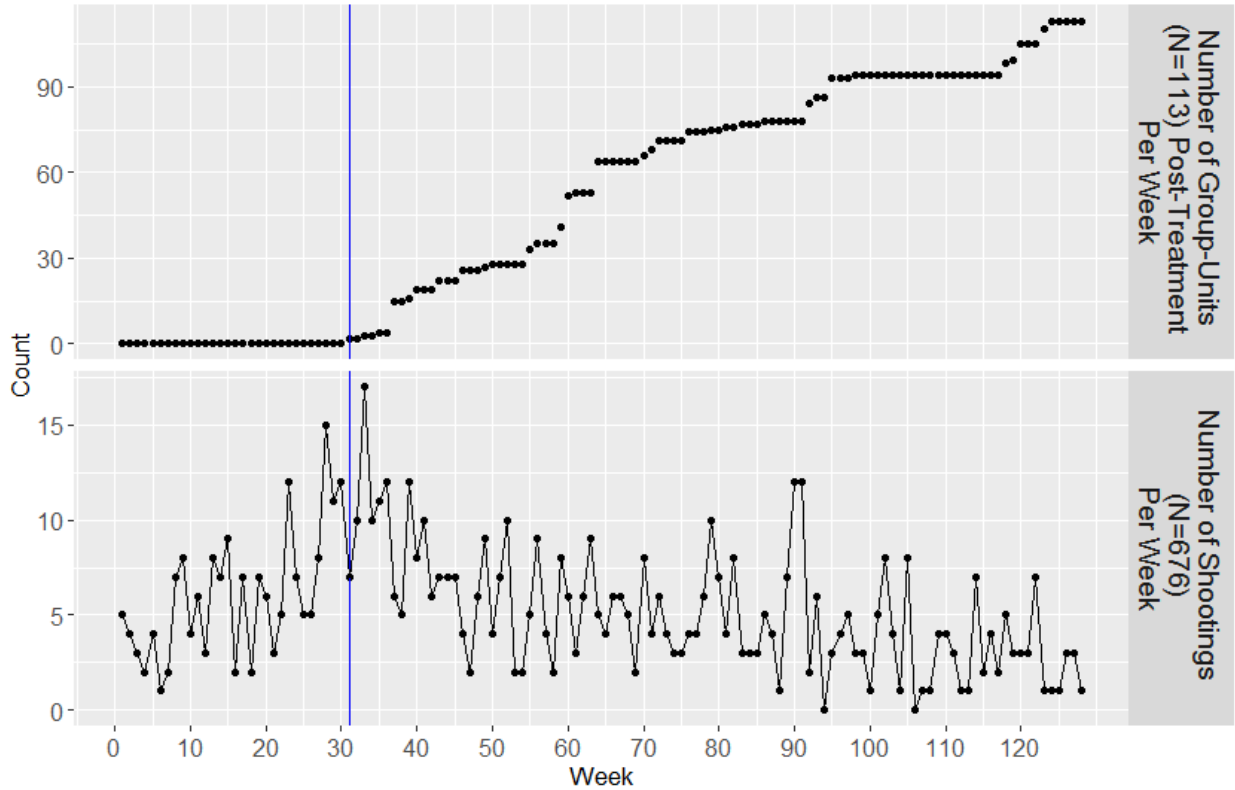
As a descriptive matter, it appears that treatment is associated with a significant reduction in shootings per week per group-unit. These significance levels were calculated through a t-test.¹⁸ On average, a group-unit, once treated (Post-Treatment), experienced 0.04 shootings per week; before treatment (Pre-Treatment), it experienced 0.05 shootings per week ($p < 0.001$). Thus, on average, a Post-Treatment group-unit experienced 2.1 shootings per year and a Pre-Treatment group-unit experienced 2.7 shootings per year.

The below times series graph, Figure 1, shows (1) the number of group-units that were Post-Treatment for each week and (2) the number of shootings per week. The vertical blue link indicates

¹⁸ A t-test is a statistical test to descriptively compare two means to determine whether they are significantly different.

Week 31 – the week the first group-unit became treated. As Figure 1 shows, by Week 128, all 113 group-units were now treated. Before Week 31, no group-unit was treated.

Figure 1: Times Series of Shootings (N=676) Involving 113 Group-Units and Implementation Over 128-Week Period



However, these descriptive numbers do not control for finer temporal or seasonal trends. The temporal variation in treatment is conducive to a quasi-experimental stepped wedge design (Ridgeway & MacDonald, 2017; Hussey & Hughes, 2007). In a stepped wedge design, each unit provides its own comparison – after treatment relative to before treatment. Specifically, a group-unit can be compared after it was treated (Post-Treatment) to before it was treated (Pre-Treatment).

The following Poisson regression model estimates whether receiving the GVI treatment had any effect on the number of shootings per group-unit per week. The outcome (λ_{it}) is the count of GMI shootings (both fatal and non-fatal) in a group-unit i during week t . In turn, β_1 captures the multiplicative change in the number of GMI shootings per week per group-unit, Post-Treatment relative to Pre-Treatment. The terms β_2 and β_3 capture any linear or quadratic trend over the study

period. For each group, the model includes a fixed effects term, α_i , which captures largely invariant characteristics of a group-unit during the study period such as previous history of violence and overall membership characteristics. Additionally, $\gamma_{Season(t)}$ is a fixed effects term for season. It is reasonable to expect that violence increases during summer months (Andresen & Malleson, 2013); thus, the model must account for the season during which a shooting occurred.

$$\text{Equation 1:} \quad \log(\lambda_{it}) = \beta_0 + \beta_1 Treated_{it} + \beta_2 t + \beta_3 t^2 + \gamma_{Season(t)} + \alpha_i$$

This analysis uses permutation tests to calculate significance levels. Standard significance tests resulting from only a regression model may inherently rely on distributional assumptions such as the absence of spatial and temporal correlation. However, for many quasi-experimental designs, it may be reasonable to assume that such correlation exists. For example, a shooting in one week may be correlated with a retributive shooting the following week, a possibility that prior research about group-involved violence supports. (Kennedy, 2019).

To that extent, a permutation test provides a non-parametric alternative that generates a reference distribution for the parameters of interest (Ridgeway & MacDonald, 2017). The null hypothesis in this analysis is that the key outcome of interest – GMI shootings – will not differ Post-Treatment relative to Pre-Treatment for a given group-unit i . Consequently, to generate a reference distribution, the permutation test randomly reassigned the starting week of the treatment for each group-unit. For example, suppose that in the original data, Group-Unit X began treatment in Week 58. Before Week 58, it was not treated (Pre-Treatment), but throughout Weeks 59-128 it remains treated (Post-Treatment). In the permuted data, Group-Unit X can begin treatment as early as Week 2 or as late as Week 128. For each of the 113 group-units, a total of 127 unique treatment patterns are therefore possible.

The Poisson regression model is recomputed with the permuted data. This process simulates what the distribution of the treatment effects would look like under the null hypothesis that the number of shootings per week per group-unit is independent of GVI treatment.

As an additional matter, assuming that receiving treatment has an effect on the number of shootings per group-unit per week, it is relevant to assess whether cumulative treatment dosage for a

group-unit is a possible mechanism. Specifically, the cumulative number of direct contacts between GVI and a group-unit may have some role in the effectiveness of GVI.

For the cumulative dosage analysis, a dose is defined as each instance of treatment for a group-unit. Routine follow-up interactions between the GVI social services team and a GVI recipient from a given group-unit are not included as a dose.

The below table demonstrates the range of dosage between Week 30 and Week 128. In Week 31, 111 group-units had not received any dose, and 2 group-units had each received one dose. By Week 128, 40 group-units had received one dose, 22 group-units had received 2 doses, 26 group-units had received between 3 and 5 doses, and 25 group-units had received 6 or more doses. In Week 128, the maximum dose for a group-unit was 14.

Table 3: Cumulative Dose Distribution Among Group-Units, Weeks 30-128

	0	1	2	3-5	6 or more
Week 30	113	0	0	0	0
Week 31	111	2	0	0	0
Week 32	111	2	0	0	0
Week 33	110	3	0	0	0
Week 125	0	43	19	27	24
Week 126	0	40	22	26	25
Week 127	0	40	22	26	25
Week 128	0	40	22	26	25

As a descriptive matter, the below table demonstrates the average number of shootings per group-unit per week based on the number of doses that group-unit received during a given week. Where a group-unit receives one or two doses relative to 0 doses, there appears to be a significant association with a reduction in shootings per group-unit per week. Significance levels were calculated through a t-test.

Table 4: Descriptive Table of Effect of Dosage Relative to No Treatment for Shootings Per Group-Unit Per Week

Dose	Average Number of Shootings Per Group-Unit Per Week	Average Number of Shootings Per Group-Unit Per Year
0	0.05	2.7
1	0.03***	1.6
2	0.02***	1.1
3-5	0.05	2.7
6 or more	0.06	3.2

*Note: p-values for the average difference (t-test) for a given dose relative to 0 doses are indicated as follows: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*

In isolation, however, these descriptive numbers do not account for seasonal or other temporal trends. The dosage analysis uses the above Poisson regression model (Equation 1) to estimate the effect of dosage on the on the number of shootings per group-unit per week. However, for the dosage analysis, β_1 captures the multiplicative change in the number of GMI shootings per week per group-unit attributable to each level dose relative to 0 doses (Pre-Treatment).

Significance levels were calculated through a permutation test that randomly reassigned the treatment sequence for a group-unit. The permutation test creates a reference distribution to test the null hypothesis that dosage levels have no effect. Where dosage is categorized as 0, 1, 2, 3-5, and 6 or more, there are 71 unique dosage patterns among the group-units. For example, suppose that in the original data, Group-Unit X received 1 dose in Week 58. Before Week 58, it remained untreated (0 doses). In Week 70, it received an additional dose. In Week 95, it received a third dose and in Week 99, a fourth dose. By contrast, Group-Unit B received only 1 dose in Week 120. Group-Unit L received 2 doses in Week 90 and 2 additional doses in Week 122. In one possible permutation sequence, Group-Unit X randomly receives the dosage pattern for Group B. Group-Unit B randomly receives the dosage pattern for Group-Unit L.

Supplemental sensitivity analyses were also conducted to assess the effect of GVI treatment on firearm violence at the group dimension. First, using the Poisson model in Equation 1, the main analysis about the effect of GVI treatment on a group-unit was recomputed with each of the 66 groups

as the unit of analysis – rather than the group-unit. Significance levels were again calculated with a permutation test.¹⁹

Secondly, using the Poisson model in Equation 1, the main group-unit level analysis is re-run with shootings from only January 2020 through December 2021. Specifically, over this 105-week period, N=573 shootings occurred involving 103 group-units²⁰. This sensitivity analysis accommodates the possibility that older shootings have a higher chance of being deemed GMI due to subsequent investigation compared to more recent shootings; any observed reduction in shootings would conceivably be the product of reduced GMI designation and not actual decreases in violence.

II. RESULTS

Post-Treatment relative to Pre-Treatment, a group-unit experienced a significant 38.6% reduction in shootings per week. The results of both supplemental sensitivity analyses support the robustness of this finding. Specifically, where the unit of analysis is the group rather than the group-unit, there is a significant 33.9% reduction in shootings per group per week, Post-Treatment relative to Pre-Treatment. Additionally, where the analysis is confined to shootings that occurred between only January 2020 and December 2021, there is a significant 37.2% reduction in shootings at the group-unit level per week, Post-Treatment relative to Pre-Treatment.

As to dosage, receiving 2 doses relative to 0 doses produced a significant 50.3% reduction in shootings per week for a group-unit. The below table presents the results.

¹⁹ As a descriptive matter, it appears that, on average, treatment is associated with a significant reduction in shootings per week per group. These significance levels were calculated with a t-test. On average, a group experienced 0.10 shootings per week Pre-Treatment and 0.07 shootings per week Post-Treatment ($p < 0.01$).

²⁰ As a descriptive matter, it appears that, on average, treatment is associated with a significant reduction in shootings per week per group-unit during the period between January 2020 and December 2021. These significance levels were calculated with a t-test. On average, a group experienced 0.06 shootings per week Pre-Treatment and 0.04 shootings per week Post-Treatment ($p < 0.01$).

Table 5: Percentage Change in Shootings Per Group-Unit Per Week

	Percentage Change in Shootings
Post-Treatment (1 or more Doses) Compared to Pre-Treatment (0 Doses)	-38.6% (-57.6%, -11.0%) $p=0.01^*$
1 Dose Compared to 0 Doses	-36.7% (-62.9%, 7.8%) $p=0.09$
2 Doses Compared to 0 Doses	-50.3% (-74.1%, -4.5%) $p=0.04^*$
3-5 Doses Compared to 0 Doses	-35.5% (-69.0%, 34.1%) $p=0.24$
6 or More Doses Compared to 0 Doses	-36.6% (-85.5%, 178.1%) $p=0.55$
Sensitivity Test Post-Treatment (1 or More Doses) Compared to Pre-Treatment (0 Doses) Group as Unit of Analysis – Not Group-Unit	-33.9% (-52.8%, -7.4%) $p=0.02^*$
Sensitivity Test Post-Treatment (1 or More Doses) Compared to Pre-Treatment (0 Doses) Truncated (January 2020-December 2021)	-37.2% (-57.3, -7.7) $p=0.02^*$

Note: Percentage change computed as $100(e^B - 1)$. Values in parentheses are permutation test p -values. P -values that are less than 0.05 are marked with an asterisk ().*

EFFECT OF GVI ON PLACE FIREARM VIOLENCE

This Evaluation also assesses the place-based effect of Group Violence Intervention on shootings. Specifically, this component assesses the effect of GVI on both group member-involved (GMI) shootings and all shootings per week per census tract. Since August 2020, the Mobile Call-In Team (MCIT) has visited multiple census tracts throughout Philadelphia and have made a direct in-person contact with either a GVI recipient or a GVI recipient's influential in the tracts.

I. DATA AND METHODS

The data sources for the place analysis are the Shooting Victim Dataset (January 2020-May 2022), the Notification Dataset (August 2020-May 2022), and U.S. Census Bureau cartographic boundary census tract shapefiles (U.S. Census Bureau, 2022).

Philadelphia is comprised of 384 census tracts and six (6) geographic Philadelphia Police Department (PPD) Divisions – South, Southwest, Northwest, East, Northeast, and Central. The boundaries of the police divisions are not coterminous with the census tract boundaries. GVI implementation began in the Southwest Division (August 2020). Subsequently, GVI implementation occurred in the Central Division (January 2021), South Division (February 2021), and Northwest Division (March 2021). In April 2022, initial GVI implementation began in the East Division and has continued into the Northeast Division.

There are N=260 census tracts that have boundaries that are completely or partially within the Central, Southwest, South, and Northwest Divisions. More importantly, however, of these census tracts, N=227 census tracts experienced at least one shooting during the 128-week period between January 2020 and May 2022 (Weeks 1-128).

Of these N= 227 census tracts, N=123 of them experienced treatment. These N=123 census tracts are the primary spatial unit of interest for this analysis. For this analysis, treatment occurs for a census tract where at least one in-person contact has physically occurred in that census tract between the MCIT and a GVI recipient, an influential of a recipient or with both the recipient and the influential. This contact can include, for example, a custom notification visit where the GVI candidate was not present, but an influential, such as a parent, interacted with the MCIT. Contacts that occurred through only telephone or through call-in meetings, which have occurred at Philadelphia City Hall, are *not included* as treatment contacts. These contacts do not capture the effect of a contact that physically occurs within a neighborhood.

In defining treatment in this manner, this analysis seeks to assess the effect of GVI on a broader and more ecological level. It is reasonable to hypothesize that where Philadelphia Police Department (PPD) officers and GVI social service team members are visible in a neighborhood and directly interact with an individual, GVI may have effects on firearm violence beyond GVI recipients and their groups.

In the 123 census tracts, a total of N=729 treatment contacts occurred between August 2020 and May 2022. No treatment occurred during the period between January 2020 and July 2020 (Weeks 1-30). Once a census tract *i* is treated, it remains treated for the remainder of the analysis. Each of the 123 census tracts began receiving treatment during at least one week in the period between Week 31 and Week 128. All told, between January 2020 and May 2022 (Weeks 1-128), N=2,975 total shootings occurred in the 123 census tracts. Of these, there were N=682 GMI shootings.²¹

Table 6: Count of Shootings, Southwest, Central, South, and Northwest (January 2020-May 2022)

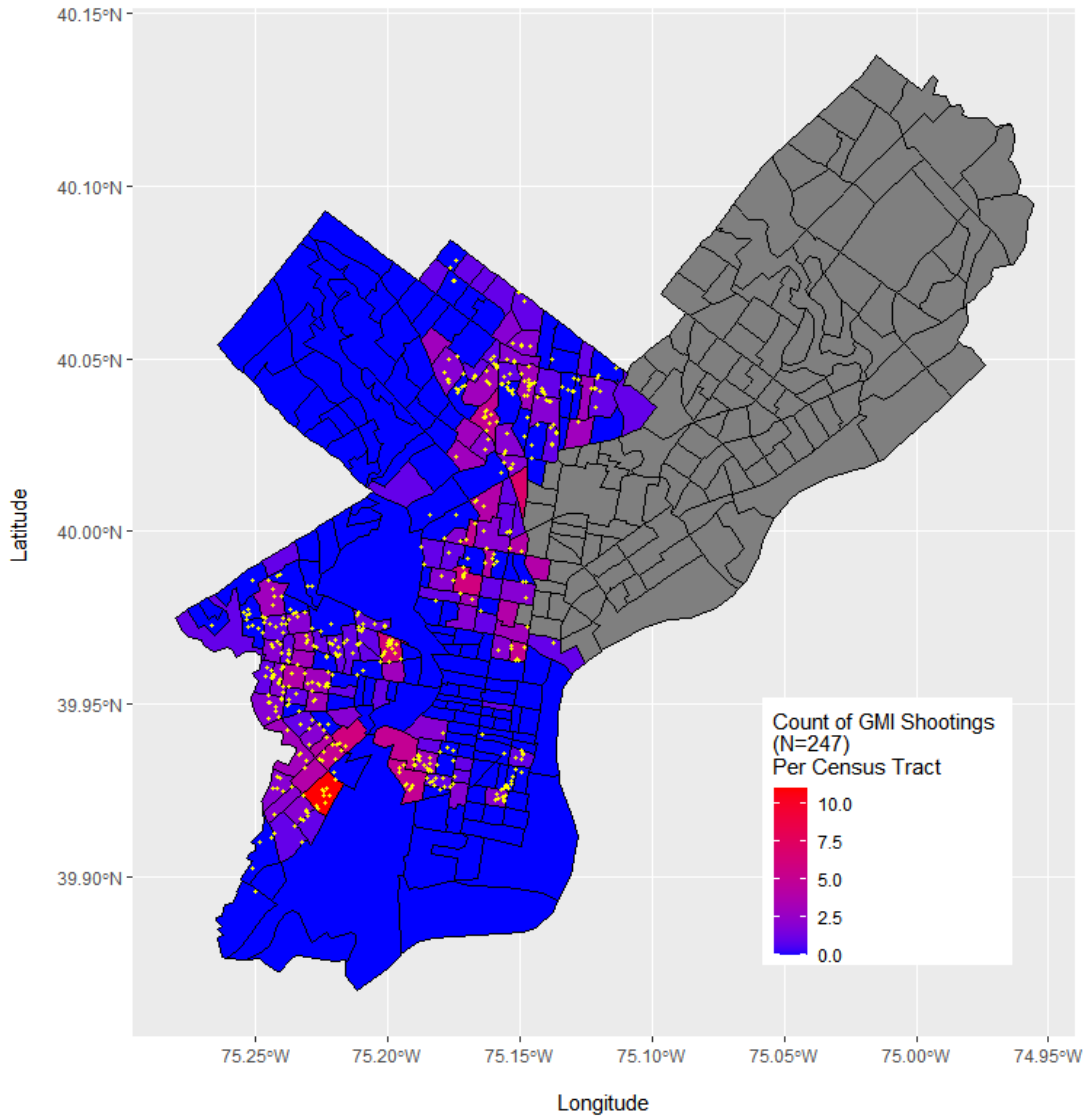
	Shooting Count (January 2020-May 2022)	GMI Shooting Count (January 2020-May 2022)	GMI Shooting Count (January 2020-August 2020)
Census Tracts that Eventually Received GVI Treatment in South, Central, Southwest and Northwest Divisions 123 Census Tracts	2975	682	199
Untreated Census Tracts in South, Southwest, Central and Northwest Divisions (“Displacement”) 104 Census Tracts	829	178	48
Both Untreated and Treated Census Tracts 227 Census Tracts	3804	860	247

²¹ Both the Notification dataset and the Shooting Victim dataset had latitude and longitude or geocodable address information that enabled the linkage of each notification and each shooting with the census tract in which the notification or shooting occurred.

On average for the 123 census tracts, once a census tract was treated (Post-Treatment), it experienced 0.18 shootings per week compared to 0.20 shootings per week ($p < 0.05$) before treatment (Pre-Treatment). Thus, on average, a census tract experienced 9.5 shootings per year Post-Treatment compared to 10.6 shootings per year Pre-Treatment. Also, on average, a census tract, Post-Treatment, experienced 0.03 GMI shootings per week whereas a census tract, Pre-Treatment, experienced 0.06 GMI shootings per week ($p < 0.01$). Thus, on average, a census tract experienced 1.6 GMI shootings per year Post-Treatment compared to 3.2 GMI shootings per year Pre-Treatment. The *p-values* for these averages were calculated through t-tests.

The below map demonstrates the distribution of GMI shootings before GVI implementation (January 2020-July 2020, Weeks 1-30) in the Southwest, South, Central, and Northwest Divisions. The yellow points occur in the 123 census tracts would eventually be treated and that experienced at least shooting between January 2020 and May 2022. Each yellow point indicates one dose of treatment. Approximately 500,000 people – roughly 31% of Philadelphia’s total population - live in the 123 census tracts (U.S. Census Bureau, 2020).

Figure 2: GMI Shootings in Central, Northwest, South, and Southwest Divisions, January 2020-August 2020, Pre-GVI



Each treated tract i has its own comparison – the tract before treatment (Pre-Treatment) relative to the tract after treatment (Post-Treatment). The temporal variation in treatment among census tracts is conducive to a stepped wedge design (Ridgeway & MacDonald, 2017; Hussey & Hughes, 2007). The following Poisson regression model estimates whether receiving treatment had any effect on the number of GMI shootings per census tract per week.

The outcome (λ_{it}) is the count of GMI shootings (both fatal and non-fatal) in a census tract i during week t . In turn, β_1 captures the multiplicative change in the number of GMI shootings per

week per census tract attributable to having occurred either before (Pre-Treatment) or after (Post-Treatment) the tract became treated. The terms β_2 and β_3 capture any linear or quadratic trend over the study period. For each tract (i), the model includes a fixed effects term, α_i , which captures largely invariant characteristics of the tract during the study period such as demographic characteristics. Additionally, $\gamma_{Season(t)}$ is a fixed effects term for season.

$$\text{Equation 2:} \quad \log(\lambda_{it}) = \beta_0 + \beta_1 Treated_{it} + \beta_2 t + \beta_3 t^2 + \gamma_{Season(t)} + \alpha_i$$

This analysis uses permutation tests to calculate significance levels. The null hypothesis in this analysis is that the key outcome of interest – GMI shootings – will not differ Post-Treatment relative to Pre-Treatment for a census tract i . Consequently, to generate a reference distribution, the permutation test randomly reassigned the starting week of treatment for each census tract. For example, suppose that in the original data, Census Tract X began treatment in Week 58. Before Week 58, it was not treated, but throughout Weeks 58-128 it remains treated. In the permuted data, Census Tract X can begin treatment as early as Week 2 or as late as Week 126.

The Poisson regression model was then recomputed with the permuted data, simulating the null hypothesis that the number of GMI shootings per week per tract is independent of treatment.

As an additional matter, assuming that receiving treatment has an effect on the number of GMI shootings per tract per week, it is relevant to assess whether cumulative treatment dosage for a census tract is a possible mechanism. Specifically, the cumulative number of direct contacts between GVI and a census tract may have some role in the effectiveness of GVI.

For the cumulative dosage analysis, a dose is defined as a one interaction with the MCIT and a GVI recipient, a GVI recipient's influential, or both in a census tract. During Week 31, 119 census tracts had received 0 doses, 1 had received 1 dose, and 3 had receives 2 doses. By Week 128, 23 tracts had received 1 dose, 47 tracts had received between 2 and 4 doses, and 53 tracts had received more than 4 doses.

Table 7: Average Number of GMI Shootings Per Census Tract Per Week Given Dosage Relative to No Dosage

Dose	Average Number of GMI Shootings Per Census Tract Per Week	Average Number of GMI Shootings Per Census Tract Per Year
0	0.057	3.0
1-3	0.031***	1.6
4 or more	0.033***	1.7

Note: *p-values for the average difference (t-test) for a given dose relative to 0 doses are indicated as follows: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*

For the cumulative dosage analysis, *p-values* are calculated through permutation tests. To generate a reference distribution, the permutation test randomly reassigned the treatment sequence for each census tract based on the 86 possible treatment sequences in the original data.

Besides dosage, additional analyses were also conducted. The above Poisson regression model (Equation 2) was re-run with all shootings – both GMI and non-GMI shootings. The possibility exists that GVI could have affected the number of all shootings, even if they were not GMI.

Furthermore, the possibility exists that even if the 123 treated tracts experienced reductions in both GMI shootings and all shootings, firearm violence may have simply become displaced into other census tracts in the Southwest, Central, Northwest, and South Divisions. To test for a possible displacement effect, the Poisson regression model (Equation 2) was re-run; “treatment” for these untreated tracts that experienced a shooting at some point during the study period (N=104) was set as the week in which GVI was initiated for the PPD divisions in which the census tract sits, either partially or completely. The period before the division was treated is Pre-Division-Treatment; the period after the division was treated is Post-Division-Treatment. Significance levels were calculated through permutation tests.²²

²² Descriptive numbers, calculated through t-tests, found that, on average, in an untreated tract (N=104), there were 0.05 shootings per week Pre-Division-Treatment and 0.07 shootings per week Post-Division-Treatment ($p < 0.01$). On average, there was 0.0135 GMI shootings per week Pre-Division Treatment and 0.0133 GMI shooting per week Post-Division Treatment. Given the low rate of GMI shootings in the untreated tracts (N=104), all shootings serve as a better displacement measure.

II. RESULTS

A census tract experienced a non-significant 25.1% reduction ($p=0.07$) in GMI shootings per week, Post-Treatment relative to Pre-Treatment. Importantly, however, where a census tract received 4 or more doses relative to 0 doses (Pre-Treatment), there was a significant 44.4% reduction ($p=0.03$) in GMI shootings per week.

Also, on average, a census tract experienced a non-significant 11.6% reduction in all shootings, Post-Treatment relative to Pre-Treatment ($p=0.18$). As to all shootings, there is no evidence of firearm violence displacement into neighboring census tracts.

Table 8: Percentage Change in Shootings Per Census Tract Per Week

	Percentage Change
Post-Treatment (1 or more Doses) Compared to Pre-Treatment (0 Doses)	-25.1% (-45.5%, 2.8%) $p=0.07$
GMI Shootings Per Census Tract (N=123) Per Week Effect of 1-3 Doses Relative to Pre-Treatment (0 Doses)	-15.7% (-48.0%, 36.8%) $p=0.49$
GMI Shootings Per Census Tract (N=123) Per Week Effect of 4 or more Doses Relative to Pre-Treatment (0 Doses)	-44.4% (-67.3%, -5.5%) $p=0.03^*$
Post-Treatment (1 or more Doses) Compared to Pre-Treatment (0 Doses)	-11.6% (-26.3%, 6.0 %) $p=0.18$
All Shootings Per Census Tract (N=123) Per Week Post-Division-Treatment (1 or more Doses) Compared to Pre-Division-Treatment (0 Doses)	-8.2 % (-40.2%, 40.9%) $p=0.69$
All Shootings Per Untreated (“Displacement”) Census Tract (N=104) Per Week	

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 ().*

EFFECT OF GVI ON INDIVIDUAL FIREARM VICTIMIZATION

The following analysis addresses the effect of Group Violence Intervention (GVI) on the individual-level. It assesses the likelihood that, per month, a GVI recipient will be a victim of firearm violence after GVI treatment relative to before receiving GVI treatment. For this analysis, an individual is a victim of firearm violence where the individual receives a gunshot injury (Branas, Culhane, Richmond, & Wiebe, 2008). This definition does not encompass instances where an individual is shot at – but does not receive any injury.

I. DATA AND METHODS

The data sources for the individual-level victimization analysis are the Shooting Victim Dataset (January 2020-May 2022) and the Notification Dataset (August 2020-April 2022). For the individual analysis, treatment is defined as a direct contact that an individual GVI recipient experiences with the GVI strategy. The direct contact can occur either through an MCIT custom notification visit or through a call-in meeting. Treatment does not encompass MCIT contact with an influential where a GVI candidate is completely absent and is unable to be contacted either in-person or through telephone.

All told, between August 2020 and May 2022, N=276 individuals in Philadelphia received treatment through one or more direct contacts with GVI. Of these 276 individuals, 80 received more than one treatment. Additionally, 10.5% (N=29) were of an unknown race, 87.3% (N=241) were Black, 1.4% (N=4) were both Black and White, and 0.7% (N=2) were White. All of the individuals either had a documented gender of Male (N=244) or the data referred to the individual as male. The average age of the individuals was 24.3 years old.

According to the Social Services Dataset, of the N=276 individuals, 35.9% (N=99) were on some form of community supervision such as probation at the time of their initial visit. Additionally, N=132 explicitly asked for services at the beginning of their involvement with GVI. The most commonly requested social service was employment/job training (N=108). Other services requested include drug treatment, expungement/legal aid, school/GED enrollment, and documentation. Additionally, of the N=276 individuals, by October 2022, N=86 (31.2%) were successfully connected to some type of services; N=72 (26.0%) were connected to employment and/or to the Center for Employment Opportunities (CEO) in Philadelphia.

When an individual i receives a GVI visit during a given month, he is untreated for that month and all preceding months (Pre-Treatment) but becomes treated for all subsequent months (Post-

Treatment). Thus, an individual who received a visit in November 2020 will not be treated in November 2020, but will be treated in December 2020 and all subsequent months.

The period between January 2020 and May 2022 consists of 29 months t . Thus, each of the 276 individuals became treated during at least one month in the period between Month 9 (September 2020) and Month 29 (May 2022). All told, between January 2020 and May 2022, $N=73$ total shootings occurred in which one of the individuals i was a victim.

As a descriptive matter, on average, an individual Pre-Treatment experienced 0.011 shooting victimizations per month compared to 0.007 shooting victimizations per month ($p=0.05$) Post-Treatment. Thus, Pre-Treatment, there were approximately 13.2 shootings for every 100 people in one year; Post-Treatment, there were approximately 8.4 shootings for every 100 people in one year. Where an individual was documented as having received social services by the end of October 2022, on average, the individual, on average, experienced 0.008 shooting victimizations per month Pre-Treatment compared to 0.007 shootings per month Post-Treatment ($p=0.73$). Thus, Pre-Treatment, there were 9.6 shootings per 100 people in one year compared to, Post-Treatment, 8.4 shootings for every 100 people in one year. Significance levels were calculated through t-tests.

This analysis evaluates the likelihood that each of the $N= 276$ individuals (i) is a shooting victim per month (t), Post-Treatment relative to Pre-Treatment. The below table demonstrates how many individuals became treated during a given month; multiple individuals have received the intervention at different time points. This variation in treatment start times is useful for a stepped-wedge design (Ridgeway & MacDonald, 2017; Hussey & Hughes, 2007).

Table 9: Count of Individuals Treated Per Month (August 2020-April 2022)

Month in Which Individual Received First Visit	Month in Which Individual Became Treated	Number of Individuals (N=276) Who First Became Treated Per Month
August 2020	September 2020	11
September 2020	October 2020	17
October 2020	November 2020	11
November 2020	December 2020	9
December 2020	January 2021	3
January 2021	February 2021	15
February 2021	March 2021	32
March 2021	April 2021	28
April 2021	May 2021	11
May 2021	June 2021	10
June 2021	July 2021	15
July 2021	August 2021	12
August 2021	September 2021	6
September 2021	October 2021	8
October 2021	November 2021	40
November 2021	December 2021	2
December 2021	January 2022	4.
January 2022	February 2022	2
February 2022	March 2022	7
March 2022	April 2022	6
April 2022	May 2022	27
		276

The below logistic regression model estimates the effect of GVI on the likelihood that an individual will be the victim of firearm violence per month. In this model, $shot_{it}$ is a binary outcome indicating whether individual i was a victim of a fatal or nonfatal shooting in month t , where $t=1, 2, 3, \dots, 29$; t indexes each of the 29 months from January 2020 to May 2022. In turn, when multiplied by 100, $(e^{\beta_1} - 1)$ is the percentage change in the odds of being shot Post-Treatment relative to Pre-Treatment. If GVI reduces victimization at the individual-level, then 100 multiplied by $(e^{\beta_1} - 1)$ will have a negative value. A fixed effects term, γ_i is included. This fixed-effects term captures any time-invariant characteristics for each individual such as education-level, family support, additional MCIT visits, and prior criminal justice system contacts. The model also includes a fixed-effects term α_t for each of the 29 months between January 2020 and May 2022 in which a shooting occurred.

Equation 3:

$$\log \left(\frac{P(shot_{it} = 1)}{1 - P(shot_{it} = 1)} \right) = \beta_0 + \beta_1 Treated_{it} + \alpha_i + \gamma_t$$

This analysis uses permutation tests to calculate significance levels. The null hypothesis in this analysis is that the key outcome of interest – the likelihood of shooting victimizations per month – will not differ on average for an individual, Post-Treatment relative to Pre-Treatment. Consequently, to generate a reference distribution, the permutation test randomly reassigned the starting week of the treatment for each individual. The logistic regression model was then recomputed with the permuted data, simulating the null hypothesis that the likelihood of shooting victimization per month per individual is independent of treatment.

II. RESULTS

Receiving GVI treatment was associated with a non-significant 44% reduction in the likelihood that an individual will be a shooting victim Post-Treatment relative to Pre-Treatment. Given the non-significance, the null hypothesis that GVI had no effect on an individual’s likelihood of victimization cannot be rejected. The results are in the below table.

Table 10: Percentage Change in the Odds of Shooting Victimization Per Individual (N=276) Per Month

	-44.0% (-78.0%, 34.5%) $p=0.19$
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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 ().*

EFFECT OF GVI ON INDIVIDUAL OFFENDING INCIDENTS

The following analysis assesses the effect of Group Violence Intervention (GVI) on the likelihood that, per month, an individual who is a GVI recipient will commit an offense for which he is arrested.

I. DATA AND METHODS

This analysis defines treatment consistent with the analysis assessing effect of GVI on individual-level firearm victimization above. The individuals in the analysis are the same 276 individuals in the individual-level firearm victimization analysis. This offense analysis uses the Offense Dataset (January 2020-May 2022) and the Notification Dataset (August 2020-April 2022).

This analysis evaluates the likelihood per month that each of the $N = 276$ individuals (i) commits an offense resulting in arrest, Post-Treatment relative to Pre-Treatment. The period between January 2020 and May 2022 consists of 29 months t . Thus, each of the 276 individuals became treated during at least one month in the period between Month 9 (September 2020) and Month 29 (May 2022).

All told, between January 2020 and May 2022, $N=243$ total offense incidents, which resulted in an arrest, occurred involving an individual i . Of these 243 incidents, $N=105$ involved a firearm. The below table shows the distribution of offense types in the data. Firearm-involved offenses are in gray.

As a descriptive matter, on average, Pre-Treatment, an individual committed 0.032 offenses per month compared to 0.028 offenses per month Post-Treatment ($p = 0.37$). Thus, on average, per 100 people per year, there were 38.4 offenses Pre-Treatment and 33.6 offenses Post-Treatment. Also, Pre-Treatment, on average, an individual committed 0.0134 firearm-related offenses per month (Pre-Treatment) compared to 0.0127 offenses per month Post-Treatment ($p\ value=0.79$). Thus, on average, per 100 people per year, there were 16.1 firearm-related offenses Pre-Treatment and 15.2 firearm-related offenses Post-Treatment. Significance levels were calculated through t-tests.

Table 11: Descriptive Table of Offense Types for Individual-Level Offense Analysis

Offense Type	Percentage of Offenses, Pre-Treatment N=162	Percentage of Offenses, Post-Treatment N=98
Aggravated Assault (Gun)	4.9%	4.1%
Aggravated Assault (Other)	3.1%	1.0%
Other Assaults (Simple/Domestic)	4.9%	4.1%
Burglary	4.9%	5.1%
DUI	0.0%	1.0%
Homicide (Gun)	1.2%	5.1%
Narcotics Possession	8.6%	8.2%
PWID	23.5%	19.4%
Robbery (Gun)	1.2%	3.1%
Robbery (Other)	1.2%	1.0%
Rape and Other Sex Offenses	1.2%	0.0%
Theft (including Auto Theft and Theft from Vehicle)	8.0%	8.2%
Violations of the Uniform Firearms Act (VUFA)	34.0%	34.7%
Other or Unknown	3.1%	5.1%

The below logistic regression model estimates the effect of GVI on the likelihood that an individual will offend per month. In this model, $offended_{it}$ is a binary outcome indicating whether individual i committed an offense in month t , where $t=1, 2, 3, \dots, 29$; t indexes each of the 29 months from January 2020 to May 2022. In turn, when multiplied by 100, $(e^{\beta_1} - 1)$ is the percentage change in the odds of committing an offense Post-Treatment relative to Pre-Treatment. If GVI reduces offending at the individual-level, then 100 multiplied by $(e^{\beta_1} - 1)$ will have a negative value. A fixed effects term, γ_i is included. This fixed-effects term captures any time-invariant characteristics for each individual such as education-level, family support, additional MCIT visits, and prior criminal justice system contacts. The model also includes a fixed-effects term α_t for each of the 29 months between January 2020 and May 2022 in which an offense occurred.

Equation 4:
$$\log\left(\frac{P(\text{offended}_{it} = 1)}{1 - P(\text{offended}_{it} = 1)}\right) = \beta_0 + \beta_1 \text{Treated}_{it} + \alpha_i + \gamma_t$$

This analysis uses permutation tests to calculate significance levels. The null hypothesis in this analysis is that the key outcome of interest – the average likelihood of offending incidents per individual per month - will not differ Post-Treatment relative to Pre-Treatment. Consequently, to generate a reference distribution, the permutation test randomly reassigned the starting week of the treatment for each individual. Next, the logistic regression model was recomputed with the permuted data, simulating the null hypothesis that likelihood of offending incidents per month per individual is independent of treatment.

II. RESULTS

There is a non-significant 43% increase in the likelihood that an individual will commit an offense for which he is arrested, Post-Treatment relative to Pre-Treatment. Also, receiving GVI treatment was associated with a non-significant 18% increase in the likelihood that an individual will commit a firearm-related offense for which he is arrested. Given the non-significance, the null hypothesis that GVI had no effect on an individual’s offending likelihood cannot be rejected. The results are in the below table.

Table 12: Percentage Change in the Odds of Offending Per Individual (N=276) Per Month

All offenses resulting in arrest	43.0% (-11.5%, 130%) <i>p</i> =0.14
Firearm-related offenses resulting in arrest	18% (-38.1%, 125%) <i>p</i> =0.62

*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 (*).*

EFFECT OF ENFORCEMENT ACTIONS ON GROUP VIOLENCE

This component of the Evaluation assesses the effect of Group Violence Intervention (GVI) enforcement actions on a group subject to an action.

I. DATA AND METHODS

The data sources for this analysis are the Shooting Victim Dataset (January 2020-May 2022) and the Enforcement Action Dataset (October 2020-May 2022). All, told between August 2020 and May 2022, 27 enforcement actions occurred involving 26 separate groups throughout eleven (11) police districts; the first enforcement action occurred in October 2020. These enforcement actions occurred in response to triggering incidents such as a shooting by a group member or a group member's arrest for committing a robbery with a firearm. An enforcement action generally begins anywhere from between one week to four weeks after the triggering incident. As a general rule, enforcement actions last thirty (30) days.

The unit of interest for this analysis is each of the 26 groups (i). For each of the 26 groups, it becomes treated once it is subject to its first enforcement action (Post-Action); it is untreated before the first enforcement action (Pre-Action). All told, 25 received one enforcement action, and one received two enforcement actions. Once a group is treated, it remains treated for the remainder of the analysis.

The study-period is 128 weeks (t) in length (January 2020-May 2022). No enforcement action occurred between Weeks 1 and 41; the first enforcement action occurred in October 2020, in Week 42. Each of the 26 groups became subject to an enforcement action starting during at least one week in the period between Week 42 and Week 128. During the 128-week study period (January 2020-May 2022), $N=349$ shootings occurred involving one of the 26 groups; namely, either the victim was a member of a group subject to an enforcement action or the shooter was a member of a group subject to an enforcement. In $N=322$ shootings (92.3%), only one group subject to an enforcement action was involved in a shooting. In $N=27$ shootings, more than one group subject to an enforcement action was involved in a shooting.

The outcome of interest for this analysis is the number of shootings per group per week where a member of the group was either a victim or a known shooter. As a descriptive matter, based on the results of a t-test, it appears that treatment in the form of an enforcement action may significantly reduce shootings per week per group. On average, a group, Post-Action, experienced 0.07 shootings per week; but, Pre-Action, a group experienced 0.15 shootings per week ($p < 0.001$).

The temporal variation in treatment is conducive to a stepped wedge design (Ridgeway & MacDonald, 2017; Hussey & Hughes, 2007). Each group provides its own comparison – after it was subject to an enforcement action (Post-Action) relative to before it was subject to an enforcement action (Pre-Action).

The following Poisson regression model estimates whether an enforcement action had any effect on the number of shootings per group per week. The outcome (λ_{it}) is the count of shootings (both fatal and non-fatal) in a group i during week t . Here, β_1 captures the multiplicative change in the number of shootings per week per group Post-Action relative to Pre-Action. The terms β_2 and β_3 capture any linear or quadratic trend over the study period.

For each group, the model includes a fixed effects term, α_i , which captures largely invariant characteristics of a group during the study period such as previous history of violence and overall membership characteristics. Additionally, $\gamma_{Season(t)}$ is a fixed effects term for season.

Equation 5:
$$\log(\lambda_{it}) = \beta_0 + \beta_1 Treated_{it} + \beta_2 t + \beta_3 t^2 + \gamma_{Season(t)} + \alpha_i$$

This analysis uses permutation tests to calculate significance levels (Ridgeway & MacDonald, 2017). The null hypothesis in this analysis is that the key outcome of interest – shootings – will not differ on average for a group after being subject to an enforcement action (Post-Action) relative to before being subject to an enforcement action (Pre-Action). To generate a reference distribution for the statistics of interest, for each group the permutation test altered the starting week of the treatment. For example, suppose that in the original data, Group X received an enforcement action in Week 58. Before Week 58, it was not treated, but throughout Weeks 59-128 it remains treated. In the permuted data Group X can begin treatment as early as Week 2 or as late as Week 128. For each of the 26 groups, a total of 127 unique treatment patterns are therefore possible. In short, the permutation test randomly assigns different treatment patterns to each of the groups.

The Poisson regression model is recomputed with the permuted data. This process simulates what the distribution of the treatment effects would look like under the null hypothesis that the number of shootings per week per group is independent of receiving an enforcement action.

II. RESULTS

An enforcement action significantly reduced the number of shootings per week for a group by 42.8% ($p=0.04$) where a member of that group was a shooter or victim. The below table presents the results.

Table 13: Percentage Change in Shootings Per Enforcement-Action Subject Group Per Week

Post-Action Compared to Pre-Action	-42.8% (-66.2%, -3.0%) $p=0.04^*$
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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 ().*

QUALITATIVE RESEARCH

This Evaluation conducted qualitative research to provide context for the quantitative findings. The qualitative research components were the following: (1) informal telephone conversations with Group Violence Intervention (GVI) recipients; (2) surveys given to Philadelphia Police Officers who had served as Mobile Call-In Team (MCIT) members; and (3) informal surveys distributed at two Philadelphia Roadmap for Safer Communities Community Listening Sessions.

I. GVI RECIPIENT TELEPHONE INTERVIEWS

During the autumn of 2021, the Evaluation Project Director conducted informal telephone interviews with ten (10) GVI recipients. The GVI social services team suggested the names of GVI recipients as interview respondents; these were individuals who had made or were attempting to make positive life changes. At least one GVI social services team member was present during the telephone interviews. The telephone conversations were recorded on the Evaluation Project Director's computer. The Evaluation Project Director informed the respondent that the phone conversations were being recorded; the conversation continued only after the respondent consented. The respondents were told they could decline to answer any question. Only the Evaluation Project Director has access to recordings of the conversations. To protect the respondent's privacy and safety, (1) no identifiable information is included in this Evaluation and (2) the Evaluation Project Director has deleted all recordings of the conversations.

At least seven of the respondents were employed in full-time positions. Additionally, at least eight GVI recipients had attained some education past high school, a high school diploma, or a GED. One respondent had an 11th grade education and was pursuing a GED.

Of the ten respondents, six recalled telling other group members about the Mobile Call-In Team (MCIT) visit. As one respondent explained, he and another individual with whom he had grown up were both receiving GVI; although the respondent "didn't tell everyone," he told other group members whom he "wanted to see do better." Another respondent explained that he told other group members because "people need information and resources."

The respondents were asked if they were more concerned about law enforcement scrutiny because of GVI than they would ordinarily be. They were asked to rate their concern on a scale from one (1) to five (5) with five being very concerned. Five respondents answered with a "1"; as they explained, they were not concerned about law enforcement scrutiny because they were "staying out

of trouble.” One respondent noted his desire not to be incarcerated - “I couldn't stand house arrest, how can I [tolerate] jail[?]”

Additionally, when asked to rate the moral voice messaging that they received, seven of the respondents rated it as a 5 on a scale of 1 to 5 with 5 being the most persuasive; one respondent gave it a 4. One respondent noted that he found one of the credible messengers who had been in prison to be persuasive; he recognized that “even though you're in a cell, the outside world still moves and still goes on.” Another respondent shared that the Philadelphia Police Department (PPD) Officers who were part of the GVI MCIT were “the nicest cops I ever met.”

A respondent, who had previously been shot, explained that for “young African Americans [it is] easy to get discouraged,” but GVI showed that people “are concerned about us.” Two respondents pointed out the importance of the Center for Employment Opportunities (CEO) program aspect of GVI. They noted benefits such as learning how to prepare for employment interviews and how to manage personal finances.

The respondents also shared their opinions about the causes of violence. Notably, respondents identified a strong link between social media and violence. The respondents were asked to rate the connection between social media and violence on a scale of 1 to 5 with 5 being highly important. Eight of the respondents rated it as a “5.” One respondent replied, “Do you have a 10 I can give it?” As another respondent explained, “people never forget faces.”

Pointing to the role of firearms, one respondent noted that it was “easy to get your hands on these objects.” Another respondent attributed violence to “a lot of stuff that could be handled with a conversation.” As one respondent explained, “People wanting to be who they're not. People not being themselves. People will hate you that you don't even know.” One respondent explained that drugs, including marijuana, can lead to “not thinking straight.”

The respondents also shared some factors that helped them make positive life changes. One respondent explained that he is working on the right track for himself, his mother, and his younger sibling who looks up to him.

II. PHILADELPHIA POLICE DEPARTMENT SURVEY

In Spring 2022, the Evaluation Project Director distributed a survey to 55 Philadelphia Police Department (PPD) officers who had been members of a Mobile Call-In Team (MCIT) during at least one Saturday between August 2020 and February 2022. All told, fifteen surveys were completed. The

responses were received through email, Google Forms, or a telephone call. All efforts were made to ensure the anonymity of the officers. No identifying information, such as gender, assigned police district, or specific years of service, was requested.

As members of the MCIT team, the PPD officers were responsible for ensuring the safety of the rest of the MCIT members, driving the MCIT members in a city-owned vehicle, and approaching and knocking on the door of a GVI candidate's residence. Additional responsibilities also included speaking with the candidate or the candidate's family about heightened law enforcement scrutiny, community concerns, or violence in general.

Nine respondents reported participating in the MCIT on four or more mornings whereas six respondents reported participating on one morning.

The survey asked the officers what prompted them to be part of an MCIT. The officers either volunteered for the assignment or their supervisors had asked them. Of the fifteen responses, three referenced the officers' positive rapport with community members. Additionally, five of the responses referenced the officers' first-hand knowledge of at-risk individuals who would be good GVI candidates in their respective districts. One officer explained that a supervising captain recommended MCIT participation because "I knew members in the community and familiarize myself with violent offenders." Notably, three of the responses indicated a desire to actively help reduce firearm violence. As one officer explained, "It is tiring to respond to shooting incidents [involving] minors and innocent bystanders. It was a great opportunity to experience something different and try to learn the peoples' stories."

The survey also asked officers the following prompt: "On a scale of 1 (strongly disagree) to 5 (strongly agree), how much do you agree with the statement: 'My work with the Mobile Call-In Team was similar to the work that I do everyday as a law enforcement officer.'" The average response was 2.1. One officer explained, "we don't have the time during regular patrol to do what we do with GVI." Another officer noted that "it is a different view on the situation and we are provided with a lot more tools and options for the people who need it."

Additionally, the survey prompted the officers to identify the most challenging and most rewarding aspects of being an MCIT member. Five of the officers referenced the challenge of getting a GVI candidate to be receptive to change. As one officer explained, "The most challenging aspect was trying to reach some of the youth that are still resistant to people offering them help."

Two officers referenced the difficulty of sometimes getting in contact with a GVI candidate. One officer shared, “It would be beneficial if most of the subjects answered the call or were home when we knocked. Even the people on probation we couldn't get a hold of. ... Talking to families can make a difference but the subject[s] themselves are going to have to make the necessary changes.”

Notably, four officers indicated the importance of community trust. As one officer recalled, “The most challenging aspects were being able to [limit] skepticism with community members while in full uniform.” Another officer noted, “the Trust factor. You're showing up at these individuals' homes; you need the trust of [the person] who answers the door first.”

Working with other government agencies could be both challenging and rewarding for the officers. Two officers noted the challenge of working with other government agencies whereas one officer noted that “[n]etworking with individuals from other agencies, working with an established goal” was rewarding.

When asked to articulate the most rewarding aspects of being part of the MCIT, six of the responses identified seeing an at-risk individual have the opportunity to make positive life changes, including obtaining employment. One officer explained that seeing group members “take advantage of the services offered to them” and change “their future and out look on life” was especially rewarding. The officer noted the “appreciation and respect from group members we had contact with. They appreciated the approach that my team and I took regarding the group lifestyle.” Another officer shared, “It was rewarding getting a break from running radio call to radio call for service due to lack of manpower.” The survey also invited the officers to share any other thoughts. As one explained:

GVI has promise! It can work/succeed. I watched hardened group members change their lifestyle with the assistance of GVI. If this resource is used and staffed properly with forward thinking personnel who are able to adapt to the changing environment and make adjustments when warranted. GVI is a game changer that can pay dividends in the future regarding gun violence. I noticed a side effect of GVI - group members and their family began to reach out to the officers they encountered during visit, to ask for help when facing issues that could result in gun violence. This allow[s] us to get ahead of the violence and end it before it even started. Community Policing at its best.

III. COMMUNITY MEMBER AWARENESS

The City of Philadelphia has hosted a series of community meetings as part of the Philadelphia Roadmap to Safer Communities Listening Tour. The Evaluation Project Director attended community meetings at the following dates and locations: March 7, 2022 at 1212 S. Broad Street; April 21, 2022 at 6000 Rising Sun Avenue (Lawncrest Recreation Center); and May 2, 2022 at 5801 Kingsessing Avenue (Myers Recreation Center). The Roadmap is a City-led effort to coordinate public, private, nonprofit, and community partners to end firearm violence. At these community members had the opportunity to discuss their perspectives about firearm violence as well as the overall health and safety of their communities. At the second and third meetings, the Evaluation Project Director distributed a survey to gauge awareness of the GVI strategy.

Twelve completed surveys were collected; of these, two completed surveys explicitly identified the respondent as having heard about GVI primarily through work or employment. These surveys are omitted.

The remaining ten survey respondents' neighborhoods included Southwest Philadelphia, East Mount Airy, and Lawncrest. Three of the ten completed surveys indicated that the respondent had not heard of GVI; the remaining seven completed surveys indicated that the respondent had heard of GVI. One respondent who had heard about GVI "through the City" defined it as "credible messengers trying to stop the violence." One respondent learned about the strategy through a news story; the respondent recalled that the strategy had "good results...in [either] Chester County or ...[Delaware County]." Another respondent described it as a strategy where "police identify & target individuals interested in violence." As one respondent noted, GVI involves "[p]rograms to help ex offenders." Having heard about GVI through the radio, one respondent described GVI as "a response to the crisis we are experiencing with violence in Philadelphia...."

EVALUATION FINDINGS AND DISCUSSION

The current Group Violence Intervention (GVI) implementation in Philadelphia was associated with reductions in Group Member-Involved (GMI) firearm violence. This Evaluation assessed the impact of GVI on multiple dimensions – group, place, and individual. Additionally, for each type of analysis, this Evaluation sought to define treatment in a manner most appropriate for that particular analysis.

The core evaluation question was the effect of GVI on GMI firearm violence at the group-unit level (Piehl, Kennedy, & Braga, 2000; Braga, et al., 2019; Roman, Klein, & Wolff, 2018). Treatment is defined as at least one contact between GVI and a GVI recipient who is a group-unit member. In the current GVI implementation in Philadelphia, a group-unit, Post-Treatment relative to Pre-Treatment, experienced, on average, a significant 38.6% reduction ($p=0.01$) in shootings per week.

Notably, receiving 2 doses of treatment relative to 0 doses produced a significant 50.3% reduction ($p=0.04$) in shootings per week for a group-unit. Receiving 1 dose relative to 0 doses produced a 36.7% reduction that, although non-significant ($p=0.09$), is notable for its magnitude and directionality. Where a group-unit received 3 or more doses, non-significant reductions occurred. In much the same way that treatment dose or intensity is often correlated with the severity of illness and mortality (de Grooth, et al., 2020), it is possible that higher GVI doses were correlated with the severity of violence risk for a group-unit. More precisely, higher GVI doses are not less ineffective than 2 doses – instead, the level of risk for group-units requiring 3 or more doses may reduce shootings more than otherwise would have occurred with less doses or 0 doses.

This Evaluation also conducted a place analysis that assessed whether GVI reduced shootings at the census tract-level. The Evaluation measured both GMI shootings as well as all shootings. Treatment is defined as at least one contact that physically occurred in the census tract between the Mobile Call-In Team (MCIT) and a GVI recipient, an influential, or both. A census tract experienced a non-significant 25.1% reduction ($p=0.07$) in GMI shootings per week, Post-Treatment relative to Pre-Treatment. Where a census tract received 4 or more doses relative to 0 doses (Pre-Treatment), there was a significant 44.4% reduction ($p=0.03$) in GMI shootings per week. Thus, increased GVI presence within a census tract may be associated with decreased GMI violence.²³

²³ Additionally, Post-Treatment relative to Pre-Treatment, there was a non-significant 15.7% reduction in all shootings. There was no evidence of firearm violence displacement into neighboring census tracts in the Central, Northwest, South, and Southwest Divisions.

The place analysis sought to assess the effect of GVI on an ecological level broader than that of groups. Consistent with the concept of procedural justice (Weisburd & Majmundar, 2018) it is reasonable to hypothesize that where Philadelphia Police Department (PPD) officers and the MCIT are visible in a neighborhood and have a direct positive, face-to-face interaction with a resident, GVI may improve citizens' perceptions of governmental authority. Additionally, consistent with the concepts of informal social control and collective efficacy (Braga, Weisburd, & Turchan, 2018; Kennedy, 2019), if one individual, such as a GVI recipient or a GVI recipient's family member, learns about GVI and communicates about it to others, the anti-violence messaging of GVI may be reinforced throughout the broader community. The place analysis sought to assess the possibility that collateral contacts with influentials – as well as with group members – may help reduce GMI violence.

For law enforcement who participated in the MCIT, community interactions appeared to be an important dimension to their work. As the qualitative component of this Evaluation found, at least four PPD police officers explicitly noted the importance of community trust when they are working as part of GVI. Importantly, as one PPD officer observed, “group members and their family began to reach out to the officers they encountered during visit, to ask for help when facing issues that could result in gun violence.”

During the 128-week study period between January 2020 and May 2022, GVI was largely unimplemented in the East and Northeast Divisions. Specifically, GVI implementation began in the Southwest Division (August 2020). In April 2022, GVI implementation began in the 26th District of the East Division; in September 2022, GVI implementation began in the Northeast Division. No GVI implementation has yet occurred in the 24th and 25th District (East Division). During the 128-study period, census tracts that completely lie within the East and Northeast Divisions accounted for 30.1% (N=1,678) of all shootings (N= 5,487) in Philadelphia. Future analyses should continue to assess whether geographic areas in Philadelphia that have not yet received GVI may also benefit from GVI.

The effects of GVI on individual behavior and victimization risk were also assessed. For an individual, treatment is defined as at least one contact between GVI and the individual. Post-Treatment relative to Pre-Treatment, individuals, on average, experienced a non-significant 44% reduction in the likelihood of being a shooting victim. At the same time, however, Post-Treatment relative to Pre-Treatment, individuals, on average, experienced a non-significant 43% increase in the

likelihood of committing an offense for which he is arrested and a non-significant 18% increase in the likelihood of committing a firearm-related offense for which he is arrested.

Given the non-significance of these individual findings and the resulting imprecision of the estimates, it cannot be asserted that GVI has any discernable effects on an individual's likelihood of victimization or offending. A longer study period in future research will provide an opportunity to more accurately detect the effect of GVI on individual victimization or offending risk.

Notably, offending in this Evaluation is operationalized as offenses known to law enforcement. If an individual is under heightened scrutiny for his group-involved violence risk, it is likely that law enforcement and probation officers will have greater ability to detect criminal activity. Future research should explore other measures of offending, such as self-reported behavior among GVI recipients. To that extent, the qualitative component of this Evaluation asked GVI recipients if they were more concerned about law enforcement scrutiny because of GVI than they would ordinarily be. They were asked to rate their concern on a scale from one (1) to five (5) with five being very concerned. Five respondents answered with a "1"; as they explained, they were not concerned about law enforcement scrutiny because they were "staying out of trouble."

As previous research has discussed, it is unclear whether GVI has an impact on individual-level decisionmaking and behavior (Braga, Hureau, & Papachristos, 2014). Although GVI focuses on altering group behavior, questions about its effects on individual behavior and possible mechanisms for these effects are relevant. Again, a longer study period in future research will provide an opportunity to more precisely detect the effect of GVI on individual behavior. It is possible that the reductions in firearm violence found in this study were the product of incapacitation (*e.g.*, custody or probation-based restrictions), behavioral change, access to social services, or a combination of these factors.

Assessing the relationship between social services and desistance was necessarily limited by endogeneity considerations; the individuals most likely to pursue social services were likely those individuals with other characteristics, such as family support and self-motivation, that are positively correlated with desistance. Thus, it is difficult to determine whether the social services or these other characteristics caused the desistance. Nonetheless, even if social services do not directly influence conduct, it may reduce an individual's rationalization of risky behavior (Braga & Kennedy, 2020). Specifically, it is possible that even if a GVI recipient does not take advantage of the social services available to him, the mere possibility of available services may prompt desistance.

As the qualitative component of this Evaluation found, social media-based disputes may contribute to urban firearm violence. Future GVI evaluations should build on previous research (Hyatt, Densley, & Roman, 2021) and investigate the role of social media on GMI firearm violence. Notably, at least one GVI recipient explicitly identified ready access to firearms as an important factor in violence - an observation consistent with a substantial body of previous research (Branas, Richmond, Culhane, Ten Have, & Wiebe, 2009). Prospective GVI research should further assess access to firearms as a risk factor for GMI shootings.

Enforcement actions may be an important mechanism for reducing GMI firearm violence. For purposes of the enforcement action analysis, a group is treated once it becomes subject to an enforcement action. As to groups subject to enforcement actions at some point during the study period, a group experienced, on average, a significant 42.8% reduction in shootings, Post-Treatment relative to Pre-Treatment. Future research should identify the particular levers in an enforcement action, such as increased bail requests, referrals for federal prosecution, warrant sweeps, or increased patrol, that are most effective.

Importantly, due to COVID-19-related restrictions on public gatherings, the current GVI implementation in Philadelphia departed from the usual call-in meeting model. Instead, MCIT custom notification visits provided the primary means of GVI implementation. Given the results indicating a reduction in firearm violence, a GVI implementation through MCIT custom notification visits appears to maintain the effectiveness of GVI.

Future research should continue to assess the perceptions of MCIT members, including police officers and social service providers, as well as the perceptions of GVI recipients, the influentials of GVI recipients, and community members. Additionally, the qualitative components of this evaluation aim to provide starting points for additional research concerning GVI mechanisms.

As previous research has estimated, although group members within a city constitute less than 0.5% of the population, group members may be linked to 60 to 70% of shootings and homicides (National Network for Safe Communities, 2016). Within the study period for this Evaluation (January 2020-May 2022), the data indicated that 20.9% of all victim-level shooting incidents in Philadelphia were GMI (N=1,147). Therefore, measured and procedurally just efforts directed at identifying GMI victims, shooters, and shootings may reveal a larger pool of individuals who would benefit from GVI; these efforts, in turn, may yield additional reductions in firearm violence.

Data collection and analysis are key to meaningful future evaluations of violence reduction strategies. For example, future evaluations would benefit from more comprehensive data that track specific areas of enforcement, such as prosecutors' use high bail requests. Additionally, the GVI strategy inherently depends on up-to-date intelligence on risky group activities; for example, timely and accurate data help a GVI implementation identify at-risk group members and provide opportunities to assist these group members. To that extent, a GVI implementation can provide a valuable opportunity to collect data that help policymakers, social service providers, law enforcement, and researchers better understand group-driven violence – and formulate procedurally just solutions to this violence.

As this Evaluation found, the current implementation of GVI in Philadelphia has produced reductions in firearm violence at the group-unit level and at the census tract-level during the period between January 2020 and the end of the study period, May 2022. Whether it continues to do so may depend on factors such as continued adherence to the existing process and adaptations, as needed, to evolving group-involved activity and firearm violence in Philadelphia.

CONCLUSION

The current Group Violence Intervention (GVI) in Philadelphia has significantly reduced group member-involved (GMI) firearm violence at the group-unit level and at the census tract-level. Future assessments of the effectiveness of GVI as a violence reduction strategy in Philadelphia can analyze the role of specific mechanisms such as enforcement actions and social services. Reducing violence is crucial to creating healthy, safe, and socially equitable communities for all Philadelphians. Rigorous quantitative evaluations of violence reduction strategies help us learn what works – and why – and how to make these strategies as effective as possible.

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