Improving Care for Survivors of Gun Violence

Kathleen O'Neill

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Abstract
Improving Care for Survivors of Gun Violence

Kathleen M. O'Neill
2021

Survivors of gun violence have significant sequelae including mental health disorders that often go undiagnosed and untreated. Survivors of gun violence are at high risk for both re-injury with a firearm as well as interaction with the criminal justice system. These poor outcomes for survivors of gun violence contribute to the cycle of gun violence that plague communities across the United States. Learning from historical public health successes, survivors of gun violence are an important population for targeted secondary prevention efforts. Despite this, the mechanisms for these outcomes among survivors of gun violence are largely unknown and there is a dearth of research on effective prevention strategies. Combining qualitative and quantitative research methods, I sought to better describe the experience of recovery for survivors of gun violence, conduct a pilot study of a mental health intervention for post-traumatic stress symptoms, and describe the effect of the COVID-19 pandemic on community violence in Connecticut (CT).

In Aim 1, I used a qualitative research study design and a community-based participatory research approach to better understand how Black male gunshot wound survivors in the United States describe their experience of recovery and their perceptions of their mental, emotional and social health following the event. We conducted in-depth interviews with 20 Black male gunshot wound survivors from New Haven, CT. This study identified five themes which define the psychological recovery after intentional injury from gun violence as well as describe the various strategies used by survivors of gun violence to cope with a disrupted sense of safety when returning to their communities. In the secondary analysis of the data, I found that
participants described distrust for the police and an ecology of guns that confers symbolic, social and strategic meaning to owning a gun. These findings suggest that barriers to mental health treatment may be addressed through “credible messengers” who can develop relationships of trust with this high-risk population and that interventions to decrease gun violence should address the cultural value of a gun as well as focus on improving police relations with racial/ethnic minoritized communities.

In Aim 2, I designed a pilot study evaluating the feasibility of completing a randomized controlled trial to test the Screening and Tool for Awareness and Relief of Trauma (START), a targeted mental health intervention developed for patients that come from communities of color with sustained and persistent trauma. I conducted the study at Yale New Haven Hospital in New Haven, CT through the YNHH Violence Intervention Program beginning in January 2020. For a variety of reasons but most notably due to the disruption caused by the COVID-19 pandemic, only 11 patients were enrolled in the study. With this small cohort, I was able to conclude that (1) Successful recruitment hinges on enrollment in the local hospital-based violence intervention program and the effectiveness of credible messengers in the organization; (2) The START techniques would be improved by additional audiovisual resources; (3) The novel survey to measure alienation is reliable and (4) Testing the START intervention may be most successful in a stepped wedge cluster randomized controlled trial design so that all centers in the study will receive the intervention.

In Aim 3, I examined the effect of the COVID-19 pandemic on community violence in the state of Connecticut (CT). Through the CT Hospital-based Violence Intervention Program Collaborative, I used the trauma registries from Yale New Haven Hospital, Bridgeport Hospital, St. Francis Hospital, and Hartford Hospital to collect data on all violence-related trauma presentations in the emergency room from January 1st, 2018 to January 1st, 2021. I compared the pattern of violence-related trauma presentation from pre- and post-COVID-19 using an interrupted time
series linear regression model, adjusted for seasonality. Using this data set, we stratified the analysis by race and ethnicity (Black/Latino patients compared with white patients) to determine whether race and ethnicity acted as an effect modifier on community violence during the COVID-19 pandemic. My analysis demonstrated a 55% increase in violence-related trauma presentations overall, a 61% increase in violence-related trauma presentations among racial/ethnic minoritized patients, and a 76% increase in penetrating injuries in the post-COVID time period as compared with the pre-COVID time period.

In summary, I described the experience of recovery for survivors of gun violence, piloted a targeted mental health intervention to mitigate symptoms of post-traumatic stress for this high-risk population and studied the effect of the COVID-19 pandemic on community violence in Connecticut.
Improving Care for Survivors of Gun Violence

A Dissertation
Presented to the Faculty of the Graduate School of Yale University
In Candidacy for the Degree of Doctor of Philosophy

By
Kathleen M. O’Neill

Dissertation Director: Elijah Anderson, PhD
December 2021
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CHAPTER 1. INTRODUCTION

1.1 OUTCOMES FOR SURVIVORS OF GUN VIOLENCE

1.1.1 Overview of outcomes for survivors of gun violence

Survivors of gun violence have significant sequelae including mental health disorders that often go undiagnosed and untreated. (1-6) Survivors of gun violence are more than twenty times as likely to be re-injured as a result of repeat violence, four times as likely to die from a gunshot wound, and almost three times as likely to be arrested under a violence or weapon charge compared with the general population. (7) Multiple studies have demonstrated rates of re-injury through violence ranging from 6-44% (7, 8) and rates of post-traumatic stress disorder (PTSD) between 40-65%. (1, 2, 6)

These poor outcomes for survivors of gun violence contribute to the cycle of gun violence that plague communities across the United States. Over the past 20 years, public policies and interventions have reduced the incidence of death from other traumatic injuries, but mortality related to gunshot wound injuries has not seen similar improvements. (9) Survivors of gun violence continue to be at high risk for both re-injury with a gun as well as interaction with the criminal justice system. (7) The mechanisms for these outcomes among survivors of gun violence are largely unknown and under-studied. This is a critical gap in knowledge as a public health approach to combatting gun violence identifies this population as important for targeted violence prevention.

1.1.2 Mental health outcomes among survivors of gun violence

Survivors of gun violence are vulnerable to mental illness. Multiple studies demonstrate high rates of PTSD in this population but the recognition of symptoms of PTSD among survivors of gun violence and utilization of traditional mental health care services is notoriously low. (1, 2) In
one study, only 15% of those needing mental health services accessed care in the year after their injuries.(1)

Epidemiologic studies identifying factors that pre-dispose patients to developing PTSD show that prior trauma exposure, psychiatric history, lower education, stressful living conditions, trauma intensity and type, secondary stressors and a lack of social support all increase the risk of later development of PTSD.(10) Survivors of gun violence often have these pre-disposing factors to the development of PTSD. One study found that 50% of victims of violence had experienced four or more adverse childhood experiences before the age of 18.(11) A recent study of urban violence in New Haven demonstrated that exposure to violence in low-income neighborhoods remains pervasive and consistent. In these communities, 73% had heard gunshots near their homes, 29% had family members or close friends who were injured by violence and 18% knew someone personally who had been killed by violence.(12)

While PTSD is often associated with veterans that have experienced combat, impoverished urban communities have also been found to have high rates of PTSD with a lifetime prevalence of at least 40%.(13) It is possible that these undiagnosed, untreated symptoms of PTSD contribute to gun violence seen in poor, urban communities as symptoms of PTSD have been shown to be associated with violence and involvement in the criminal justice system in multiple studies.(14-19) Though mental health and social wellbeing of survivors of gun violence are important benchmarks for recovery, the experiences of gunshot wound survivors upon re-entry into the community is largely unknown and under-researched.

1.1.3 Gun violence, race, mental health, and the criminal justice system

The gun violence epidemic disproportionately affects racial and ethnic minorities in the US and is the leading cause of death for Black men aged 15-24 years.(20, 21) In the United States (US), Black men comprise less than 7% of the US population but make up 51% of gun homicide
victims. Black men also have increased susceptibility to PTSD and depression following injury due to disproportionate experience with pre- and post-exposure stressors including: racial discrimination, poverty, incarceration, and living in racially-segregated areas with high levels of violence. In addition, Black men are less likely to be treated for their mental health symptoms. Despite this, there are few mental health interventions created specifically for communities of color or Black men.

Surviving a gunshot wound injury is also associated with increased interaction with the criminal justice system. Specifically, survivors of gun violence are three times more likely to be arrested under a violence or a weapons. In a convergence of risk, both Black men and survivors of gun violence are more likely to interact with the criminal justice system as compared with the general population.

The mechanisms for these outcomes among survivors of gun violence have not been fully elucidated, but they are likely intertwined with the underlying causes of the differential impact of both gun violence and police violence in Black communities within the US. Black communities are disproportionately affected by intensive policing practices and broad inequalities in the criminal justice system that lead Black Americans to be more likely to be charged, convicted and receive harsher sentences for crimes. This racial disparity is also seen in healthcare, where Black men have worse outcomes in terms of firearm mortality and in general when treated for any traumatic injury compared with the general population.

Coping with the psychological sequelae of gun violence is a major part of the post-injury recovery process. Survivors of gun violence often experience an exacerbation of mental illness with rates of PTSD ranging from 40-65%. Symptoms of PTSD have been shown to be associated with violence and involvement in the criminal justice system in multiple studies. This is particularly true for Black men and those that suffer intentional injuries such as gunshot wounds.
Survivors of gun violence also report a disrupted sense of safety following their injuries. (5, 39-41) In the US, studies of adolescent violence demonstrate that adolescent males are three times more likely to intend to carry a gun if they also report a fear of victimization. (42) In another study of juvenile offenders, 40% of participants reported that they would feel safer if they carried a gun. (43)

Anderson’s The Code of the Street explores the ways in which racialized alienation and lack of faith in the police and judicial system leads poor inner city Black communities to develop a “code of the street” defined as “a set of informal rules governing interpersonal behavior, including violence.”(44, 45) The purpose of this study was to better understand perceptions of the police and attitudes towards carrying a gun among a subgroup within this population, Black men who are survivors of gun violence.

1.2 MENTAL HEALTH INTERVENTIONS FOR SURVIVORS OF GUN VIOLENCE

1.2.1 Overview of post-traumatic stress disorder (PTSD) in survivors of trauma

The diagnosis of PTSD is included in the trauma and stress-related disorders section of the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-V). Following a life-threatening experience or exposure to violence, PTSD develops when an individual goes on to experience emotional numbing, hyperarousal, anxiety, avoidance and re-experiencing or flashbacks.(46) Lifetime prevalence of PTSD for the general population is estimated be around 8%. (47) For those experiencing any type of trauma such as road traffic accidents, the rates of PTSD are elevated with incidence ranging from 6-45%.(48) In one study of patients presenting to trauma clinics after all types of injury, 31.7% met the diagnostic criteria for PTSD.(49)

Among those suffering a gunshot wound injury, the mental health ramifications include acute stress disorder (ASD), post-traumatic stress disorder (PTSD), depression and anxiety. (1-5, 50)
In one study using 5 years of data from the Nationwide Readmission Database, 13.3% of patients that experienced a firearm-related injury were readmitted in the next 6 months after their injury, with 6.7% of those readmission being for PTSD or ASD. Another study of long term outcome of survivors of gun violence found that almost half of those surveyed had a positive screen for probable PTSD.

1.2.2 Prevention and treatment of PTSD after trauma

The theoretical model of PTSD pathogenesis is complex, involving (1) pre-traumatic factors such as genetic predisposition and childhood trauma; (2) peri-traumatic factors such as trauma type and severity; and (3) post-traumatic factors such as recovery environment and neurobiological mechanisms that ultimately lead to the characteristic symptoms of PTSD.

(See Figure 1)

Strategies for prevention of PTSD have generally fallen into one of two categories: Pharmacologic interventions and psychological/behavioral interventions.

Many trials have examined the role of pharmacologic interventions in the prevention of PTSD following a traumatic injury. A Cochrane review from 2014 concluded that there was moderate quality evidence for the use of hydrocortisone but no evidence supporting the use of propranolol, escitalopram, temazepam or gabapentin in preventing PTSD. Because of the lack of evidence for efficacy, the routine use of medications for the prevention of PTSD is not the current standard of care.

There is a paucity of research demonstrating effective psychological/behavioral interventions to prevent the development of PTSD. One previously widely used practice was psychological debriefing, which includes a detailed review of the traumatic experience, support for emotional expression and encouragement to reach out for help in the future. This intervention has been shown not to be effective and/or possibly harmful in a variety of traumatically injured
One study examined a more intensive practice of stepped collaborative care that involves the integration of medical care, case management and psychotherapy. In a study of 121 trauma patients (both intentional and unintentional injuries), this approach was shown to improve symptoms of PTSD and the rate of alcohol use/dependence. An effectiveness-implementation hybrid trial assessing this approach in all trauma patients is currently underway. However, there have been no studies that examine behavioral interventions designed specifically for individuals that sustained an intentional injury such as a gunshot wound injury.

1.2.3 Hospital-based violence intervention programs (HVIPs) for survivors of gun violence

Hospital-based violence intervention programs (HVIPs) connect survivors of gun violence with community-based services in the aftermath of an injury in order to improve the recovery environment.(59) HVIPs are comprised of an interdisciplinary team of social workers, peer mentors and clinicians who identify those needing services either during or soon after hospitalization for a violent injury. They then work with patients and their families to meet a diverse set of psychosocial, physical and socioeconomic needs.(60) HVIPs may offer a range of services including substance abuse treatment and individual or family therapy. While there is no standard set of HVIP services, all HVIPs offer additional resources following violent injury.(59) There is some evidence that HVIPs reduce re-injury rates and positively affect intermediate outcome measures such as increasing the use of services and decreasing violence-related behaviors, but there is no clear consensus on their efficacy.(59, 61)

HVIPs prioritize mental health and emotional and social wellbeing as pertinent patient-reported outcome measures.(60) Emotional responses to intentional injuries are different than those from unintentional trauma.(62) For gunshot wound survivors in urban populations, for example, living in a neighborhood with high levels of violence is a chronic stressor that is perceived as increasing the risk of re-traumatization and future assaultive events and therefore has a strong influence on mental health recovery.(41)

Mental health services are generally scarce and underfunded in the United States healthcare system.(63) Targeted mental health interventions at the point of care following a gunshot wound as part of a package of services provided by HVIPs have the potential to influence the trajectory of mental illness among survivors of gun violence and ultimately improve care and reduce re-injury among survivors of gun violence.
1.2.4 The Screening and Tool for Awareness and Relief of Trauma (START)

The Screening and Tool for Awareness and Relief of Trauma (START) is a targeted mental health intervention developed for patients that come from communities of color with sustained and persistent trauma. It consists of six screening questions adapted from the validated Primary Care PTSD Screen (64) with input from focus groups, surveys and in-depth interviews with victims of violence and in particular, boys and young men of color.(65) While this is a screening tool for those at-risk for PTSD, it does not focus solely on the diagnosis of PTSD. In tandem with the screening tool is embedded a START intervention, meaning educational and practical tools to assist those who have symptoms but may not meet full PTSD criteria. This is particularly crucial for those patients immediately following a traumatic event. It takes four weeks before a diagnosis of PTSD may be given, but in that time period the patient suffers without treatment.

The full START intervention requires 30-45 minutes of structured conversation at the end of which the participant leaves with a better understanding of trauma symptoms as well as on-the-spot instruction on a set of techniques designed to alleviate the symptoms of PTSD. Based on the results of his or her screening, the participant will be offered up to four techniques to alleviate his or her symptoms. For example, one tool is based on the practice of Psychological Safety Planning, commonly used for victims of domestic violence.(66) This technique involves the creation of a personal stress reduction plan called a Self-care On the Spot (SOS) kit. Participants are instructed on building upon their own capacity and resilience to consider what makes them feel calm and create a plan for self-care for when they experience intense symptoms of trauma. Another tool involves instruction on improving the sleep environment; it was designed so that even those who are unstably housed or homeless may follow the techniques. The START intervention used in the study will be the same as that used in the prior literature. A full description of the tools can be found on the website at start2heal.org/tools/.
A pilot study of START with 302 participants demonstrated a significant decrease in the frequency of the six trauma symptoms measured after four weeks. (65) For example, they reported a decrease in symptoms of hyperarousal from 21% to 7% and a decrease in symptoms of avoidance from 36% to 9%. As evidence of its effectiveness, over the four-week time period 85% of participants continued to use the exercises at least once per week and 94% of participants who used the exercises found them helpful. (65) They had a follow-up rate of approximately 66% (n=200/302). Of note, these participants were members of communities with high levels of violence; most had a history of trauma but were not specifically recruited as victims of violence. START has not been piloted on victims of gun violence specifically, nor has it been tested in a randomized controlled trial design.

While the START intervention does not replace formal mental health services, it can provide education and basic techniques to recognize and deal with the symptoms of mental illness, thereby acting as a bridge for suffering patients. Empowering patients with proven interventions may help bridge the gap for those patients that will go on to need a mental health provider for the treatment of full PTSD as well as help those who do not meet full criteria but are symptomatic. A tool like START has the potential to make a major impact in improving mental health care and outcomes for victims of gun violence nationwide.

1.2.5 Stage model of behavioral therapies research

Similar to the evaluation of new pharmacotherapies, behavioral interventions should be tested for both efficacy and safety, usually through a randomized controlled trial design. These trials hinge on demonstrating that the results or conclusions from the trial are valid for all the participants that meet inclusion criteria, or having internal validity. (67) In order to demonstrate internal validity, there must be elimination of bias, which in behavioral studies can be particularly complicated. As such, behavioral therapies must undergo rigorous pre-trial testing to ensure internal validity.
To codify this process, Rounsaville et al proposed a stage model of behavioral therapies research.(68) (See Figure 2) The purpose of Stage I is to develop all of the elements that are necessary for a full randomized controlled trial. Stage II is performing the randomized controlled trial and Stage III is testing the effectiveness of the intervention in real-world environments. Stage I is the most complicated and therefore it is split into two parts. Stage Ia involves mostly the development of the content of the therapy and specification of the target population. Stage Ib focuses on pilot/feasibility testing of the final version of the therapy. (See Figure 3)

**Figure 2.**

<table>
<thead>
<tr>
<th>Stage I</th>
<th>Stage II</th>
<th>Stage III</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal:</strong> To develop the elements required to test the efficacy of a new behavioral therapy in a randomized controlled trial.</td>
<td><strong>Goal:</strong> To test the efficacy of a new behavioral therapy in a randomized controlled trial design.</td>
<td><strong>Goal:</strong> To evaluate the transportability/implementation of treatments for which efficacy has been established in at least two randomized controlled trials.</td>
</tr>
</tbody>
</table>
| - Manual writing  
- Training program development  
- Outcome measurement development  
- Pilot/feasibility tests | - RCT  
- Generalizability  
- Implementation  
- Cost-effectiveness  
- Consumer/marketing issues | |


A randomized controlled feasibility study as described for Stage Ib of the development of behavioral therapies is a piece of research done to estimate the parameters needed to design a full randomized controlled trial.(69) It is well documented that there can be a significant amount of waste in research. A 2009 *Lancet* study estimated that as much as 85% of research investment is lost.(70) In this review the authors found that one of the reasons for this lost productivity is that over 50% of the studies they looked at failed to take adequate steps to reduce biases.(70) Pilot and feasibility studies are important tools to help reduce the amount of waste from full clinical trials by testing the design, conduct and analysis of randomized
controlled trials prior to launching a full trial. In fact, in the United Kingdom, the UK Medical Research Council requires that any randomized controlled trial first complete a pilot and/or feasibility study prior to allocation of funds for a full randomized controlled trial. 

**Figure 3.**

<table>
<thead>
<tr>
<th>Table 1. Steps in new treatment development</th>
<th>for Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>When submitting a proposal</td>
<td>la  lb  II</td>
</tr>
<tr>
<td>Treatment method</td>
<td></td>
</tr>
<tr>
<td>Specify theoretical rationale (theory of the disorder)</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>Specify hypothesized causal chain (theory of change mechanisms)</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>Demonstrate feasibility/describe feasibility plan (e.g., acceptability, safety)</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Specify process measures (operationalize causal chain)</td>
<td>✓</td>
</tr>
<tr>
<td>Provide a provisional therapist manual specifying procedures</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Specify pilot testing procedures (if applicable)</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Provide a completed therapist manual specifying procedures</td>
<td>✓</td>
</tr>
<tr>
<td>Therapist</td>
<td></td>
</tr>
<tr>
<td>Specify and justify inclusion criteria (requirements) and how measured</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>Establish availability of needed therapists</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Specify procedures for assigning cases to therapists</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Specify procedures for training and certifying therapists</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Specify procedures for supervising and monitoring performance</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Establish feasibility of training (replicability)</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Specify therapist adherence measures</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Establish reliability of therapist adherence measures</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Specify therapist competency measures and their reliability</td>
<td>✓</td>
</tr>
<tr>
<td>Client/participants</td>
<td></td>
</tr>
<tr>
<td>Identify target population (heterogeneity/homogeneity)</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>Specify and justify inclusion/exclusion criteria</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>Establish capability to recruit the needed sample</td>
<td>✓</td>
</tr>
<tr>
<td>Document retention rate in treatment</td>
<td>✓</td>
</tr>
<tr>
<td>Design and analysis</td>
<td></td>
</tr>
<tr>
<td>Specify measures</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>Establish reliability of new outcome measures</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Report outcome data</td>
<td>✓</td>
</tr>
<tr>
<td>Specify control conditions (experimental or quasi-experimental)</td>
<td>✓</td>
</tr>
<tr>
<td>Specify procedures for assigning clients to treatment</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Demonstrate feasibility of control</td>
<td>✓</td>
</tr>
<tr>
<td>Specify a priori hypotheses (outcome, predictors, process, etc.)</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Specify analysis plan to test hypotheses</td>
<td>✓</td>
</tr>
<tr>
<td>Demonstrate necessary statistical power for analyses</td>
<td>✓</td>
</tr>
<tr>
<td>Specify efficacy/safety monitoring point for continue/stop</td>
<td>✓ ✓</td>
</tr>
</tbody>
</table>

*Stages of research: la = feasibility testing, early development and refinement of treatment procedures; lb = “tinkered” pilot testing of treatment outcome; II = efficacy testing; may include a tailored pilot efficacy-testing phase.*

1.2.6 Applying the stage model of behavioral therapies research to START

The development of the START intervention has passed through Stage Ia of the model of behavioral therapies research described above. However, the necessary parameters for a full randomized controlled trial are unknown and therefore a feasibility study as described for Stage Ib is the next logical step in the development of this intervention. These studies typically have the following major aims: (1) Establish successful recruitment and retention of participants; (2) Demonstrate patient acceptance of the therapy and feasibility of the control, (3) Evaluate the feasibility of delivering the treatment (intervention fidelity); (4) Estimate the effect size for the primary outcome measures in order to perform a power calculation for sample size for the Stage II studies; and, (5) Provide empirical evidence for clinical improvement over the course of treatment in at least one important outcome domain.

START has been shown to be effective at reducing symptoms of post-traumatic stress for the general population living in communities with high levels of violence in preliminary, as yet unpublished studies. However, this tool has not been rigorously tested in a randomized controlled trial design and it has also not been piloted in a high-risk population such as survivors of gun violence. The intervention fits into the profile of a Stage Ia intervention as described above and is promising enough to warrant advancement to Stage Ib. Research in early interventions for PTSD generally involve heterogeneous populations and don’t take into account trauma type, demographics, and recovery environment. There is no consensus on effective prevention of PTSD with major review articles citing the paucity and heterogeneity of studies as major barriers. A better understanding of the utility of this targeted, culturally sensitive tool for prevention of symptoms of post-traumatic stress in gunshot wound survivors would provide the information necessary for planning a randomized controlled trial in the future and ultimately contribute to the larger body of literature on PTSD prevention while simultaneously addressing a major need in this community.
1.3 COVID-19 AND COMMUNITY VIOLENCE

1.3.1 Overview of the COVID-19 pandemic

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was initially discovered in late 2019 in Wuhan, China.(73) Over the next several months, the resulting condition, COVID-19, spread to become a pandemic with devastating consequences worldwide; including almost 2 million confirmed cases with more than 100,000 deaths within the United States (US) by June 2020.(74)

As the first major pandemic in almost a century, the COVID-19 pandemic is a unique historical event with unprecedented variables such as the institution of mandatory social distancing restrictions. In Connecticut, Governor Lamont issued the “Stay Safe, Stay Home” executive order on March 23rd, 2020. This order required nonessential businesses and not-for-profit entities to stop all in-person services.(75) This led to the temporary closure of many businesses resulting in broad social disruption. The order expired on May 21st, 2020, but the mandatory social distancing restrictions continued in varying forms through the end of 2020.

1.3.2 COVID-19 and guns

In times of emergency and uncertainty, sales of guns in the United States increase.(76) Following the onset of the COVID-19 pandemic, gun sales surged with an estimated increase of 2.1 million gun purchases from March through May 2020 (as compared with previous years).(77-81) Even with nationwide stay-at-home orders, the majority of states included gun retailers as essential businesses and therefore gun sales continued.(82) With increased access to guns in the population, there is reason to suspect that gunshot wound injuries (unintentional gunshot wound injury, gun suicide and interpersonal gun violence) will also increase.(83-86)
1.3.3 COVID-19 and race

Initial studies on the epidemiology of morbidity and mortality related to COVID-19 suggested that minoritized and low socioeconomic status communities are among the hardest hit by COVID-19. (87-92) As more research emerges on the COVID-19 pandemic, a consensus in the literature has begun to develop that Black and Latino population experienced disproportionately higher rates of SARS-CoV-2 infection and mortality. (93, 94) While some of this can be attributed to health risks associated with severe COVID-19 illness, employment, household composition, access to care and socioeconomic status likely played an even more important role in the differential effects of the pandemic by minoritized status. (95-97)

1.3.4 COVID-19 and community violence

Research on natural disasters such as hurricanes, earthquakes and tornadoes suggests that these events may lead to increases in child abuse, domestic violence, suicide and interpersonal violence. (98-103) The COVID-19 pandemic recreates some of the traits of a natural disaster including broad social disruption, job loss, and large scale morbidity and mortality. It is possible that the COVID-19 pandemic could have a similar effect on community violence, but more research is needed to answer this question.

Early data from the pandemic suggests that some forms of community violence increased in the first few months. In the six weeks following stay-at-home orders in Philadelphia, PA, one study found a 23% relative decrease in falls from standing in tandem with a near 100% relative increase in intentional gun-related injuries. (104) Several other studies and news stories have noted similar increases in all forms of community violence in the wake of the COVID-19 pandemic. (105-111)

Longer term studies on the immediate and long-term effects of the pandemic on community violence have yet to be thoroughly examined, including whether the effect of the COVID-19 pandemic on community violence differs by racial and ethnics minoritized status.
1.4 SPECIFIC AIMS

The overall objective of this research is to better understand the experience of recovery for victims of gun violence, attempt to develop a mental health screening and intervention tool for this population, and better understand the effect of the COVID-19 pandemic on community violence in Connecticut (CT). The central hypothesis of this research is that survivors of gun violence will describe significant mental health needs during recovery from their injuries, that the Screening and Tool for Awareness and Relief of Trauma (START) will be a promising and feasible mental health intervention to improve their symptoms, and that the COVID-19 pandemic has exacerbated community violence in CT. The central hypothesis was tested using three specific aims:

**Aim #1:** Explore how survivors of gun violence describe their experience of recovery from a gunshot wound and their perceptions of their mental, emotional and social health following the injury. This involved a) Fostering a relationship with a local organization that specializes in working with survivors of gun violence using community-based participatory research principles; b) Development of a structured interview guide for qualitative interviews with the community partner; c) Recruiting participants for individual qualitative interviews; d) Thematic analysis of qualitative data using the constant comparative method of qualitative analysis and a coding team made up of community members and researchers.

**Aim #2:** Evaluate the feasibility of testing the Screening and Tool for Awareness and Relief of Trauma (START) intervention for survivors of gun violence presenting to the hospital in a randomized controlled trial design. This involved a) Enrolling patients presenting to Yale New Haven Hospital with a gunshot wound into the study and testing the success of recruitment; b) Randomizing participants to receive the START intervention or regular care through the Yale New Haven Violence Intervention Program (YNH VIP); c) Assessing intervention fidelity; d) Collecting baseline and follow up data of all participants including symptoms of post-traumatic
stress disorder (PTSD) from an adapted PTSD Checklist- Civilian Version (PCL-C) Insomnia Severity Index (ISI); e) Tracking the amount of engagement with each participant along with the dropout/lost to follow-up rate; and f) Data analysis consisting of paired t-test analysis of the participant’s PCL-C and ISI scores to estimate the effect size of the intervention.

**Aim #3:** Analyze the pattern of violence-related trauma presenting to trauma centers in CT and determine whether there is an increase of community violence presentations since the onset of the COVID-19 pandemic and whether this disproportionately affects racial and ethnic minoritized communities. This involved a) Engaging with the major trauma centers in CT to collaborate in a study; b) Collecting data using the trauma registries at YNHH and participating institutions for all violence-related-trauma presentations in the emergency room from January 1st, 2018 to January 1st, 2021; c) Describing violence-related trauma presentations from before and after the onset of the COVID-19 in CT using descriptive statistics; d) Comparing the pattern of violence-related trauma from pre- and post-COVID-19 using a time series linear regression model; e) Analyzing the mode of injury for violence-related trauma presentations; and f) Completing a stratified analysis between Black/Latino and all other violence-related trauma presentations to determine whether race and ethnicity acted as an effect modifier on community violence during the COVID-19 pandemic.
CHAPTER 2. AIM 1: SURVIVORS OF GUN VIOLENCE AND THE EXPERIENCE OF RECOVERY

2.1 METHODS

2.1.1 Study design

We used a qualitative research study design and a community-based participatory research (CBPR) approach to better understand how Black male gunshot wound survivors in the United States describe their experience of recovery and their perceptions of their mental, emotional and social health following the event.(112, 113) Institutional Review Board (IRB) approval was obtained through the Yale Human Subjects Committee. Members of our academic research team had over 15 years of experience working with community leaders in the Greater New Haven, Connecticut Black community that we leveraged for this research partnership.(114-117) Our community/academic partnership agreed to a memorandum of understanding between the University and a nonprofit organization that had a Street Outreach Worker program working to interrupt violence within the community.

2.1.2 Recruitment

Our community partners used a snowball sampling method (118) to recruit adult Black men with a history of a gunshot wound. Individual street outreach workers distributed flyers to community members they knew had a history of a gunshot wound. These community members then contacted the investigators. Following the interview, each participant was asked to distribute more flyers to community members in their social circle that might be eligible for the study. Participants were excluded from the study if they were not community members and/or had been injured outside of the greater New Haven area, a medium-sized metropolitan area in the northeastern United States. After the first ten interviews, we began purposeful sampling, (118)
asking participants to recruit individuals that had been shot in the last five years and/or were under the age of 30 to ensure a diverse range of perspectives.

2.1.3 Interviews

Participants were informed that their interviews would be audio recorded and transcribed with the removal of any identifying information. Participants were paid $40 in cash for their time. Consistent with CBPR principles, our whole team developed a semi-structured interview guide of open-ended questions about the participant’s personal experiences in New Haven, the circumstances surrounding their injuries, their experiences in the hospital, perceptions of providers, and their experience of recovery including whether they experienced symptoms of PTSD and depression. (See Figure 4)

Participants were interviewed according to their preference either in an office space, their homes, the public library or another public location. Individual interviews were digitally recorded and professionally transcribed. This author (KMO), a white woman and academic researcher, conducted 13 interviews. In recognition of possible “outsider” influence on the interview, a Black man from New Haven who works as a street outreach worker, conducted 7 interviews.
2.1.4 Data analysis

The coding team for the primary analysis consisted of one community member with experience in violence prevention, three investigators with experience in injury prevention research, and a qualitative research expert. We used the constant comparative method of qualitative analysis. (119) Each member of the coding committee read the transcripts and catalogued the transcript data by assigning conceptual codes to different sections and then organizing these into a codebook with themes. The coding team met approximately once per month over five

- What have you been doing since that happened?
- Since your injury, have you been assessed or interacted with the police? Have you witnessed or gotten into any kind of fight/altercation?
- Subject has been involved in violence/criminal justice system since incident. What do you think has helped keep you safe?
  - Why do you think others end up assessed, interacting with police or getting into fights again?
  - Subject has been involved in violence/criminal justice system since incident. Why do you think it keeps happening to you?
- What do you need to be safe?
- Can you name any services (organizational, groups, or institutions) in New Haven that work to prevent gun violence or deal with the effects of gun violence?
- Have you used any of these services?
- Looking back, what do you think you could have done to prevent this from happening?
- If you had a younger brother or sister that you wanted to protect from getting injured like this, what advice would you give them?

Mental health

- Have you ever had any experience that was so frightening, horrible or upsetting (including your injury) that it made you afraid of returning to your home that in the past month?
  - Have had nightmares about it or thinking about it when you did not want to?
  - Tried hard not to think about it or went out of your way to avoid situations that reminded you of it?
  - Were constantly on guard, watchful or easily startled?
  - Felt numbed or detached from others or activities or your surroundings?
- Do you know anyone with depression, PTSD or any kind of mental illness?
  - Have you ever known anyone who takes medication for a mental illness?
- Do you think their treatment helped?
- If you had those problems, would you go seek help from a therapist or a psychologist or a doctor or nurse?
  - If not, what would you do instead?
  - If so, what would be the best way to do that?

Gun violence in the neighborhood

- Do you know anyone else who has been shot?
- Besides what you just told us, have you ever been shot at before? Have you ever seen someone else get shot?
- Have you ever caused a gun accident? Do you carry a gun around now?
- When there is a shooting, how do police in the neighborhood react?
  - How do the families react?
  - How do the police react?
- What do you think about this gun violence in this community?
- What would change the situation?
months until the codebook was finalized to discuss themes and discrepancies between individual codes. These codes and themes were organized on Dedoose Version 8.0.35, a web-based qualitative research software. (120) Our team concluded that we had thematic saturation (the point at which no new codes are being generated) after 15 interviews; we then completed five more interviews to confirm saturation.

The themes, along with illustrative quotations, were presented back to three groups to confirm validity and to engage in dialogue about next steps: to the participants themselves (both one-on-one and at a group meeting); to our community partner organization; and to local community stakeholders (including the Center for Research and Engagement Steering Committee for New Haven Community-Academic Research, a committee for research on gun violence in New Haven, and multiple community planning meetings).

2.1.5 Secondary analysis

We then completed a secondary analysis using the same data set to further analyze themes identified in the codebook that were outside of the main purpose of the original study. The purpose of this secondary analysis was to better understand perceptions of the police and attitudes towards carrying a gun among a subgroup within this population, Black men who are survivors of gun violence.

Two primary coders coded the transcripts using a theory driven approach consistent with directed content analysis as described by Hsieh et al. (121) The initial coding schema was based on prior literature around community-police relations and attitudes towards guns in urban communities in the US and prior research in sociology. (122, 123) This research included The Code of the Street by Elijah Anderson, a work which brought to the forefront the idea that in Black communities, the police are often viewed "as representing the dominant white society and not caring to protect inner city residents." (44) Other works included articles describing how
intensive policing practices and broad racial inequality within the criminal justice system leads to the phenomenon of *legal cynicism* within the Black community, defined as “a cultural orientation in which the law and the agents of its enforcement, such as the police and courts, are viewed as illegitimate, unresponsive and ill equipped to ensure public safety.” (124) The coding framework also drew from prior sociological work on the ecology of guns, which argues that “[guns] have become an important part of the discourse of social interactions in modern urban life, with symbolic meaning (power and control), social meaning (status and identity) and strategic importance.” (125) We applied these theories in the initial coding structure and used directed content analysis to determine whether survivors of gun violence express similar ideas.

We consolidated codes after the first five interviews through multiple coding meetings until reaching a consensus for the coding schema. This schema was then applied to the next 10 interviews and the codes were organized thematically into a codebook. (119) This finalized codebook was applied to the final 5 interviews without any generation of new codes. The rest of the coding team, consisting of academic researchers, community members and a former police chief of New Haven, read through the transcripts and met with the two primary coders to discuss the codebook. At multiple coding meetings over three months, the codes and themes with exemplar quotes were presented and discussed with solicited input from the community members in the coding team for confirmation.

### 2.2 RESULTS

#### 2.2.1 Sample

We conducted 20 interviews. All participants were Black males. Their ages ranged from 20-51 years old. The time since injury ranged from less than 1 year to over 30 years, 75% had a history of incarceration and 50% reported ever seeking any form of mental healthcare (Table 1).
Table 1. Sample characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (range) or Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td>36 (20-51)</td>
</tr>
<tr>
<td>Length of interview, minutes</td>
<td>38 (10-82)</td>
</tr>
<tr>
<td>Years since injury</td>
<td>13 (&lt;1-32)</td>
</tr>
<tr>
<td>History of incarceration, yes</td>
<td>75%</td>
</tr>
<tr>
<td>History of mental illness, yes</td>
<td>50%</td>
</tr>
<tr>
<td>Circumstances of injury</td>
<td></td>
</tr>
<tr>
<td>Targeted by someone</td>
<td>40%</td>
</tr>
<tr>
<td>Random/Unsure</td>
<td>35%</td>
</tr>
<tr>
<td>Robbed</td>
<td>10%</td>
</tr>
<tr>
<td>Bystander</td>
<td>15%</td>
</tr>
</tbody>
</table>

Mental illness included diagnoses of depression, post-traumatic stress disorder and/or bipolar disorder. History of incarceration included time spent in prison only (not including arrests or time spent in jail).

2.2.2 Themes: Primary analysis

In discussing the aftermath of a gunshot wound injury, five key themes emerged as reactions to the event: (1) Isolation: “It really made me not go anywhere;” (2) Protection: “I gotta protect myself;” (3) Aggression: “I'll be the one doing the shooting when that happens;” (4) Normalization: “It didn't really matter;” and (5) Barriers to mental health treatment: “They not just gonna take advice from anybody.” Every participant in this study expressed at least one of these reactions. (See Table 2 for exemplar quotes)

**Theme 1 – Isolation: “It really made me not go anywhere” (Participant #1)**

Following gunshot wound injury, 65% of participants described restricting themselves from visiting particular neighborhoods, streets, and places of business. In some cases, participants physically restricted themselves to stay in their homes. Others described isolating themselves not only from certain places, but also from certain people. They described behaviors such as avoiding old associates, crowds, or limiting their social circle to only a few people.

**Theme 2 – Protection: “I gotta protect myself” (Participant #2)**
While participants discussed a long history of exposure to violence, prior to being shot many
“did not think it would happen to me.” After their injuries, they experienced a lost sense of
invincibility. This was often exacerbated by a loss of “reputation” and “respect” from their peers
and neighbors as an acute consequence of having been shot. Losing the protection of a good
reputation and the perception of increased danger from their neighborhood led 55% of
participants to admit that they considered carrying a gun or started to carry a gun right after they
were shot.

Theme 3 – Aggression: “I’ll be the one doing the shooting when that happens” (Participant #6)

Other participants described how they were not only more likely to carry a gun, but also more
likely to use a gun. Of the participants, 15% described how every confrontation or disagreement
after their initial injury was more likely to lead to gunfire.

Theme 4 – Normalization: “It didn’t really matter” (Participant #7)

For 50% of our participants, violence was so frequently a part of their daily lives that they were
numb to it. They considered being exposed to violence as normal. Even the experience of being
shot did not rattle or change this perception. Being shot was just a normal occurrence in their
neighborhoods.

Theme 5 – Barriers to mental health treatment: “They not just gonna take advice from anybody”
(Participant #1)

Of our participants, 50% reported interacting with mental health professionals to discuss
symptoms of PTSD or depression. These participants described negative interactions with
mental health professionals and a number of barriers were identified. One major barrier was a
lack of trust between the provider and participant. Providers often do not share the same racial,
cultural and socioeconomic background as the participants. Participants perceived that the
mental health providers had little to no concept of the context in which they live. This eroded
confidence in the ability of a mental health provider to give meaningful advice. Participants suggested that instead of looking to a traditional mental health care provider, the healthcare team should find a “credible messenger” to provide mental healthcare for survivors of gun violence.

Table 2. Primary analysis themes

<table>
<thead>
<tr>
<th>Theme</th>
<th>Exemplar quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolation</td>
<td><strong>Physical</strong></td>
</tr>
<tr>
<td></td>
<td>It made me think that anything can happen at any given time. Anything. So, I just created my own little circle and my own little zone and stayed in it. That’s what I did. (Participant #5)</td>
</tr>
<tr>
<td></td>
<td><strong>Social</strong></td>
</tr>
<tr>
<td></td>
<td>Being that I didn’t know who shot me or what reasons it was for, I didn’t really go places. So, after getting shot mainly—I was already antisocial depending on what spots we went to—but after getting shot, it really made me not go anywhere. So, that was crazy. (Participant #1)</td>
</tr>
<tr>
<td>Protection</td>
<td><strong>Loss of invincibility</strong></td>
</tr>
<tr>
<td></td>
<td>I was hardheaded back then, thinking: I’m steel…like, bullets can just bounce off me. I realized that night that I’m not made of steel. That night it was plain to see that I bleed like everybody else. (Participant #10)</td>
</tr>
<tr>
<td></td>
<td><strong>Loss of reputation</strong></td>
</tr>
<tr>
<td></td>
<td>[Once] you already been shot, you gonna have to pick up a gun because now you’re twice as likely to be shot again. Because once you get shot, everybody knows it. (Participant #1)</td>
</tr>
<tr>
<td></td>
<td><strong>Firearm carriage</strong></td>
</tr>
<tr>
<td></td>
<td>I could stay in the house and never come out never again; or, I gotta protect myself…If I had my gun, I probably woulda shot him before he shot me. You know? (Participant #2)</td>
</tr>
<tr>
<td>Aggression</td>
<td><strong>The last time I got shot I think that made me more security minded… Security was like, the number one priority. Never going to get shot again. I went and got a bullet proof vest…and got more guns. After that, every altercation that had to do with shooting, I probably initiated it first outta saying to myself, I’m never gonna get shot again first. I’ll be the one doing the shooting when that happens.</strong> (Participant #6)</td>
</tr>
<tr>
<td>Normalization</td>
<td><strong>Numbing</strong></td>
</tr>
<tr>
<td></td>
<td>Just from being exposed to so much raw shit as a child, my reality was different from other realities…If I heard gun shots, that shit didn’t even startle me. (Participant #1)</td>
</tr>
<tr>
<td></td>
<td><strong>A daily occurrence</strong></td>
</tr>
<tr>
<td></td>
<td>I didn’t really think anything of it. It didn’t bother me, I returned. I just went back to the neighborhood…I was still out in the neighborhood the next day selling drugs with a crutch. It didn’t really matter. (Participant #7)</td>
</tr>
</tbody>
</table>
Barriers to mental health treatment

Lack of trust

R: They had me talk to a psychiatrist and all that in the hospital when I got shot and stuff like that. Yeah. I had to.
I: Did it help?

Lack of credibility

They not just gonna take advice from anybody. Nobody does. Like, I don’t give a fuck how many doctorates you got—if I don’t like you, I don’t like you. Fuck you and your advice. (Participant #1)

Credible messenger

So, first they [the healthcare team] have to find somebody that they [survivors of gun violence] can relate to or somebody that they look up to as far as wanting to hear what they got to say. And then they have to get that person to go out of their way to really push them in the proper direction. (Participant #1)

2.2.3 Themes: Secondary Analysis

The recurring themes around the perceptions of the police included: (1) Legal cynicism: “I don’t like police, none of them”; (2) Interactions with the police in a medical setting: “The cops didn’t make it any better;” and (3) Ambivalence around police presence within the community: “That’s their job to protect me, too.” Themes related to guns in the community encompassed: (1) The availability of guns: “Getting a gun is about as easy as buying a pair of sneakers”; (2) Symbolic meaning: “Guns give them courage”; (3) Social meaning: “I just let them know: I have a gun, too;” and (4) Strategic meaning: “It’s just for protection” and “You live by the sword, you die by the sword.”

Perceptions of the police

Every participant expressed distrust in the police in some form. They expressed this legal cynicism in a variety of ways—stating that they believe police do not care, abuse their position, target victims of shootings for no reason and do not investigate crimes for people they find undeserving. (see Table 3)
This distrust was most apparent when participants described their interactions with the police after sustaining a gunshot wound. For the majority of participants, these interactions with the police in a medical setting were negative and traumatic. Those that did not express negative emotions towards police in this setting described their interactions as routine. (see Table 3) Most participants expressed that they perceived that the police officers they encountered were lacking empathy, focusing solely on investigating the crime while ignoring or actively interfering with treatment for life-threatening injuries. (See Table 3)

_The cops didn’t make it any better. The cops, they got there like at the same time with the ambulance. The cops were standing in the doorway blocking the ambulance, like really about to let me die because I didn’t know who shot me. He was like, “I know you know who shot you.” _(Participant #9)

In one instance, the participant, perceiving complicity between the hospital and the police, left the hospital after being acutely disrespected by police in the emergency room.

_I remember the officer—I won’t say his name—he came in the emergency room. I was there and he said, “Hey, hey, are you okay? Are you alright?” And I was like, “Yeah” I said, “I’m all right” … He was like, “Do you know who shot you?” I said, “I have no idea.” He said, “Fuck you, I hope you die.” That was what he said to me. So, after he left, the doctors went out for a minute, they left me, and I left the hospital._ (Participant #4)

Even while expressing aspects of legal cynicism, some participants reported trusting the police (see Table 3) and others expressed ambivalence, balancing the need for police presence while distrusting some of the police officers themselves.

_Police presence—even though they don’t really like the police. Just the presence of the police being there, lets you know that somebody ain’t going to start shooting because the police is there._ (Participant #4)
### Table 3. Perceptions of the police.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Exemplar quote</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Legal cynicism</strong></td>
<td>They got the cops out here acting crazy, harassing, beating, killing people… They don’t get arrested or nothing… I don’t like police, none of them… They go home and have peace while we mourn. (Participant #15)</td>
</tr>
<tr>
<td></td>
<td>I mean people think that the police, especially the person who has a bad name as far as with the police as a street guy. His name has been in shit; he’s been shooting. Some people feel that when a person is like that, the police don’t investigate as hard. That’s what a lot of people believe in the African American community. (Participant #6)</td>
</tr>
<tr>
<td></td>
<td>Getting shot makes you more likely to get in trouble. Because once you get shot now you got a target on your back from the police. Even though you ain’t do nothing. But say you could be somebody that just play basketball, like the police can be like, “why did he get shot if he just played basketball?” Now they watch you. They watch you for two reasons: One, they don’t want you to retaliate; and two, because they want to see what you’re doing. (Participant #13)</td>
</tr>
<tr>
<td><strong>Interactions with police in the medical setting</strong></td>
<td>[The cops] asked me a couple of questions but, like I said, the person [who shot me] had a mask on. So, there wasn’t really nothing to say, I just told them what I was doing that day, what happened after and what happened at the time… I know they had to do their job. (Participant #13)</td>
</tr>
<tr>
<td></td>
<td>The cops didn’t make it any better. The cops, they got there like at the same time with the ambulance. The cops were standing in the doorway blocking the ambulance, like really about to let me die because I didn’t know who shot me. He was like, “I know you know who shot you.” (Participant #9)</td>
</tr>
<tr>
<td></td>
<td>The detective, she telling me, “Take that shirt off because I need that shirt for evidence.” I’m like, make sure I’m all right before you even worrying about a shirt, you know what I’m saying? (Participant #11)</td>
</tr>
<tr>
<td></td>
<td>I remember the officer—I won’t say his name—he came in the emergency room. I was there and he said, “Hey, hey, are you okay? Are you all right?” And I was like, “Yeah!” I said, “I’m all right.” They cut all my clothes up and stuff; I was shot with a really big gun. He was like, “Do you know who shot you?” I said, “I have no idea.” He said, “Fuck you, I hope you die.” That was what he said to me. So, after he left, the doctors went out for a minute, they left me and I left the hospital. (Participant #4)</td>
</tr>
<tr>
<td><strong>Police presence within community</strong></td>
<td>When you are doing dirt, you are always going to feel like the police are against you. When you are living a righteous life, you realize that the police is there for you… That was their job… That’s their job to protect me too. (Participant #10)</td>
</tr>
<tr>
<td></td>
<td>Police presence—even though they don’t really like the police. Just the presence of the police being there, lets you know that somebody ain’t going to start shooting because the police is there. (Participant #4)</td>
</tr>
</tbody>
</table>
Guns in the community

Almost every participant commented that guns in New Haven are readily available and easily obtained. As one participant described it, “getting a gun is about as easy as buying a pair of sneakers.” (Participant #1) Participants described being aware of the ubiquity of guns in their community even from a young age, such that many believed that owning a gun is a necessary part of living in their neighborhood.

> It was always in my house, my brothers always had them… You always felt that the people over there got ‘em, so, I gotta have it… Not everybody shoots with a gun, but everybody feels they have to have a gun. (Participant #4)

Culturally, a gun is more than just a weapon. For many of our participants, it was imbued with meaning, symbolizing both power and control. One participant described how carrying a gun makes a person feel powerful and gives him “false heart”:

> If a person walks [in] and he got no gun on him, he walks in with more respect and everything. You have way more manners than what you would have if you walk in with a gun. Now you got a gun on you, now you feel like you have the advantage of people.

  (Participant #10)

Carrying around a gun was also a way to feel in control, especially during a chaotic time. A different participant described how carrying a gun gave him a sense of control immediately after his gunshot wound injury.

> I felt like I needed to carry a gun. Because, at the time, like I said, my brother got shot, I got shot. Felt like a lot of stuff was happening. I felt like I can get shot again. (Participant #13)
Carrying around a gun was also described as having social meaning. One participant related how the act of carrying a gun alters the individual’s identity within a group, signifying to others that he is “in the game.”

*It was like either you in the game or you out the game. Either you walking around with that gun or you walking around with your tail between your legs and just not doing nothing.*

(Participant #2)

Another participant discussed how after an incident of acute disrespect (such as being injured with a gun), carrying a gun was a way to build up respect within a group. Stating that after getting shot, most people in his neighborhood will “want to go get a gun and try to build his name back up.” (Participant #11)

This highlights how carrying a gun confers status within a group, which in turn provides protection against being injured in the future. One participant described a conversation he had with his son, trying to convince him not to carry a gun. In that discussion, his son described how just having a gun confers social status, and therefore safety, for him, stating “I’m not planning on doing nothing to him. I just let them know: I have a gun, too. Leave me alone.” (Participant #4)

In this way, simply carrying a gun is perceived as a form of personal protection in the community.

In part because of the lack of trust in police protection, participants expressed that when they felt threatened, owning a weapon was a form of problem-solving behavior to ensure personal safety.

*People tell me they carry guns. But, most of the people I talk to, tell me that they carry guns, because they’re afraid. It’s just for protection because the other people have guns… If everybody else got one, I’m the only fool without one?* (Participant #4)
While all participants described at least one of the myriad reasons above for carrying a gun, a few of them also enumerated the negative consequences of carrying a gun. These consequences ranged from the spiritual to concrete penalties like incarceration. (See Table 4)

One participant described why becoming a father made him not want to carry a gun, stating: “You see the two end results: either dead or in jail. Why would I put my kids in that situation?” (Participant #12)

Another participant expressed his belief that carrying a gun, rather than being a way to protect himself, instead put him at higher risk for sustaining a gunshot wound.

God got the shield on me now. Because they say, you live by the sword, you die by the sword. We consider in the hood, that’s the sword. If I pick up that sword, that’s going to put a hole into this shield that God holding me now. (Participant #8)

<table>
<thead>
<tr>
<th>Table 4. Guns in the community</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Theme</strong></td>
</tr>
<tr>
<td><strong>Availability of guns</strong></td>
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<td></td>
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<tr>
<td><strong>Symbolic meaning</strong></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>
We in a society like: He got shot. He watched his brother’s father get killed. His cousin got shot. Now he got caught with a gun. Why do you think he got a gun? (Participant #5)

After I got shot, I carried a gun, everywhere. Either a gun or a knife—I wasn’t nowhere without it. (Participant #1)

### Social meaning

<table>
<thead>
<tr>
<th>Identity</th>
<th>It was like either you in the game or you out the game. Either you walking around with that gun or you walking around with your tail between your legs and just not doing nothing. (Participant #2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>It’s hard to be out here every day and not look the part like you’re supposed to. You don’t fit in. The ones who really don’t fit in—these are the ones who don’t have all the latest sneakers and stuff like that—they usually the shooters. That’s what we know because they’re the one who, they feel like they always got something to prove. “You don’t respect me? What I got on? You’re going to respect me because you know how I am.” (Participant #4)</td>
</tr>
<tr>
<td></td>
<td>They infatuated with you know, just thinking they the man, with a gun. (Participant #5)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Status</th>
<th>That’s how these little young boys thinking nowadays. Because once you fight them and beat them up and you embarrass them, he’s not going to take that loss. He is going want to go get a gun and try to build his name back up. (Participant #11)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Today’s society right now is people thinking that guns make you tough. Make you the man if you do things like that. (Participant #5)</td>
</tr>
<tr>
<td></td>
<td>I felt that I needed to carry a gun when I got a lifestyle. (Participant #6)</td>
</tr>
</tbody>
</table>

### Strategic meaning

<table>
<thead>
<tr>
<th>Protection</th>
<th>People tell me they carry guns. But, most of the people I talk to, tell me that they carry guns, because they’re afraid. It’s just for protection because the other people have guns… If everybody else got one, I’m the only fool without one?… Their fear every day is that if they don’t go out with a gun, somebody is going to shoot them. And they tell you, “I’m not a violent person but I go somewhere and they pull their guns out on me.” And some of them walk around, a lot of these kids walk around with BB guns just to show you, “I got one too.” So, they back them off. (Participant #4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If you’ve got three people in that neighborhood with guns you going to be the fourth person with a gun. (Participant #5)</td>
</tr>
<tr>
<td></td>
<td>[You carry a gun] just to you make yourself feel safe. Like I don’t want to have to go through that pain again. I just want to feel safe. (Participant #11)</td>
</tr>
<tr>
<td></td>
<td>I did carry a gun. I had to cause I was just shot. So, I could stay in the house and never come out never again or I gotta protect myself. Because now, I didn’t think that person was gonna shoot me… if I had my gun I probably woulda shot him before he shot me. You know? So, I was thinking like now I have to keep my gun on me at all times. No matter where I’m at or where I’m going—if I’m in the car or on the bus or riding a bike or walking, I had my thing on me. (Participant #2)</td>
</tr>
</tbody>
</table>
**Negative consequences**

"He is not going to touch no gun regardless. We did 19 and a half years for [carrying] a gun: a convicted felon carrying a firearm." (Participant #10)

You see the two end results: either dead or in jail. Why would I put my kids in that situation?" (Participant #12)

God got the shield on me now. Because they say, you live by the sword, you die by the sword. We consider in the hood, that’s the sword. If I pick up that sword, that’s going to put a hole into this shield that God holding me now. The demons can ooze their way back in. Since now I don’t have the sword around me, nowhere near me, I’m blessed and I just take a day at a time. (Participant #8)
CHAPTER 3. AIM 2: A PILOT CLINICAL TRIAL OF THE SCREENING AND TOOL FOR AWARENESS AND RELIEF OF TRAUMA (START) FOR SURVIVORS OF GUN VIOLENCE

3.1 METHODS

3.1.1 Study design

We designed a pilot study evaluating the feasibility of completing a randomized controlled trial to test the Screening and Tool for Awareness and Relief of Trauma (START). Participants were recruited from the Yale New Haven Violence Intervention Program (YNH VIP). The pilot study used a mixed methods study design that included both quantitative and qualitative data collection to assess the START intervention as well as the feasibility of completing a randomized controlled trial. The purpose of this study was to estimate important study parameters that would enable a future randomized controlled trial using the framework provided by Rounsaville et al. (68)

3.1.2 Eligibility

Victims of gun violence who were eligible for YNH VIP services recovering from their injury were approached by investigative staff to be included in the study as described below in the recruitment section. *Inclusion criteria* consisted of presentation to Yale New Haven Hospital (YNHH) with the primary diagnosis of a gunshot wound and eligibility for enrollment in the YNH VIP, a hospital-based violence intervention program that began enrolling patients for preventative services in January 2021. *Exclusion criteria* included severe traumatic brain injury, children under the age of 18, patients otherwise unable to give consent, non-English speaking patients, victims of sexual assault and patients with history of a severe mental illness and/or those already undergoing treatment for a mental illness by a licensed professional.
3.1.3 Recruitment

All patients were recruited following enrollment in the YNH VIP. These patients were enrolled in the program in one of two ways: (1) If a patient was admitted to the hospital on the trauma surgery service, they were approached by YNH VIP staff prior to discharge for enrollment in the program; (2) If a patient was solely seen in the Emergency Room and then discharged to home, they were identified in the electronic medical record as being a candidate for YNH VIP services. The list of potential participants in the YNH VIP were reviewed at weekly meetings. VIP staff then contacted potential participants to set up appointments. At that appointment, they decided whether to enroll in YNH VIP. After agreeing to enroll in YNH VIP, they were offered the opportunity to participate in the pilot study. Those agreeing to participate in the study were given $40 Visa gift cards as compensation for their time.

3.1.4 Randomization

Participants were block randomized using a random number generator. YNH VIP staff responsible for recruiting patients into the study were given a stack of sealed folders. Once the patient agreed to participate in the study, the YNH VIP staff member would break the seal of the folder and would be able to see whether the participant was randomized into either the treatment arm or the control arm.

3.1.5 Intervention

Participants randomized into the treatment arm received the START intervention alongside usual care from the YNH VIP staff. Those randomized to the control arm received the usual screening for PTSD and referral for outpatient services if warranted as well as usual care from YNH VIP staff. The START intervention consisted of 30-45 minutes of structured conversation that consists of a description of typical trauma symptoms and on-the-spot instruction on a set of techniques designed to alleviate post-traumatic stress symptoms. The original START
intervention provided up to four techniques to alleviate symptoms based on the screening questions. In this study, to ensure intervention fidelity and more easily operationalize the intervention, all participants randomized into the treatment arm received information on the common reactions to trauma as well as instruction in all four techniques for alleviation of symptoms.

3.1.6 Data collection

Baseline quantitative data collection of all participants consisted of demographics, mechanism of injury, screening questions for childhood trauma, medical and surgical history, peritraumatic emotional responses, functional ability, perceived social support, depression and baseline symptoms of post-traumatic stress disorder (PTSD) from an adapted PTSD Checklist- Civilian Version (PCL-C) (127) and baseline symptoms of insomnia using the Insomnia Severity Index (ISI).(128) All participants had a follow-up visit or phone call from an academic researcher within 6 weeks and between 3 and 6 months from discharge to repeat the parameters described above and assess for post-injury stressful life events, risky behaviors related to firearms/drugs/alcohol, a novel assessment of alienation (see Figure 5), and interaction with the criminal justice system. All data was self-reported.

Qualitative data analysis consisted of structured interviews with all participants that received the START intervention as well as with administrators of the START intervention. Participants were paid an additional $40 for participating in the qualitative interviews. Administrators of the START intervention received a stipend to compensate them for their time enrolling patients and participating in the qualitative interviews. All interviews were digitally recorded and professionally transcribed with any identifying information removed from the transcripts. Using the constant comparative method of qualitative research,(119) our coding team read through the transcripts and came to a consensus list of codes and themes. The themes were presented back to participants for confirmation.
3.1.7 Accommodating for the COVID-19 pandemic

In response to the COVID-19 (Coronavirus Disease of 2019) pandemic in Connecticut, Governor Lamont issued the “Stay Safe, Stay Home” executive order on March 23rd, 2020. This order required nonessential businesses and not-for-profit entities to stop all in-person services. This led to the temporary closure of many businesses resulting in broad social disruption. The order expired on May 20th, 2020, but the mandatory social distancing restrictions continued in varying forms through the end of 2020. During that time, the YNH VIP staff was unable to participate in research activities and therefore the pilot study was on hold for a period of approximately 3-4 months. Recognizing the myriad ways the COVID-19 pandemic may affect our study population, we also amended the data collection to include questions in both the survey and the qualitative interviews about how participants were affected by COVID-19.

3.1.8 Outcomes and data analysis

The START intervention was appropriate for Stage Ib behavioral intervention trials as described by Rounsaville et al. For Stage Ib behavioral intervention trials, there are five main aims of the study done in preparation for a full scale randomized controlled trial:

1. Establish successful recruitment and retention in the study. We used the recruitment procedure described above and determined the rate of refusal of participation and our recruitment numbers during the study period. We examined lost-to-follow-up rates and calculated the amount of missing data. Participants recruited into the study were compared with eligible patients unable to be recruited by age, race, ethnicity, gender, reported income (reported income was based on the median income by zip code from the US Census Bureau), disposition from the emergency department, whether the participant had a primary care physician (PCP), homelessness, diagnosis of mental illness, diagnosis of substance use disorder, prior gunshot wound, or prior assault. Univariable differences
were compared using the Fisher’s exact test for categorical variables and Kruskall-Wallis test for continuous variables.

(2) **Demonstrate patient acceptance of the therapy and feasibility of the control.** All participants who received the intervention completed a survey within 6 weeks of enrollment assessing receipt, acceptance and use of the intervention. We also used qualitative data from the structured interviews to contextualize patient use of the intervention. Interactions between participants and YNH VIP staff responsible for enrollment in the study and administration of the START intervention were audio recorded. The audio recordings of the participants randomized to the control condition were reviewed to ensure that the YNH VIP staff did not incorporate elements of the START intervention into those interactions.

(3) **Assess intervention fidelity.** Intervention fidelity refers to the degree to which an intervention is delivered as initially planned. In this study, we conducted a fidelity assessment using the framework described by Carroll et al. (129) This entailed tracking the components of the intervention provided by the administrators of the intervention, the amount of engagement with each participant (ie: duration of the intervention, amount of time spent with each participant), and evaluating which participants were lost-to-follow up. The YNH VIP staff that administered the START intervention completed a survey of the components covered in the intervention. The YNH VIP staff surveys were compared with those from the audio recording of the intervention to ensure that the staff recollection was accurate. Qualitative data collected in structured interviews with the administrators and participants were used to contextualize this information.

(4) **Estimate the effect size for the primary outcome measures.** Analysis of the data consisted of the average change in participant PCL-C and ISI scores as well as paired t-test analyses of participants’ scores at the initial, 6 week and 3-6 month time points.

(5) **Provide empirical evidence for clinical improvement over the course of treatment in at least one important outcome domain.** The primary outcomes were change in the PCL-C and the
ISI from baseline symptoms. Prior studies used a 5-point change in the PCL-C as a minimum threshold for treatment response and a 10-point change as a minimum threshold for clinically meaningful improvement.(130) A decrease of 8-9 points in the ISI was associated with moderate clinical improvement with a cutoff score of 10 for detecting insomnia.(128) Statistical significance was defined as a p-value < .05 and was determined using the Wilcoxon sign rank test given that there were < 30 participants in the final cohort. We also tracked perceived social support, depression, risky behaviors related to firearms/drugs/alcohol, a novel assessment of alienation (see Figure 5), and interaction with the criminal justice system. Potential confounding factors including age, gender, reported childhood trauma, financial stress (defined as having difficulty paying bills or job loss), perceived social support, being directly affected by the COVID pandemic (defined as having a personal diagnosis of COVID or knowing someone that died from COVID), drug and alcohol use, and severity of presentation were also analyzed. Univariable differences were compared using the Fisher’s exact test for categorical variables and Kruskall-Wallis test for continuous variables.

3.1.9 Assessing the reliability of a novel survey to measure “alienation”

In this study, we piloted a novel survey tool to measure “alienation” from society. This tool was created based on the results from our qualitative study in Aim #1 and includes domains in isolation, protection, aggression, safety and distrust in police as described in Aim #1 results. (Figure 5) Iterations of the tool included solicited input from community members, including individuals with a history of a gunshot wound. Each of these measures should be correlated with each other and therefore I assessed construct validity using Cronbach’s alpha as a measure of internal consistency and reliability for this novel scale, both overall and for each individual factor. I used a benchmark of Cronbach’s alpha >0.70 as our test of reliability.(131)
Figure 5. Alienation tool

<table>
<thead>
<tr>
<th>Alienation tool (10 items)</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Mildly disagree</th>
<th>Neutral</th>
<th>Mildly agree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I am afraid for my safety.</td>
<td></td>
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<tr>
<td>2. I generally try to stay in my house.</td>
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<tr>
<td>3. There are certain places I don’t go because they are not safe.</td>
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<td></td>
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<tr>
<td>4. There are certain people I stopped spending time with because they are dangerous.</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>5. I need to carry around some kind of weapon for my protection.</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>6. I need to carry around a gun for my protection.</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>7. If I were to get into a fight, I would use a gun to protect myself if I had one on me.</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>8. When it comes to my safety, I feel different now compared to how I felt before I got shot.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>9. I do not trust the police.</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. The police are not interested in keeping me safe.</td>
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<td></td>
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</tbody>
</table>
3.2 RESULTS

3.2.1 Recruitment and retention

Over the first 15 months of the pilot study (January 1st, 2020 – March 31st, 2021), we recruited 11 participants into the study. A total of 219 patients presented to Yale New Haven Hospital with a primary diagnosis of a gunshot wound in that time period. Of those, 21 (9.6%) died of their injuries in the emergency room, 13 (5.9%) were under the age of 18, and 16 (7.3%) gunshot wound survivors presented during the COVID-19 lockdown (March 23rd – May 21st, 2020) when the study was shut down due to the COVID-19 pandemic. That left a total of 169 gunshot wound survivors that could be recruited into both the YNHH Violence Intervention Program (YNHH VIP) and the study. Of those gunshot wound survivors, 27 were enrolled in the YNHH VIP. Since enrollment in the YNHH VIP was part of the eligibility criteria for enrollment in the study, there were only 27 patients eligible for participation during the study period. Of those, 11 (40.7%) participants were successfully enrolled in the study, 15 (55.6%) refused participation and 1 (3.7%) was determined to be ineligible due to severe mental illness. (See Figure 6)

Figure 6. Recruitment

GSW= Gunshot wound

![Flowchart showing recruitment process]
There was no difference in age, race, ethnicity, gender, median income, disposition from the emergency department, whether the participant had a primary care physician (PCP), homelessness, prior gunshot wound or prior assault between those participants enrolled in the study and those not enrolled in the study. The participants who enrolled in the study were less likely to have a diagnosis of mental illness (p=.046) or substance use (p=.001) in their chart. (See Table 5)

Table 5. Recruitment

<table>
<thead>
<tr>
<th></th>
<th>All eligible patients</th>
<th>Not enrolled</th>
<th>Enrolled</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of eligible patients</td>
<td>27</td>
<td>16</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Mean Age</td>
<td>28.8 (1.3)</td>
<td>28.1 (2.0)</td>
<td>29.8 (1.3)</td>
<td>.267</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>3.7% (1)</td>
<td>6.3% (1)</td>
<td>0% (0)</td>
<td>.658</td>
</tr>
<tr>
<td>Black</td>
<td>92.6% (25)</td>
<td>93.8% (15)</td>
<td>92.6% (15)</td>
<td></td>
</tr>
<tr>
<td>Latino</td>
<td>3.7% (1)</td>
<td>0% (0)</td>
<td>7.4% (1)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>18.5% (5)</td>
<td>18.8% (3)</td>
<td>18.2% (2)</td>
<td>.684</td>
</tr>
<tr>
<td>Median Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;$40,000</td>
<td>3.7% (1)</td>
<td>6.3% (1)</td>
<td>0% (0)</td>
<td>1.00</td>
</tr>
<tr>
<td>$40 – 80,000</td>
<td>92.6% (25)</td>
<td>87.5% (14)</td>
<td>100% (11)</td>
<td></td>
</tr>
<tr>
<td>$80 – 120,000</td>
<td>3.7% (1)</td>
<td>6.3% (1)</td>
<td>0% (0)</td>
<td></td>
</tr>
<tr>
<td>&gt;$120,000</td>
<td>0% (0)</td>
<td>0% (0)</td>
<td>0% (0)</td>
<td></td>
</tr>
<tr>
<td>Disposition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharge from ED</td>
<td>48.1% (13)</td>
<td>37.5% (6)</td>
<td>63.6% (7)</td>
<td>.173</td>
</tr>
<tr>
<td>Admitted</td>
<td>51.9% (14)</td>
<td>62.5% (10)</td>
<td>36.4% (6)</td>
<td></td>
</tr>
<tr>
<td>Has a PCP</td>
<td>59.3% (16)</td>
<td>56.3% (9)</td>
<td>63.6% (7)</td>
<td>.508</td>
</tr>
<tr>
<td>Homelessness</td>
<td>11.1% (3)</td>
<td>0% (0)</td>
<td>27.3% (3)</td>
<td>.056</td>
</tr>
<tr>
<td>Substance use</td>
<td>38.4% (10)</td>
<td>66.7% (10)</td>
<td>0% (0)</td>
<td>.001</td>
</tr>
<tr>
<td>Mental illness</td>
<td>18.2% (5)</td>
<td>33.3% (5)</td>
<td>0% (0)</td>
<td>.046</td>
</tr>
<tr>
<td>Prior GSW</td>
<td>3.7% (1)</td>
<td>6.3% (1)</td>
<td>0% (0)</td>
<td>.593</td>
</tr>
<tr>
<td>Prior assault</td>
<td>26.9% (7)</td>
<td>40.0% (6)</td>
<td>9.1% (1)</td>
<td>.093</td>
</tr>
</tbody>
</table>

ED= Emergency Department. PCP= Primary Care Physician. Continuous data are presented as mean with standard deviation (SD); categorical variables are presented as a percentage and number (N). P-values are from Kruskal-Wallis test for continuous variables and Fisher’s exact test for categorical variables. All definitions of variables can be found in the manuscript.
During the course of the study, we implemented strategies to improve recruitment. Beginning in September, we offered a $40 Visa cash card as an incentive to join the study. Due to the COVID-19 pandemic, one of the major barriers was that START requires an in-person meeting for a participant to be enrolled. For over 6 months, the YNH VIP staff were not allowed or actively discouraged from approaching patients in the hospital or follow-up trauma clinic due to the concern for exposure to COVID-19. Beginning in September, YNH VIP staff began recruitment both in the hospital and at the follow-up trauma clinic.

We conducted all follow up qualitative interviews and surveys over the phone. If a participant could not be reached over the phone, this was brought to the attention of the YNH VIP staff. The YNH VIP staff would then use community contacts including friends and family members to find updated phone numbers for the participants. Using this strategy, we had a 100% follow up rate for all study participants and no missing information. All study participants randomized to receive the START intervention completed all qualitative interviews (6 qualitative interviews). All YNH staff involved in enrollment and recruitment completed qualitative interviews (2 qualitative interviews).

*Barriers to enrollment*

From our qualitative interviews with the YNH VIP staff, it was clear that there were a number of barriers that contributed to the low levels of recruitment for the study. One of the most significant barriers was time. The process of enrollment in the YNH VIP is a lengthy procedure and completing the survey and the intervention for the study often meant that the administrator ran out of time to complete everything. Enrollment in the study would then be postponed for a second appointment which was often cancelled or postponed outside of the recruitment window for the study. (See Table 6) Another major barrier was distrust in the medical establishment and in particular distrust of medical research. One participant noted that this distrust is reinforced within medical settings that are often not perceived as welcoming to patients of color—
particularly when those patients are the victims of a crime. Finally, YNH VIP staff noted that the COVID-19 pandemic very much interrupted normal operations and was a significant barrier to enrollment throughout most of the study period.

**Facilitators to enrollment**

YNH VIP staff also identified facilitators that enhanced enrollment in the study. In particular, the ability to develop a rapport with the participant was very important. Having a staff member that could serve as a “credible messenger”—someone from the community that could vouch for the program and the research—was a very important part of encouraging participants to enroll in the study. (See Table 6)

**Table 6. Recruitment themes**

<table>
<thead>
<tr>
<th>Theme</th>
<th>Exemplar quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barriers</td>
<td>Some of the clients don't do the study, but I think it was level of comfort and safety that they feel or did not feel. Some of them I just couldn't get them to enroll or even sit down long enough to enroll, or I couldn't catch them. (Administrator #1)</td>
</tr>
<tr>
<td></td>
<td>I do think it’s a little lengthy. (Administrator #2)</td>
</tr>
<tr>
<td></td>
<td>[It’s] just the hospital setting, and it not being supportive. Like, I've just accepted I'm the only black person. They think I'm a criminal or I'm just like a nobody. And people pick up on those feelings...In the ED, I get this all the time. But like, if you come in and somebody's shot at you. Like that's criminal behavior. So you are evidence and you're at your most vulnerable...And I can't let you talk to your family right now until the police get here and speak to you first. So it's not just the hospital's fault. I mean, these are systems issues that unfortunately, we haven't been able to address and also in stay within the constraints of the other rules. (Administrator #1)</td>
</tr>
<tr>
<td></td>
<td>The layer of mistrust that exists, particularly in the Black communities... So you talk about, like, the Tuskegee experiment, and like the impact that had on the black community and a distrust for the medical profession, particularly people who don't look like you. (Administrator #1)</td>
</tr>
<tr>
<td></td>
<td>But for here, it was different, like, there was a level of mistrust, but it was more like when it came to these victims, they all they felt that they were like being victimized all over again, or that they were looked at, as a social allegory...and being labeled as a difficult patient, or rude patient with a bad attitude. And yes, there is definitely a lot of rudeness and a very bad attitude. But I think the question is, why is that so? (Administrator #1)</td>
</tr>
<tr>
<td></td>
<td>The pandemic, this current pandemic, made it a little bit challenging because we lost space, our environment. We had to go inside of people’s homes—which is not a problem—but when there’s a pandemic, sometimes it gets a little bit uncomfortable,</td>
</tr>
</tbody>
</table>
and not just for myself, for them too, like, who was this man coming here? (Administrator #1)

[The COVID-19 pandemic affected] access to people. These people just being afraid of not knowing what would happen and just nobody was trying to be face-to-face with anybody. (Administrator #2)

Facilitators

The first thing I did was try to establish a rapport through enrolling them in the HVIP program and the applications toward victim services. And then once I established a rapport, [I asked about] terms of having like feeling comfortable, and something as simple as like, do they have the capacity to all the time and availability to actually return phone calls? To be able to communicate? Then I would go into the involvement of the of the study. (Administrator #1)

I was probably instrumental because he would call sometimes when he couldn't get in touch with the clients. I will make sure we get them there. I'm the one who usually has a relationship with them or I know somebody who does. So, I'm instrumental in getting them there in the first place. I get them to the study and then if you're uncomfortable, I kind of give them a little talk in general, it might be some little personal stuff or whatever, blah, blah, blah, before you want to actually talk to them or whatever. And then after I follow up with them: was it alright, whether it was too much, or was it bad, or to see how it went with them. That's really just making it easier for them as much as possible. (Administrator #2)

3.2.2 Acceptance of therapy

Receipt and use of the intervention

Of the six participants that received the intervention, two of them (33%) reported that they did not use any of the exercises. Among those who did use the exercises, they reported that they used the exercises quite frequently—either “once or twice per week” or “every day.” The most commonly used exercise was the self-care on the spot (SOS) plan which was rated as “very helpful” by every participant that used that exercise.

The qualitative interviews provided some insight into why some participants chose not to use the exercises. The participants that did not use the exercises at all expressed severe skepticism with the exercises right from the beginning. (See Table 7) This skepticism was also noted by some of the YNH VIP staff that sought to mitigate this perception by relating to the participants on a personal level and vouching for the utility of the techniques. Other participants reported that reading was a significant barrier. The intervention includes sharing many written
descriptions of the techniques and the participants reported that this was overwhelming and discouraged them from using the techniques. One YNH VIP staff member similarly noted that he believed reading was a significant barrier for participants and that the addition of an audio or visual component for the intervention would be beneficial.

Despite the barriers, those that used the exercises reported that they found them useful. Multiple participants noted that the exercises had the effect of calming their anxiety. The YNH VIP staff also expressed buy-in for the exercises and reported that they believe the exercises are beneficial. (See Table 7)

Table 7. Receipt of intervention themes

<table>
<thead>
<tr>
<th>Theme</th>
<th>Exemplar quote</th>
</tr>
</thead>
</table>
| **Skepticism**      | *Intvr: What did you think about the exercises?*  
*Resp: Do they really work? Well, I don't need them. I never even tried them (Participant #2)*  
*Intvr: What were your first impressions?*  
*Resp: That it was just BS. It wasn't really going to work. (Participant #3)*  
*It's real personal—to handle like massages and things like that. Like, it's difficult for some hardcore young guys to sit here and talking about sleep and sleep deprivation. I just can help him do this work really well. So, I would also sometimes talk to them and say, “Well, I try this and it works for me. I can't sleep either. I'm just like you. I'm out here just like you so issues sleeping.” So that is just easing them into that conversation…Having credible messengers, like a person sort of like that, to make it easier for them to understand like we're not invading, this is just something that will help you.* (Administrator #2) |
| **Reading barrier** | *A lot of people can't read to be honest with you. I mean, so to sit here and read over it—and some people are uncomfortable with somebody showing them that… Even if they are able to read, they don't want to sit down and read. A type of audio or something incorporated, that would read it to them or talk to them. Like so you can just press one button and explain everything for us.* (Administrator #2)  
*Intvr: Why do you think you didn’t use them?*  
*Resp: Because I probably just wasn't like kind of focused on the paperwork actually… It's just, I'm not a reader. I don't like reading. I know myself. I just get sidetracked when it comes to reading.* (Participant #5) |
Helpful when tried

Intvr: What did you think about it after you started using it, was it helpful?
Resp: Somehow, yes it was. It helped me relax and stuff; calm down my anxiety.
( Participant #3)

It was actually great to learn about different ways to like cope with things...Like
sometimes I just play music, and I zone out. It is just like a relief. When I breathe I just,
take a deep breath, inhale, exhale. It makes me feel better sometimes. (Participant #9)

I don’t have any negative stories, and everybody seemed to respond to it positively—
all the ones who got the intervention. Because it’s such a great skill to have.
(Administrator #1)

3.2.3 Feasibility of the control

In this pilot study, only the participant was blinded to the assignment of either treatment or
control in that they were not told whether they were in the treatment or control group. However,
each participant was likely able to tell whether he or she was in the treatment or control group
based on whether he or she received the START intervention teaching. The YNH VIP staff
enrolling participants, the researcher conducting follow up interviews and qualitative interviews
and the researcher conducting the data analysis were all aware of the assignment.

After reviewing the audio recordings of the interactions between YNH VIP staff and the control
group there were no instances of YNH VIP staff teaching and/or discussing the concepts or
techniques from the START intervention to participants randomized to the control. In the
qualitative interviews with YNH VIP staff, none reported that they used the START techniques
with any participants in the control condition. However, one staff member noted that it was
emotionally difficult to not provide the intervention, stating: “It’s not hard, but I personally feel
awful. Like I’m doing a disservice to them.”
3.2.4 Intervention fidelity

Delivery of the intervention

On average, the YNH staff enrolling participants spent 19.6 minutes with each participant. There was a statistically significant difference in the time spent with each participant between the treatment and control groups (p=.006). YNH staff spent 24.5 minutes on average with the treatment participants and 13.8 minutes on average with the control participants. The increase in time was largely spent performing the START intervention as assessed on the audio-recordings.

Following each administration of the START intervention, the YNH staff member who completed the intervention filled out a survey specifying which components of the START intervention were covered in the session. The survey results were compared with the audio recordings. The results of the survey and the audio recording were in accordance 81.3% of the time. There was one recording missing due to equipment failure.

3.2.5 Potential confounding factors

A total of 11 participants were successfully recruited. Of those, 5 participants were randomized to the control group and 6 participants to the treatment group. The average age of participants was 28.6 years old and there were more men than women (81.8% male overall). There was no statistically significant difference in age, gender, reported history of childhood trauma, report of financial stress, perceived social support, being directly affected by COVID, drug and/or alcohol use, or severity of presentation between the control and treatment groups. (See Table 8)
### Table 8. Potential confounding factors

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>Control (N=5)</th>
<th>Treatment (N=6)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total # of participants (N)</td>
<td>11</td>
<td>5</td>
<td>6</td>
<td>n/a</td>
</tr>
<tr>
<td>Minutes spent with participant</td>
<td>19.6 (2.2)</td>
<td>13.8 (1.5)</td>
<td>24.5 (2.4)</td>
<td>.029</td>
</tr>
<tr>
<td>Mean age</td>
<td>28.6 (1.6)</td>
<td>29.8 (2.9)</td>
<td>27.7 (1.9)</td>
<td>.465</td>
</tr>
<tr>
<td>Male gender</td>
<td>81.8% (9)</td>
<td>80.0% (4)</td>
<td>83.3% (5)</td>
<td>.727</td>
</tr>
<tr>
<td>Reported childhood trauma</td>
<td>54.5% (6)</td>
<td>60.0% (3)</td>
<td>50.0% (3)</td>
<td>.608</td>
</tr>
<tr>
<td>Financial stress</td>
<td>81.8% (9)</td>
<td>80.0% (4)</td>
<td>83.3% (5)</td>
<td>.727</td>
</tr>
<tr>
<td>Perceived social support</td>
<td>63.4 (3.4)</td>
<td>65.9 (1.8)</td>
<td>61.3 (6.1)</td>
<td>.715</td>
</tr>
<tr>
<td>COVID</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Had COVID</td>
<td>27.3% (3)</td>
<td>60.0% (3)</td>
<td>0.0% (0)</td>
<td>.061</td>
</tr>
<tr>
<td>Knows someone who died from COVID</td>
<td>36.4% (4)</td>
<td>40.0% (2)</td>
<td>33.3% (2)</td>
<td>.652</td>
</tr>
<tr>
<td>Drug/alcohol use</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marijuana</td>
<td>72.7% (8)</td>
<td>80.0% (4)</td>
<td>66.7% (4)</td>
<td>.576</td>
</tr>
<tr>
<td>Excessive alcohol use</td>
<td>63.6% (7)</td>
<td>60.0% (3)</td>
<td>66.7% (4)</td>
<td>.652</td>
</tr>
<tr>
<td>Other drugs</td>
<td>18.2% (2)</td>
<td>0.0% (0)</td>
<td>33.3% (2)</td>
<td>.455</td>
</tr>
<tr>
<td>Severity of presentation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peritraumatic response</td>
<td>72.7% (8)</td>
<td>60.0% (3)</td>
<td>83.3% (5)</td>
<td>.545</td>
</tr>
<tr>
<td>% Admitted</td>
<td>72.7% (8)</td>
<td>100.0% (5)</td>
<td>50.0% (3)</td>
<td>.182</td>
</tr>
<tr>
<td>% ICU</td>
<td>27.3% (3)</td>
<td>40.0% (2)</td>
<td>16.7% (1)</td>
<td>.545</td>
</tr>
<tr>
<td>% Required surgery</td>
<td>54.5% (6)</td>
<td>80.0% (4)</td>
<td>33.3% (2)</td>
<td>.242</td>
</tr>
</tbody>
</table>

CI: Confidence interval. ICU: Intensive Care Unit. Perceived social support: Score from the Multidimensional Scale of Perceived Social Support. Depression: Score from the Patient Health Questionnaire (PHQ-9). Excessive alcohol use: defined as drinking more than 5 drinks on one occasion monthly. Peritraumatic response: Reported feelings of terror and helplessness when sustained injury. Reported childhood trauma: Reported physical abuse to themselves or someone in their household as a child. Continuous data are presented as mean with standard deviation (SD); categorical variables are presented as a percentage and number (N). P-values are from Kruskal-Wallis test for continuous variables and Fisher's exact test for categorical variables. All definitions of variables can be found in the manuscript.
### 3.2.6 Primary outcomes

**PTSD Checklist- Civilian Version (PCL-C)**

The primary outcomes for the study included change in the PCL-C and the ISI from baseline symptoms. On average there was a 2.5-point and a 13.2-point decrease in the PCL-C from initial assessment to 1 month in the control and treatment group, respectively. There was a further 1.0-point decrease in the PCL-C in the control group from 1 month to 3-6 months but an increase of 6.6-points in the treatment group. (See Figure 7) These relationships were not statistically significant by Wilcoxon sign rank test.

**Figure 7. PCL-C scores**

![PCL-C Scores](image)


<table>
<thead>
<tr>
<th>Group</th>
<th>Difference from initial to 1 month</th>
<th>p-value</th>
<th>Difference from 1 month to 3-6 months</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>- 2.5</td>
<td>.893</td>
<td>-1.0</td>
<td>.854</td>
</tr>
<tr>
<td>Treatment</td>
<td>- 13.2</td>
<td>.248</td>
<td>+ 6.6</td>
<td>.500</td>
</tr>
</tbody>
</table>

P-values are from Wilcoxon sign rank test given participants <30.
**Insomnia Severity Index (ISI)**

On average there was a 9.0-point and a 4.2-point decrease in the ISI from initial assessment to 1 month in the control and treatment group, respectively. There was a 0.8-point increase and 3.8-point increase in the ISI in the control and treatment group respectively from 1 month to 3-6 months. (See Figure 8) These relationships were not statistically significant by Wilcoxon sign rank test.

**Figure 8. ISI scores**

<table>
<thead>
<tr>
<th>Group</th>
<th>Difference from initial to 1 month</th>
<th>p-value</th>
<th>Difference from 1 month to 3-6 months</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>-9.0</td>
<td>.225</td>
<td>+0.8</td>
<td>.578</td>
</tr>
<tr>
<td>Treatment</td>
<td>-4.2</td>
<td>.115</td>
<td>+3.8</td>
<td>.279</td>
</tr>
</tbody>
</table>

P-values are from Wilcoxon sign rank test given participants <30.
3.2.7 Secondary outcomes

There were no statistically significant differences between the control and treatment groups for any of the secondary outcome measures including depression, alienation (using our novel alienation survey tool), or risky behaviors including carrying a knife or a gun. (See Table 9)

Table 9. Secondary outcome measures

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>Control</th>
<th>Treatment</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>10.7 (1.2)</td>
<td>11.7 (2.3)</td>
<td>9.9 (1.3)</td>
<td>.465</td>
</tr>
<tr>
<td>Alienation (overall)</td>
<td>4.6 (0.3)</td>
<td>4.5 (0.3)</td>
<td>4.6 (0.5)</td>
<td>.784</td>
</tr>
<tr>
<td>Isolation</td>
<td>5.4 (0.4)</td>
<td>5.5 (0.3)</td>
<td>5.3 (0.6)</td>
<td>.927</td>
</tr>
<tr>
<td>Protection</td>
<td>3.6 (0.5)</td>
<td>3.5 (0.7)</td>
<td>3.7 (0.9)</td>
<td>.784</td>
</tr>
<tr>
<td>Aggression</td>
<td>3.2 (0.5)</td>
<td>3.3 (0.7)</td>
<td>3.1 (0.8)</td>
<td>.715</td>
</tr>
<tr>
<td>Safety</td>
<td>4.9 (0.4)</td>
<td>5.0 (0.7)</td>
<td>4.9 (0.6)</td>
<td>.855</td>
</tr>
<tr>
<td>Police</td>
<td>4.6 (0.5)</td>
<td>4.3 (0.7)</td>
<td>4.9 (0.6)</td>
<td>.564</td>
</tr>
<tr>
<td>Carry a weapon</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knife</td>
<td>27.3% (3)</td>
<td>20.0% (1)</td>
<td>33.3% (2)</td>
<td>.576</td>
</tr>
<tr>
<td>Gun</td>
<td>18.2% (2)</td>
<td>20.0% (1)</td>
<td>16.7% (1)</td>
<td>.727</td>
</tr>
</tbody>
</table>

CI: Confidence interval. Depression: Score from the Patient Health Questionnaire (PHQ-9). Continuous data are presented as mean with standard deviation (SD); categorical variables are presented as a percentage and number (N). P-values are from Kruskal-Wallis test for continuous variables and Fisher’s exact test for categorical variables. All definitions of variables can be found in the manuscript.

3.2.8 Assessing the reliability of a novel survey to measure “alienation”

The alienation survey overall had a Cronbach’s alpha score of 0.75. In factor analysis, the isolation factor (questions 2-4) had a Cronbach’s alpha of 0.65, the protection factor (questions 5-6) measured at 0.91, safety (questions 1 and 8) at 0.33 and distrust in police (questions 9 and 10) at 0.87. (See Figure 5) As the factor for aggression consisted of only one question (question 7), Cronbach’s alpha for this factor was not calculated.
CHAPTER 4. AIM 3: THE IMPACT OF THE COVID-19 PANDEMIC ON VIOLENCE-RELATED TRAUMA PRESENTING TO TRAUMA CENTERS IN CONNECTICUT

4.1 METHODS

4.1.1 Study design

We used a retrospective cohort study design. Using the trauma registries at Yale New Haven Hospital, Bridgeport Hospital, St. Francis Hospital, and Hartford Hospital we collected data for all violence-related-trauma presentations in the emergency room from January 1st, 2019 to January 1st, 2021. Violence-related trauma presentations were defined by trauma type and included gunshot wounds, stabbings, and assault. Data collection included basic demographics (race, ethnicity, zip code, age, gender), injury severity, discharge disposition, need for intensive care, need for admission, and length of stay.

4.1.2 Connecticut Hospital-based Violence Intervention Program Collaborative

The Connecticut (CT) Hospital-based Violence Intervention Program (HVIP) Collaborative was established in 2019 and was comprised of all major trauma centers in the state of CT (Yale New Haven Health System, St. Francis Hospital, Hartford Hospital and Connecticut Children’s Medical Center). Yale New Haven Hospital, St. Francis Hospital, and Hartford Hospital are the only level 1 trauma centers in the state of Connecticut. These systems receive transfers of major trauma from around the state. YNHH system encompasses hospitals in two major metropolitan areas in Connecticut (New Haven and Bridgeport) while Hartford Hospital and St. Francis Hospital largely serve the Hartford metropolitan area. These hospital systems together represent over 80% of the market share in the state of Connecticut overall and encompass all major metropolitan areas in the state including Hartford, New Haven, and Bridgeport. (132) For example, Yale New Haven Hospital alone accounts for 98% of all discharges in the greater New Haven area. (132) The purpose of the collaborative is to coordinate and combine resources and
efforts across the state to better serve victims of violence. The collaborative meets once per month to discuss progress in a variety of areas including collaboration for research projects.

4.1.3 Data collection

This study was approved by the Yale University Institutional Review Board. The study was reviewed by officials at participating institutions and approved by their institutional review boards for data-sharing. Data use agreements were processed by participating institutions. Each institution provided de-identified information on all violence-related traumas included in their trauma registries from January 1st, 2018 to December 31st, 2020. To avoid potential identifying information, all individuals included in the dataset that were 80 years of age and older were listed as being 80 years old. Reported income was based on the median income by zip code from the US Census Bureau.

4.1.4 Data analysis

We described violence-related trauma presentations from before and after the onset of the COVID-19 pandemic and the institution of social distancing restrictions in CT using descriptive statistics. Dividing the cohort into pre- and post-COVID-19 (onset defined as the beginning of social distancing restrictions put in place by Governor Lamont on March 23rd, 2020), (75) we completed a bivariate analysis of differences in major covariates using chi-square or t-test statistics for categorical and continuous variables, respectively. Covariates included age, race, ethnicity, gender, need for admission, need for intensive care, income level, injury severity score and length of stay. We then compared the pattern of weekly violence-related trauma presentations from pre- and post-COVID using a time series linear regression model, adjusted for seasonality. Incidence rate ratios (IRR) with 95% confidence intervals (CI) were calculated assuming a relatively stable population over the last three years. Using this data set, we stratified the analysis by race and ethnicity (Black/Latino patients compared with white patients)
to determine whether race and ethnicity acted as an effect modifier on community violence during the COVID-19 pandemic. We also stratified by type of injury defined alternatively as assault, stab wound, or gunshot wound. Stab wounds and gunshot wounds were also grouped altogether as “penetrating injuries” for analysis. The period of the stay-at-home order, March 23rd – May 21st, 2020 presented multiple confounding factors and therefore was interpreted as a transition period between pre- and post-COVID-19 pandemic for all analyses. We performed all statistical analyses using Stata 14 (StataCorp LLC, College Station, TX).

4.2 RESULTS

4.2.1 Descriptive statistics

There was a total of 2,563 violence-related trauma presentations from Yale New Haven Hospital, Bridgeport Hospital, Hartford Hospital and St. Francis Hospital from January 1st, 2018 to January 1st, 2021 (excluding CT’s stay-at-home period, March 23rd-May 21st, 2020). Of those, 1,907 violence-related traumas occurred before the onset of the COVID-19 pandemic and 656 occurred after the beginning of the pandemic. There was no significant difference in age, gender, race/ethnicity, admission to the intensive care unit (ICU) or injury severity score between the pre- and post-COVID groups. The post-COVID group was more likely to be admitted to the hospital following their injuries as compared with the pre-COVID group (p=.009). (See Table 10)

Table 10. Distribution of baseline characteristics of violence-related trauma before and after onset of COVID-19

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>Pre-COVID</th>
<th>Post-COVID</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total # of presentations (N)</td>
<td>2,563</td>
<td>1,907</td>
<td>656</td>
<td>n/a</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>20.9%</td>
<td>20.2%</td>
<td>16.6%</td>
<td>.202</td>
</tr>
<tr>
<td>Black</td>
<td>51.8%</td>
<td>51.2%</td>
<td>53.7%</td>
<td></td>
</tr>
</tbody>
</table>

(See Table 10)
<table>
<thead>
<tr>
<th></th>
<th>26.5%</th>
<th>26.5%</th>
<th>26.5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latino</td>
<td>0.4%</td>
<td>0.3%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Asian</td>
<td>2.1%</td>
<td>1.8%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Age (mean)</td>
<td>34.1</td>
<td>34.1</td>
<td>34.2</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>83.9%</td>
<td>83.5%</td>
<td>84.9%</td>
</tr>
<tr>
<td>Women</td>
<td>16.1%</td>
<td>16.5%</td>
<td>15.1%</td>
</tr>
<tr>
<td>Severity of presentation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Admitted</td>
<td>65.1%</td>
<td>63.7%</td>
<td>69.5%</td>
</tr>
<tr>
<td>% ICU</td>
<td>21.6%</td>
<td>20.6%</td>
<td>24.7%</td>
</tr>
<tr>
<td>ISS (mean)</td>
<td>9.2</td>
<td>9.2</td>
<td>9.3</td>
</tr>
</tbody>
</table>

CI: Confidence interval. ICU: Intensive care unit. ISS: Injury severity score. Continuous data are presented as mean with standard deviation (SD); categorical variables are presented as a percentage and number (N). P-values are from linear regression for continuous variables and logistic regression for categorical variables. All definitions of variables can be found in the manuscript.

4.2.2 Time series linear regression analysis for all violence-related injuries

Overall, there was a 55% increase in violence-related trauma presentations to the ED in our population in the post-COVID time period as compared with the pre-COVID time period (IRR: 1.55; 95%CI: 1.34-1.80; p-value<.001). (See Table 11, Figure 9) There were significant differences between hospitals. Significant increases in violence-related trauma presentations were observed at Bridgeport Hospital (IRR: 1.56, 95%CI: 1.12-2.16; p-value=.009), St. Francis Hospital (IRR: 2.84; 95%CI: 1.97-4.09; p-value<.001) and Hartford Hospital (IRR: 1.70; 95%CI: 1.21-2.40; p-value=.002). However, there was no significant change in violence-related trauma presentations at Yale New Haven Hospital (IRR: 1.11; 95%CI: 0.89-1.38; p-value=.362)
**Figure 9. Time series linear regression analysis for all violence-related injuries**

![Graph showing time series linear regression analysis for all violence-related injuries](attachment:image.png)

Interrupted time series regression analysis for all violence-related injuries in combined dataset, adjusted for seasonality. Data points are weekly violence-related trauma presentations. Blue line = predicted mean violence by the model; Dashed blue line = predicted mean violence with removal of effect of COVID-19 pandemic; Red lines = lockdown period (March 23 – May 21, 2020).

### 4.2.3 Stratified time series linear regression analyses

**Stratification by racial/ethnic minority status**

When the data was stratified by racial/ethnic minoritized status (including only patients that were Black and/or Latino), there were significant differences between groups. Racial/ethnic minoritized patients experienced a 61% increase in violence-related trauma presentations to the ED in the post-COVID time period as compared with the pre-COVID time period (IRR: 1.61; 95%CI: 1.36-1.90; p-value<.001). White patients by comparison had no significant change in violence-related trauma presentations in the post-COVID time period as compared with the pre-COVID time period (IRR: 0.91; 95%CI: 0.61-1.36; p-value=.659). (See Table 11, Figure 10)
Figure 10. Stratified time series linear regression analyses

Interrupted time series regression analysis for all violence-related injuries in racial and ethnic minorities (defined as either Black or Latino) (top), in the white population (middle), and plotted on the same graph (bottom) from combined dataset, adjusted for seasonality. Data points (y-axis) are weekly violence-related trauma presentations. Blue line = predicted mean violence for racial/ethnic minorities. Dashed blue line = predicted mean violence for racial/ethnic minorities with removal of effect of COVID-19 pandemic; Green line = predicted mean violence for non-minority population. Dashed green line = predicted mean violence for non-minority population with removal of effect of COVID-19 pandemic; Red line = lockdown period (March 23 – May 21, 2020).
Stratification by type of injury

There was a 76% increase in penetrating injuries (defined as stab wounds and gunshot wounds) in the post-COVID time period as compared with the pre-COVID time period (IRR: 1.76; 95%CI: 1.46-2.13; p-value<.001). There was a 57% increase in gunshot wounds (IRR: 1.57; 95%CI: 1.24-1.98; p-value<.001) and 93% increase in stab wounds (IRR: 1.93; 95%CI: 1.42-2.62; p-value<.001) in the post-COVID time period as compared with the pre-COVID time period. The difference in assaultive injuries in the pre- and post-COVID time period was not statistically significant (IRR: 1.27; 95%CI: 1.00-1.61; p-value=.050). (See Table 11, Figure 11)

Figure 11. Time series regression analyses stratified by mode of injury

Data points are weekly violence-related trauma presentations. Blue line = predicted mean GSW (gunshot wound) injuries by week; Dashed blue line = predicted mean GSW injuries by week with removal of effect of COVID-19 pandemic; Orange line = predicted mean penetrating injuries (defined as gunshot wound or stabbing) by week; Dashed orange line = predicted mean penetrating injuries by week with removal of effect of COVID-19 pandemic; Green line = predicted mean assault injuries by week; Dashed Green line = predicted mean assault injuries by week with removal of effect of COVID-19 pandemic; Red line = lockdown period (March 23 – May 21, 2020).
Table 11. Relative risk calculation from the interrupted time series regression analysis

<table>
<thead>
<tr>
<th>Violence-related trauma presentation</th>
<th>Rate Ratio</th>
<th>95% Confidence interval</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>1.55</td>
<td>1.34-1.80</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>YNHH</td>
<td>1.11</td>
<td>0.89-1.38</td>
<td>.362</td>
</tr>
<tr>
<td>Bridgeport</td>
<td>1.56</td>
<td>1.12-2.16</td>
<td>.009</td>
</tr>
<tr>
<td>St. Francis</td>
<td>2.84</td>
<td>1.97-4.09</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Hartford Hospital</td>
<td>1.70</td>
<td>1.21-2.40</td>
<td>.002</td>
</tr>
<tr>
<td>Among racial and ethnic minorities</td>
<td>1.61</td>
<td>1.36-1.90</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Among white population</td>
<td>0.91</td>
<td>0.61-1.36</td>
<td>.659</td>
</tr>
<tr>
<td>Penetrating injury</td>
<td>1.76</td>
<td>1.46-2.13</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>GSW injury</td>
<td>1.57</td>
<td>1.24-1.98</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Stab injury</td>
<td>1.93</td>
<td>1.42-2.62</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Assault injury</td>
<td>1.27</td>
<td>1.00-1.61</td>
<td>.050</td>
</tr>
</tbody>
</table>

Racial and ethnic minorities were defined as Black and Latino patients. All incidence rate ratios are assuming a relatively stable population over the last three years.
CHAPTER 5. DISCUSSION

5.1 SUMMARY OF KEY FINDINGS

In summary, I studied the experience of recovery for survivors of gun violence using qualitative research methods with a community-based participatory research approach and identified five themes which define psychological recovery after intentional injury from gun violence. In addition, I completed a secondary analysis identifying themes around perceptions of police and guns in the community. Using the results from that research, I designed a pilot study evaluating the feasibility of completing a randomized controlled trial for a targeted mental health intervention designed for communities of color, the Screening and Tool for Awareness and Relief of Trauma (START). While this study was delayed and complicated by the COVID-19 pandemic, I was able to conclude that successful recruitment hinges on enrollment in the local hospital-based violence intervention program (HVIP), that the START techniques would be improved by additional audiovisual resources, and that a full randomized controlled trial of the intervention may be most successful in a cluster-randomized controlled trial design. Finally, I examined the effect of the COVID-19 pandemic on community violence in Connecticut. This study demonstrated a 55% increase in violence-related trauma presentations overall, a 61% increase in violence-related trauma presentations among racial/ethnic minoritized patients, and a 76% increase in penetrating injuries in the post-COVID time period as compared with the pre-COVID time period.

5.2 THE EXPERIENCE OF RECOVERY FOR SURVIVORS OF GUN VIOLENCE

In the primary analysis of this qualitative study, I identified five themes which define the psychological recovery after intentional injury from gun violence: (1) Isolation: physical and social restriction due to intense fear of surroundings; (2) Protection: a disrupted sense of safety leading to maladaptive behaviors including the desire to carry a gun; (3) Aggression: willingness
to use a firearm in an altercation; (4) Normalization: lack of reaction driven by the ubiquity of gun violence in the community; and (5) Distrust of health care providers: a key barrier to mental health treatment. These five themes characterize the psychological and emotional experience of recovery from surviving gun violence. From these data I propose that a lack of support during the recovery period, exacerbation of post-traumatic stress symptoms from community stressors, and maladaptive strategies in response to a disrupted sense of safety (including risky behaviors such as carrying a firearm) suggest a mechanism for violent re-injury seen among survivors of gun violence. (5, 62, 133) Using this data, I identified an appropriate targeted mental health intervention for further development in a pilot randomized controlled trial.

In the secondary analysis, I identified themes around perceptions of police and guns among survivors of gun violence. I found that the participants described a deep distrust of the police while noting acutely traumatic experiences with police officers while receiving medical care. In addition, participants described ready access to guns and ascribed symbolic, social and strategic meaning to owning and carrying a gun in their communities that extended beyond its use as a weapon. These themes offer insight into the higher risk of gunshot wound injury and arrest for a violence or a weapons charge seen in survivors of gun violence overall.

5.3 PREPARING A RANDOMIZED CONTROLLED TRIAL FOR START

This pilot randomized controlled trial examined the feasibility of testing START in a randomized controlled trial design. I was able to make conclusions about several crucial domains of a behavioral intervention trial: (1) Recruitment and retention, (2) Acceptability of the intervention, (3) Feasibility of the control, (4) Intervention fidelity, and (5) Approximate effect size and provide some evidence for clinical improvement.
5.3.1 Recruitment and retention

Recruitment for the study was challenging due to the COVID-19 pandemic and the low numbers of participants enrolled in the hospital-based violence intervention program (HVIP). This was a trend throughout the United States as many HVIPs were required to shut down or switched to limited crisis response and remote operations leading to decreased enrollment and lack of engagement with clients. Recruitment was further complicated by distrust among the study population for clinical trials. A major facilitator to enrollment was the presence of a “credible messenger” to recruit participants into the study. Therefore, recruitment for this study hinges on the enrollment in the local HVIP and the effectiveness of credible messengers participating in the recruitment process. Once a participant was enrolled, retention in the study was successful through coordination with HVIP staff and community contacts.

5.3.2 Acceptability of the intervention

Participants expressed skepticism of the intervention and identified reading as a major barrier for using the techniques. All of the techniques are reinforced through printed handouts which many participants found cumbersome and inconvenient. However, once the participant used the techniques, he or she described them as helpful for alleviating symptoms of anxiety. The addition of audiovisual resources for START would greatly improve their convenience and utility. These should be considered in the planning for future clinical trials to make the intervention more effective.

5.3.3 Feasibility of the control

The process of randomization was successful in this study and there was no evidence in the audio recordings of contamination of the control state. However, the qualitative data suggested that it may be emotionally difficult for staff members to avoid providing services they perceive as helpful to those participants in the control condition. As such, a stepped wedge cluster
randomized controlled trial design may be the most successful trial design for the START intervention. (134) In this design, each center involved in the study would be randomized to receive the intervention at different times. Initially, all centers will be in the “control” phase where none have been exposed to the intervention. At regular intervals (aka “steps”), groups of centers (“clusters”) would be randomized to implement the START intervention, crossing from the control to the intervention state following a transition period. This would continue until all clusters cross over to the intervention arm.

**Figure 12. Schematic of stepped wedge cluster randomized controlled trial design including transition period with six clusters.** Adapted from Hemming et al.(134)

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**5.3.4 Intervention fidelity**

In comparing the fidelity survey results with the audio recordings, I found an 81.3% concordance rate. This suggests that using a simple survey for the administrators of the intervention to ensure crucial components of the intervention are completed would be sufficient in a future randomized controlled trial.
5.3.5 Primary and secondary outcomes

The primary outcomes for the study included change in the PTSD Checklist-Civilian version (PCL-C) and the insomnia severity index (ISI) from baseline symptoms. Due to the low sample size, I was unable to make statistically significant conclusions about these outcomes or their approximate effect sizes in the population. However, there was a 13.2-point decrease in the PCL-C from initial assessment to 1 month in the treatment group compared with a 2.5-point decrease in the control group. Though this was not statistically significant, if this trend were maintained in a larger sample it would signify clinical improvement in symptoms. Prior studies used a 5-point change in the PCL-C as a minimum threshold for treatment response and a 10-point change as a minimum threshold for clinically meaningful improvement. (130)

Secondary outcome measures included depression, alienation (using our novel alienation survey tool) and risky behaviors including carrying a knife or a gun. Once again, I was unable to make statistically significant conclusions about these outcomes or their approximate effect sizes in the population due to low sample size. However, with our data I was able to confirm that our novel alienation survey tool was reliable in this population with a Cronbach’s alpha score of 0.75.

5.4 THE EFFECT OF THE COVID-19 PANDEMIC ON COMMUNITY VIOLENCE IN CONNECTICUT

Overall, there was a 55% increase in violence-related trauma presentations to the ED in Connecticut trauma centers in the post-COVID time period as compared with the pre-COVID time period.

5.4.1 Minoritized communities were hit the hardest

When the data was stratified by racial/ethnic minoritized status (including only patients that were Black and/or Latino), those patients experienced a 61% increase in violence-related trauma
presentations to the ED in the post-COVID time period as compared with the pre-COVID time period. White patients by comparison had no significant change in violence-related trauma presentations in the post-COVID time period as compared with the pre-COVID time period. The stark difference in community violence based on racial and ethnic minoritized status gives further evidence of systemic social and health inequities placing minoritized communities at the greatest risk for the long-term effects of the COVID-19 pandemic.

5.4.2 Penetrating injuries were responsible for most of the increase in community violence

There was a 76% in penetrating injuries (defined as stab wounds and gunshot wounds) in the post-COVID time period as compared with the pre-COVID time period. By comparison, the difference in assaultive injuries in the pre- and post-COVID time period was not statistically significant. This finding suggests that targeted interventions such as those for prevention of gun violence and investing in community violence intervention programs should be key focuses of the long-term COVID-19 relief effort.

5.5 LIMITATIONS

There are several limitations in the study from Aim#1. First, some of the participants were many years removed from their injury and therefore their recollections were subject to significant recall bias. Participants were prompted to describe specific situations and experiences to stimulate an accurate memory of the account. In addition, as many of our participants were describing traumatic events, these memories are the most likely to persist unchanged over time. Secondly, it is possible that participants were influenced by social desirability bias—the desire to appear to adhere to social norms that suggest certain behaviors are more positive or negative than others (135)—in their responses. To mitigate this, all participants were ensured anonymity for all responses and interviewers of different backgrounds participated in the data collection. Thirdly,
this research was conducted in a population of Black men within a single metropolitan area in the northeast recruited using snowball sampling from a single community-based organization. As such, it is unclear whether our findings are transferable to other racial/ethnic groups, genders and areas in the United States. However, our findings are consistent with findings from other qualitative and quantitative studies from similar populations in different US cities, suggesting that these conclusions may not be isolated to our community but rather reflect a broader phenomenon in cities across the US. (2, 5, 24, 29, 39, 41, 44, 62, 124, 133, 136, 137) Finally, one of the greatest challenges was recruitment of individuals to interview. Given the amount of distrust between the research institutions in New Haven and local community, particularly in communities of color in New Haven, I found that it was difficult to recruit young Black men to talk about their experiences. This challenge was overcome, in part, by partnership with the Street Outreach Worker Program of New Haven. However, this reliance on the community partner may have biased our recruitment to include participants with a particular ideology or background.

In the study from Aim #2, the main limitation was the low number of participants. This limited the conclusions I was able to make about the primary and secondary outcomes because none of the findings were statistically significant due to insufficient power. In addition, it is possible that the participants included in the trial were more likely to be reliable as compared with the population that was not engaged by the HVIP or that refused participation in the study. This selection bias may have skewed the results and boosted our ability to retain participants in the study. For the qualitative portions of the study, while I was able to interview all participants and all members of the YNH VIP staff involved in the study, the coding team did not reach thematic saturation to fully finalize the codebook due to the low number of participants and interviews.

There were several limitations in the study from Aim #3, as well. Trauma registry data may not fully reflect the impact of the COVID-19 pandemic on community violence because it does not capture all intentional injuries within a community. Less seriously injured patients that do not
come to the attention of the trauma department are not included in the trauma registries. These registries also would not capture those violence-related injuries that do not come to the hospital—individuals that die before transport to the hospital and those patients that did not seek care in the emergency department. The strength of using the trauma registry, however, is that these limitations are mostly consistent throughout the time period of the study allowing for accurate comparison between time periods. The one notable exception being that patients may have chosen to avoid the hospital specifically during the COVID-19 pandemic due to fear of infection—in which case this analysis would under-estimate the effect of the COVID-19 pandemic on community violence.

5.6. CONCLUSIONS

The themes from Aim #1 describe the various strategies used by survivors of gun violence to cope with a disrupted sense of safety when returning to their communities as well as attitudes towards police and guns in their communities. The described maladaptive reactions suggest a mechanism for the violent re-injury and add insight into the higher risk for arrest for a violence or a weapons charge seen among survivors of gun violence. These findings further offer potential targets to help this undertreated, high-risk population. Gun violence prevention and reduction interventions should not only include laws that reduce the wide availability of guns but also strategies that work on the cultural value of guns in different communities. Furthermore, efforts to improve police relations with Black communities, including legislation that holds police accountable in instances of brutality and abuse of power, should be a central priority for the public health sector seeking to curb the gun violence epidemic. Barriers to mental health treatment may be addressed through “credible messengers,” who can develop relationships of trust with similarly injured Black men. Reducing and eliminating violence exposure and traumatic stress in racially segregated, economically disadvantaged neighborhoods needs to be a key public health and mental health priority. Based on our study, investment in training
community members to conduct outreach and targeted mental health interventions during recovery from a gunshot wound injury, such as the START intervention, is an important area of future research.

In the pilot randomized controlled trial of the START intervention I was able to make significant progress in preparing this targeted mental health intervention for a future full randomized controlled clinical trial in survivors of gun violence. I demonstrated successful retention in the study through coordination with HVIP staff, a strategy which should be replicated in future clinical trials. In preparation for future clinical trials, HVIP sites being vetted for inclusion should submit their annual enrollment numbers to provide an accurate estimate for study recruitment. Based on the results of the survey and qualitative interviews, barriers to using the START techniques include skepticism of the exercises themselves and an over-reliance on reading materials for their use. Future work on the START intervention should develop audiovisual resources for the exercises that will make them more accessible to this population. In addition, HVIP sites included in the study should be examined for the existence of credible messengers within their organization to be included in recruitment and administration of the START techniques. Finally, my findings suggest that administrators of the intervention found it emotionally difficult to maintain the control condition due to a sense that those participants are missing out on useful services. Therefore, testing the START intervention may be most successful in a stepped wedge cluster randomized controlled trial design so that all centers in the study will receive the intervention.

Finally, my research on the effect of the COVID-19 pandemic on community violence demonstrated a significant increase in violence-related trauma presentations to trauma centers throughout CT in the post-COVID-19 time period, particularly in racial/ethnic minoritized communities. Most of this increase in community violence was the result of penetrating injuries—stabbings and gunshot wounds. Long term relief efforts for the COVID-19 pandemic
should include policies and programs for community violence prevention and mental health
treatment for victims of community violence to prevent known downstream sequelae, particularly
mental health disorders such as PTSD. Funding for these efforts should specifically target
racial/ethnic minoritized communities. Policymakers should further consider legislation that limits
individual access to guns, prevents gun trafficking and improves relationships between police
and communities of color to help curb the community violence epidemic.
REFERENCES


Eastern Association for the Surgery of Trauma Injury Control and Violence Prevention Section and Guidelines Section. 2016:1-7.


Reyes C, Husain N, Gutowski C, St. Clair S, Pratt G. Chicago’s coronavirus disparity: Black Chicagoans are dying at nearly six times the rate of white residents, data show. Chicago Tribune. 2020 April 7, 2020.


107. Board IE. When coronavirus and gun violence collide, it makes both more deadly | Editorial. 2020 March 26, 2020.


