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# BMJ Open

## Building community resilience to prevent and mitigate community impact of gun violence: Conceptual framework and intervention design

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3 **Building community resilience to prevent and mitigate community impact of gun**  
4 **violence: Conceptual framework and intervention design**  
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## Abstract

**Background:** The United States has the highest rate of community gun violence of any developed democracy. There is an urgent need to develop feasible, scalable, and community-led interventions that mitigate incident gun violence and its associated health impacts. Our community-academic research team received National Institutes of Health funding to design a community-led intervention that mitigates the health impacts of living in communities with high rates of gun violence.

**Methods and analysis:** We adapted “Building Resilience to Disasters,” a conceptual framework for natural disaster preparedness, to guide actions of multiple sectors and the broader community to respond to the manmade disaster of gun violence. Using this framework, we will identify existing community assets to be building blocks of future community-led interventions. To identify existing community assets, we will conduct social network and spatial analyses of the gun violence episodes in our community and use these analyses to identify people and neighborhood blocks that have been successful in avoiding gun violence. We will conduct qualitative interviews among a sample of individuals in the network that have avoided violence (N=45) and those living or working on blocks that have not been a location of victimization (N=45) to identify existing assets. Lastly, we will use community-based system dynamics modeling processes to create a computer simulation of the community-level contributors and mitigators of the effects of gun violence that incorporates local population-based data for calibration. We will engage a multi-stakeholder group and use themes from the qualitative interviews and the computer simulation to identify feasible community-led interventions.

**Ethics and dissemination:** The Human Investigation Committee at Yale University School of Medicine (#2000022360) granted study approval. We will disseminate study findings through peer-reviewed publications and academic and community presentations. The qualitative interview guides, system dynamics model, and group model building scripts will be shared broadly.

## Article Summary

### Strengths and limitations of this study:

- We use an assets-based, community resilience framework to understand and address a complex, socially-involved problem, such as community gun violence.
- We use systems science informed by a community-engaged, participatory approach to elicit community assets that might be protective from gun violence.
- We use a community-engaged design process throughout to increase the likelihood of intervention sustainability.
- System dynamics modeling allows for interventions to be tested and evaluated for impact in simulation before being implemented in reality.
- The system dynamics model can be adapted for use by other communities that are also looking for approaches to mitigate gun violence.

## Introduction

Community gun violence killed more than 28,000 people in the United States in 2017-18, with racial and ethnic minorities disproportionately affected.<sup>1</sup> These deaths have collateral impact, as families and neighbors of these victims and perpetrators are also affected, amplifying its long-term health impacts.<sup>2-4</sup> Living in violence-endemic neighborhoods is associated with chronic stress, poor cognitive performance, and poor health outcomes.<sup>5-7</sup> In a national study of adolescents, 38% reported witnessing community violence, and 7% and 10% of those who witnessed community violence were diagnosed with post-traumatic stress disorder and depression, respectively.<sup>8</sup>

In addition to the negative health effects among community members, violence is strongly associated with extreme socioeconomic disadvantage, and in turn exacerbates these disadvantages, creating a vicious cycle. Community-level risk factors for gun violence include poverty,<sup>9-11</sup> unemployment, and housing environments.<sup>12-13</sup> The association between these risk factors and violence is mediated by social cohesion and willingness to intervene in neighborhood events—broadly conceived as the collective efficacy<sup>14</sup> of a community—which is itself negatively impacted by community violence.<sup>15</sup> Exposure to violence is associated with lower high school graduation rates and lower rates of college attendance,<sup>16</sup> cementing long-term economic disadvantage.<sup>17</sup> Compounding the negative health effects of exposure to violence, aggressive policing tactics often used in communities with high levels of violent crime have a negative impact on test scores among African American boys,<sup>18</sup> while violent victimization increases the likelihood of subsequent gun-carrying behaviors.<sup>19</sup> As such, because the community environment is inextricably linked to the incidence and effects of community gun violence, using a community-based approach is necessary to curb the incidence and effects of gun violence.

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3 However, few interventions to prevent and/or mitigate the broader health consequences of gun  
4 violence are focused on the physical or social attributes of neighborhoods. The strongest  
5 existing evidence supporting neighborhood interventions that reduce gun violence and improve  
6 community resident health is related to greening urban landscape. A recent cluster randomized  
7 study in Philadelphia found that the greening of urban lots was associated with reduced crime  
8 and violence and improved mental wellbeing of community members.<sup>20-21</sup> Some evidence also  
9 suggests that reducing alcohol availability<sup>22</sup> and improving street lighting can reduce  
10 neighborhood violent crimes.<sup>23</sup> These interventions are promising, but more study is needed.  
11 We do not yet know which of these interventions is the most effective or cost effective. There  
12 may also be other potential, untapped community-level social factors – such as neighborhood  
13 cohesion – that could influence the incidence or effects of gun violence but have yet to be  
14 tested.  
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30 One underappreciated path to identifying effective interventions that reduce community  
31 exposure to gun violence is designing and implementing them in partnership with community  
32 leaders and residents of violence-endemic neighborhoods. Emerging literature suggests  
33 community ownership of interventions and partnerships are important for sustaining reductions  
34 in gun violence.<sup>24-25</sup> In 2011, we convened a multi-sector partnership of city leaders, community  
35 members, and academic researchers in response to a marked increase in community gun  
36 violence in New Haven, CT. We conducted a study to determine if it were possible to activate  
37 community members and local officials to engage in a community-based approach to respond to  
38 gun violence.<sup>26</sup> Our results indicated that community members anticipate community gun  
39 violence and take action to mitigate the health impacts of community gun violence: parents were  
40 creating action plans with their children in the event of finding a stray gun or witnessing gun  
41 violence and building community coalitions to check in with neighbors after a shooting. Further,  
42 those that reported higher rates of neighborhood social cohesion and collective-efficacy had  
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3 lower exposure to gun violence, even after adjusting for socio-demographics, home ownership  
4 status, employment status, and number of years living in the community.<sup>26</sup>  
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9 We received funding from the National Institutes of Minority Health and Disparities  
10 (1R01MD010403-01) to design an assets-based, community-led intervention to reduce gun  
11 violence that engages community members and that mitigates the health impacts of living in  
12 communities with high rates of gun violence. In this paper, we describe the history behind our  
13 community-academic partnership, the conceptual framework on which this work is grounded,  
14 and the methodology by which we will identify community assets and design an intervention.  
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16 Our hypothesis is that a research process that uses an assets-based framework and that  
17 includes community partners from multiple sectors will lead to novel community-led  
18 interventions to prevent and mitigate the effects of gun violence for future development and  
19 testing.  
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### 32 **Conceptual Framework**

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34 We embed this study protocol in a disaster preparedness framework that focuses on  
35 strengthening community assets and that addresses both the psychosocial and logistical  
36 aspects of potential responses to gun violence. Our group chose to adapt *Building Resilience to*  
37 *Disasters*, a framework developed for disaster preparedness by RAND, to guide multiple sectors  
38 and the broader community in response to natural disasters (**Fig 1**).<sup>27</sup> Our community-academic  
39 partnership recognized the strong parallels between a natural disaster and that of a “chronic,  
40 manmade disaster” like gun violence, in terms of the immediate and long-term trauma and the  
41 importance of a community-led response.  
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54 **Fig 1. Building Resilience to Disasters, a framework from RAND for natural disaster and adapted for man-**  
55 **made disaster like gun violence**  
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3 The framework identifies eight key levers of community resilience (wellness, access, education,  
4 engagement, self-sufficiency, partnership, quality and access), which, in turn, strengthen five  
5 core components of community resilience (red boxes). Each lever was adapted for preventing or  
6 mitigating the effects of gun violence: wellness was defined as assets that promote social and  
7 economic well-being (e.g., relationships with neighbors or family; barber shops or churches;  
8 parks); access was defined as individuals' access to resources which promote physical, mental,  
9 and emotional well-being (e.g., access to a physician or therapist; a neighbor texting tree;  
10 having a mentor); education addresses communication around guns; engagement reflects  
11 social cohesion within community and with other organizations; self-sufficiency is the ability of a  
12 community member to take action in the community to create a safe and orderly environment  
13 (e.g., self-policing, starting a block watch, church organizes a gun buy back); partnerships refers  
14 to developing strong connections between individuals in planning response and recovery  
15 around gun violence; quality is associated with the use or promotion of data collection, analysis,  
16 and utilization for gun violence prevention or response activities; and lastly, efficiency is the  
17 efficient use of data for gun violence prevention and responsiveness. In particular, we chose this  
18 framework given that the levers of engagement and self-sufficiency (highlighted in orange, Fig  
19 1) spoke to the role that community members had in building the core component of social  
20 cohesion, which is critical to community resilience. This framework focuses on strengthening  
21 these eight levers for preparedness, thereby improving day-to-day systems and fortifying the  
22 positive relationships that allow a community to anticipate and respond effectively to community  
23 gun violence. Responsibility for preparedness is shared across communities and all levels of  
24 government, with members of the public as full and active participants in the prevention of and  
25 response to gun violence.  
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## 51 52 53 **Methods**

### 54 *Overview*

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4 We will use a set of novel and complementary methods to identify and characterize existing  
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6 community assets that build community resilience and may also mitigate the incidence and  
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8 impact of gun violence episodes in our community (Fig 2). Specifically, we will use social  
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10 network analyses, spatial analyses, qualitative interviews, and system dynamics modeling to  
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12 first identify community assets, or protective factors, and then model the effects of strengthening  
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14 these assets on the anticipated rates and effects of gun violence.  
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19 Social network analyses map and measure the number and strength of relationships among  
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21 people and have shown that a small proportion of individuals in any given community are  
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23 involved in gun violence.<sup>28</sup> Spatial analyses, where the unit of analysis is a neighborhood block,  
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25 have shown that gun violence takes place consistently on only a few blocks within cities. Both of  
26  
27 these analyses will be helpful in identifying what factors put people and places within  
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29 communities at risk for future gun violence, but also which ones are protective. We will use  
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31 these analyses to identify what we call “positive deviants”: people, organizations, and  
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33 neighborhood blocks that have been successful in avoiding gun violence despite being high risk  
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35 based on sociodemographic characteristics. We will then conduct qualitative interviews among  
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37 a sample of these people and individuals living or working on these blocks to identify existing  
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39 assets to prevent or mitigate the effects of gun violence. Lastly, we use a community-engaged  
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41 approach to design a system dynamics simulation model of the community-level contributors  
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43 and mitigators of the effects of gun violence in New Haven, CT. This simulation will incorporate  
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45 a community-generated casual loop diagram, data from the social network and spatial analyses,  
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47 local population-based based data, and themes from the qualitative interviews in its design. We  
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49 will use the model to test, *in silico*, the anticipated effects of feasible community-led  
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51 interventions on the incidence and effects of gun violence.  
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## Fig 2. Incorporation of Data to Create a System Dynamics Model to Identify Resilience-Building Community

### Assets

#### *Social Network Analysis of Victims and Perpetrators of Gun Violence*

We will first construct the social network of gun violence in New Haven, CT, thus allowing us to better understand individual and network factors that put individuals at risk for victimization.

Victims and perpetrators of gun violence concentrate within small and identifiable social networks of largely minority men. For instance, nearly 70% of shootings in Chicago occurred within networks constituting less than 6% of the city's population.<sup>29-30</sup>

We will conduct a social network analysis using disaggregated arrest records and police data on gun violence from 2011 – 2016 and determine the distribution of gunshot victimization in New Haven, CT within social networks. We will then model gun violence victimization using a random forest model, in which the probability of future victimization depends on individual-level attributes, the history of past victimizations, and the history of past victimizations among each individual's network peers.<sup>28,32,33</sup> The random forest model will be used to estimate the probability that each individual will be victimized in the future, given individual and network factors.

We will use these data in two ways; first, we will identify individuals within the social network of gun violence who have had a high risk of victimization, given individual, network, and neighborhood risk factors, but have not been victimized (i.e., positive deviants). These individuals will be approached to participate in qualitative in-depth interviews to elicit community assets they utilized to remain safe from gun violence. Second, data from the social network analysis will be used to initialize relevant rates and parameters in the system dynamics model

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3 simulating the incidence and effects of gun violence in New Haven, CT. We will also be able to  
4 integrate the social network with the system dynamics model.  
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### 8 9 *Neighborhood Block-level Spatial Analysis of Gun Violence Events*

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11 Next, we will conduct a spatial analysis to identify blocks within the six high-violence  
12 neighborhoods of New Haven that are at high risk for being a location for a gun violence event  
13 but have not yet been a location of such an event. Data from Boston indicate that 50% of  
14 shootings occurred on less than 3% of all city streets.<sup>30</sup> We will use a point-process model to  
15 identify neighborhood blocks that have a lower or higher incidence of gun violence than would  
16 be expected based on socio-economic and demographic factors and the level of gun violence in  
17 surrounding blocks.  
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28 We will analyze the location and timing of gunshot victimizations in New Haven, CT, from 2011-  
29 2016 using a two-component spatio-temporal intensity model.<sup>34</sup> In the first component, we  
30 model the count of victimizations in each census block group as a function of neighborhood-  
31 level socioeconomic indicators (e.g., proportion of households with income below 50% of the  
32 poverty threshold; number of evictions) and demographic indicators (e.g., population aged 15-  
33 34). The second component is a “self-exciting” process, which allows for victimization events to  
34 temporarily increase the probability of secondary victimization events in spatial and temporal  
35 proximity. Based on the fitted model, we will simulate the frequency of victimizations in each  
36 census block group and identify the block groups with fewer victimizations than expected (i.e.,  
37 positive deviants). Like the social network analysis, we will use these data in two ways; first, we  
38 will identify neighborhood blocks within the six high-violence neighborhoods of New Haven, CT,  
39 that are expected to have high risk for incident gun violence but where no shootings have  
40 occurred. We will approach individuals who live and/or work on these blocks to participate in  
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3 qualitative interviews. Second, we will use these data to initialize parameters of the system  
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5 dynamics model.  
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### 9 *Qualitative In-depth Interviews of “Positive Deviants”*

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11 A “positive deviance” approach is an approach to behavioral and social change based on the  
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13 observation that in any community there are people whose uncommon but successful behaviors  
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15 or strategies enable them to find better solutions to a problem than their peers, despite facing  
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17 similar challenges and having no extra resources or knowledge than their peers.<sup>35</sup> A positive  
18  
19 deviance approach has been applied successfully to complex problems, such as  
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21 malnourishment in developing countries and hospital quality improvement projects targeting  
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23 coronary heart disease,<sup>35</sup> but not to community gun violence. Our hypothesis is that these  
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25 individuals or people who live or work on these neighborhood blocks may have leveraged  
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27 community assets that have been effective in preventing gun violence.  
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32 We will conduct in-depth interviews among “positive deviant” individuals identified in our social  
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34 network and spatial analyses to elicit factors protective against gun violence. Individuals will be  
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36 selected for in-depth interview based upon identified positive deviant factors, such as not having  
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38 personal involvement in gun violence, despite exposure to gun violence and being connected to  
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40 people who have been involved in gun violence identified in our social network map (n=45). We  
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42 will also conduct interviews among individuals living on the “positive deviant” blocks identified in  
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44 our spatial analysis (n=45). We will use a combined inductive and deductive coding strategy for  
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46 the network-based and block-based interviews, using our community resilience conceptual  
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48 framework for categorization of factors by the eight levers and identify each lever as an  
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50 individual, organizational, or built environment asset.<sup>36</sup> Because the community members of our  
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52 research team are especially interested in interventions that build on community engagement  
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54 and self-sufficiency, we will probe especially for assets that are community-led. The interviews  
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3 will address these questions, including: “If you have friends who have experienced violence or  
4 victimization, what do you think might be different between you and them?”; “How have you  
5 avoided getting involved in gun violence?,” “Why hasn’t this block had a shooting?” (S1 and S2  
6 Appendices).  
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### 10 11 12 13 *System Dynamics Modeling to Identify Effective Community-led Interventions*

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15 Recognizing that the community resilience conceptual model is more complex than depicted –  
16 levers interact with each other and with other community factors to contribute to the outcome –  
17 we will use a participatory process to better understand how these levers from the resilience  
18 model, and potentially other factors, together influence the community-wide impact of gun  
19 violence. Specifically, we will use group model building, a collaborative, participatory method for  
20 involving diverse stakeholders in the design of a system dynamics model.<sup>37</sup> Group model  
21 building has been used to explore the key determinants of community violence and has been  
22 useful, in particular, for bridging different racial experiences of gun violence.<sup>38</sup> System dynamics  
23 modeling is a method that describes dynamic, multilevel, linear, and nonlinear processes  
24 required so that solutions to challenging social problems like gun violence can be identified.<sup>39-45</sup>  
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39 We will assemble a multi-sector group to engage in a series of these group model building  
40 sessions to create a causal loop diagram. A causal loop diagram is a visualization of how  
41 different variables in a system are interrelated. The group will include stakeholders that  
42 represent each lever of the community resilience framework, including but not limited to police,  
43 community leaders, educators, health professionals, researchers, and neighborhood residents.  
44 Together, participants will design a causal loop diagram that describes how community factors  
45 from all eight levers in the community resilience framework influence each other and influence  
46 exposure to gun violence. The group model building sessions will be overseen by facilitators, a  
47 process coach, an assistant modeler, and a community research assistant, who will provide  
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3 feedback and reflection on the interactions that occurred during the modeling sessions. This  
4 additional layer of feedback and reflection will provide additional insight to which we can further  
5 adapt the model.  
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11 We will use the resulting causal loop diagram to inform the design of a system dynamics model.  
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13 Local data on gun violence rates, data from social network and spatial analyses, community-  
14 based assets related to the eight levers of community resilience, and rates of negative health  
15 outcomes related to living in violence-endemic neighborhoods will be further utilized to calibrate  
16 and validate the model.<sup>26,46,47</sup> We may link the social network into the system dynamics model,  
17 creating a hybrid model, if it is expected to significantly refine the output. We will review how  
18 well the structure of the system dynamics model reflects codes and themes elicited from the  
19 qualitative interviews (i.e., construct validity). We will iteratively present this model to our  
20 community stakeholder group for additional refinement and modification.  
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32 The model will then be used to simulate the impact of an intervention or set of interventions  
33 aimed at preventing and mitigating health outcomes related to exposure to community gun  
34 violence. Hypothesized multi-component community interventions will be simulated with greater  
35 or fewer of the actual components to identify the minimum set(s) of interventions required to  
36 achieve desired outcomes. We provide examples of potential neighborhood interventions  
37 categorized by the eight resilience levers (Table 1). Intervention(s) that are considered feasible  
38 by community stakeholders and effective in the simulation model will be the basis of future  
39 interventions that we will implement and test.  
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50 **Table 1. Examples of possible neighborhood interventions categorized by resilience levers**  
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Lever	Definition	Examples of Related Neighborhood Interventions
Wellness	Promote pre- and post-incident population health, including behavioral health	<ul style="list-style-type: none"> <li>Creating green spaces from vacant lots to improve safety and visual appeal of neighborhood</li> <li>Develop public health messaging to promote healthy lifestyles and bolster psychologic wellness</li> </ul>
Access	Ensure access to high-quality health, behavioral health, and social services	<ul style="list-style-type: none"> <li>Work with local community health centers to have extended hours for mental health services after an episode of gun violence</li> <li>Provide psychological first aid immediately to community members in their homes after gun violence</li> </ul>
Education	Ensure ongoing information to the public about preparedness, risks, and resources before, during, and after a disaster	<ul style="list-style-type: none"> <li>Educate children at local schools through theater about gun safety</li> <li>Train community partners in proper risk communication and response techniques to gun violence</li> </ul>
Engagement	Promote participatory decision-making in planning, response, and recovery activities	<ul style="list-style-type: none"> <li>Engage local business owners, such as liquor store owners, in violence prevention efforts</li> <li>Develop a community plan for re-establishing social routines and relationships, and reclaiming the space of the gun violence event</li> </ul>
Self-Sufficiency	Enable and support individuals and communities to assume responsibility for their preparedness	<ul style="list-style-type: none"> <li>Promote programs that recognize the vital role community members can play as "first responders" to gun violence</li> <li>Establish a phone or text tree that gets activated directly after an event of gun violence</li> </ul>
Partnership	Develop strong partnerships within and between government and nongovernmental organizations	<ul style="list-style-type: none"> <li>Work with local police to develop texting programs to facilitate information exchange about events of gun violence</li> <li>Determine what social networks exist and how to activate them during episodes of gun violence and to prevent gun violence</li> </ul>
Quality	Collect, analyze, and utilize data on building community resilience	<ul style="list-style-type: none"> <li>Collect and monitor measures of social networks, community resilience and gun violence to assess baseline levels and change over time</li> <li>Share resilience and recovery-related data and lessons to improve resilience-building activities</li> </ul>
Efficiency	Leverage resources for multiple use and maximum effectiveness	<ul style="list-style-type: none"> <li>Provide funding to NGOs to include planning response activities for gun violence</li> <li>Develop plans to assess community needs for resource allocation at the onset of incident gun violence</li> </ul>

### *Patient/Public Involvement*

We will utilize a full community-engaged approach, and members of the public will be involved throughout the entire study. A diverse group of community leaders have been involved in the design of the conceptual framework. We will include their viewpoints in the qualitative study and their insights and experiences will guide the design of the system dynamics model. They will also guide dissemination.

### **Ethics and Dissemination**

The Human Investigation Committee at Yale University School of Medicine (#2000022360) granted study approval. We will disseminate study findings through peer-reviewed publications and academic and community presentations. The qualitative interview guides, system dynamics modeling, and group model building scripts will be shared broadly.

### **Discussion**

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3 Our academic-community partnership has uniquely framed gun violence as a chronic, manmade  
4 disaster and is seeking solutions in a strengths-based, disaster-preparedness model that builds  
5 community resilience in order to mitigate the long-term health effects of community gun  
6 violence.<sup>27</sup> Our approach is based on addressing the community context within which gun  
7 violence persists, builds on community strengths, addresses all community members -- rather  
8 than solely perpetrators or victims -- and allows for rigorous and structured planning and  
9 evaluation. Further, we will integrate data from formal social network and spatial analyses into a  
10 system dynamics model to identify feasible and effective community-led interventions. To the  
11 best of our knowledge, this will be one of the first times a formal application of systems science  
12 will contribute to interventions that build community resilience to mitigate the effects of  
13 community gun violence.  
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28 Also unique to our approach is identifying community assets that can be leveraged to mitigate  
29 the impacts of gun violence and related health sequelae. Rarely have gun violence prevention  
30 or mitigation strategies been designed to strengthen the existing assets within neighborhoods.  
31 To date, the majority of gun violence prevention efforts are focused on risk reduction, through  
32 gun buy backs and enforcement, illicit drug use and enforcement, and gang prevention and  
33 enforcement, but these types of interventions do not necessarily address the root causes of  
34 community violence and have only been found to have short-term impact, if any.<sup>25,27,48-51</sup>  
35 Instead, we apply an assets-based, community-driven framework, anticipating that solutions for  
36 community gun violence can originate from both preventing and mitigating impacts of gun  
37 violence, as well as building upon existing neighborhood assets. Specifically, we will identify  
38 “positive deviants,” who are closest to gun violence and can speak firsthand about community  
39 assets that may prevent and mitigate effects of gun violence. Using this framework is innovative  
40 and may identify novel interventions, which as of yet have not been applied to community gun  
41 violence.  
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5 The utilization of participatory modeling to address the conceptual and analytical challenges  
6 inherent in identifying and estimating the impact of multiple community factors on chronic  
7 community gun violence is also a novel approach. Few prior interventions to reduce gun  
8 violence have been led by community or in full partnership with community, despite literature  
9 indicating the importance of community ownership and partnerships between informal  
10 (community) and formal (police and government) social control in creating sustainable  
11 reductions in gun violence.<sup>24</sup> We will use participatory modeling to not only engage the  
12 community, but also to identify and create informal and formal social control partnerships.  
13  
14 Additionally, the system dynamics model that the group of community stakeholders create will  
15 be one of the first to address chronic community gun violence. Through its creation, key  
16 resilience levers can be identified and bolstered, and multi-faceted interventions can be  
17 explored in an inexpensive and non-harmful trial *in silico* before implementation and formal  
18 evaluation in the real world. This aspect is particularly useful for community gun violence  
19 because of the many severe and interrelated negative health outcomes associated with it. The  
20 system dynamics model could also be adapted by other communities interested in designing  
21 interventions to reduce exposure to gun violence and its health impacts.  
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## 42 **Conclusions**

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45 In this manuscript, we describe a community-driven process of designing interventions that is a  
46 departure from more traditional interventions to reduce gun violence exposure, which focuses  
47 on identifying existing neighborhood assets that can be the focal point for future interventions to  
48 build resilience and reduce gun violence and its health sequelae.<sup>26,47,51-54</sup> By using an innovative  
49 combination of a positively-framed approach and participatory systems science methods, we  
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3 anticipate being able to identify novel solutions to community gun violence for future  
4 effectiveness testing through a process that can be replicated by other communities.  
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### 8 **Funding Statement**

9  
10 The study described was supported by the National Institute on Minority Health and Health  
11 Disparities (1R01MD010403-01A1). The views expressed in this article are those of the authors  
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13 Health Disparities; National Institutes of Health.  
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23 which this work originated.  
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### 30 **Author Contributions**

31 EAW, CR, BR, AG, AP, MW conceptualized the study design, and GW, NH, LB-R, and PV  
32 contributed to the study design. EAW, RB, BR drafted and led writing the manuscript, and all  
33 authors contributed to revising it for important intellectual content. All authors approved the final  
34 version of the manuscript.  
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### 44 **Competing Interests Statement**

45 Drs. Roy and Riley report personal fees from Heluna Health, personal fees from the Institute for  
46 Healthcare Improvement, and grant funding from the Robert Wood Johnson Foundation and the  
47 Institute for Healthcare Improvement, outside the submitted work. Dr. Roy also reports grant  
48 funding from the National Heart, Lung, and Blood Institute outside the submitted work. Dr. Wang  
49 also reports funding from the National Heart, Lung, and Blood Institute, National Cancer  
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Institute, National Institute on Drug Abuse, the California Health Care Foundation, and the William T. Grant Foundation. The other authors declare no competing interests.

For peer review only

## Supporting Information

### S1 Appendix. Spatial Network Analysis Interview Guide.

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**S2 Appendix. Individual Interview Guide**

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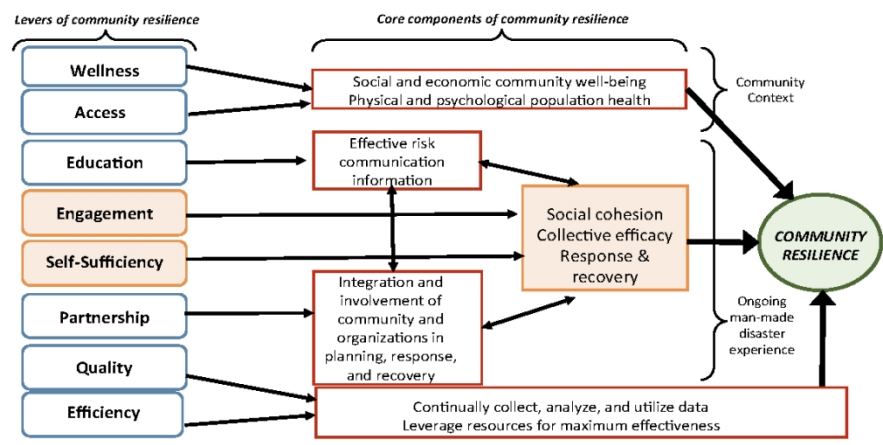


Fig 1. Building Resilience to Disasters, a framework from RAND for natural disaster and adapted for man-made disaster like gun violence

165x86mm (200 x 200 DPI)

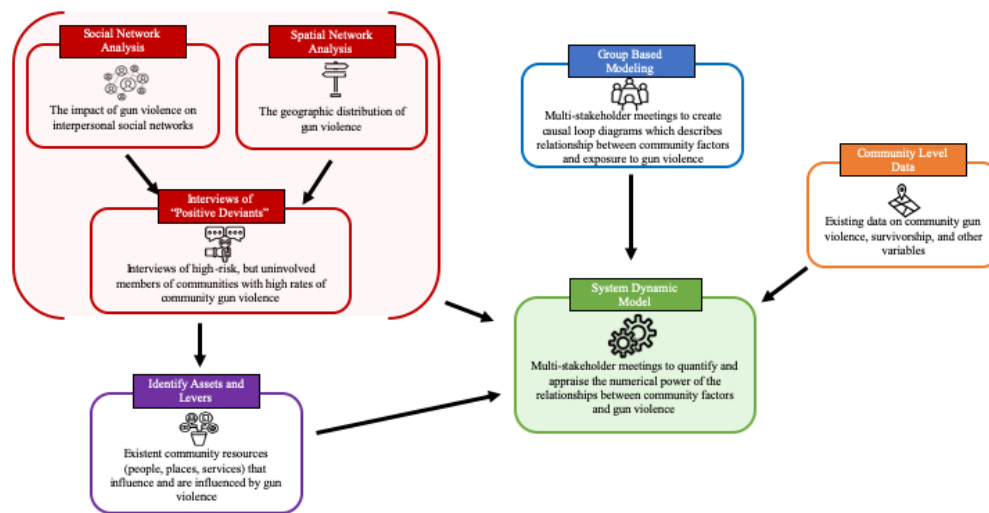


Fig 2. Incorporation of Data to Create a System Dynamics Model to Identify Resilience-Building Community Assets

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***Interview guide objectives: This interview guide is for people who we think might be community experts at avoiding gun violence. Objectives are to identify [hidden/unexpected] assets in the community, which have lessened or mitigated the impact of gun violence.***

Intro: Thank you so much for talking with me today. As you know, we're interested in learning how community members can work together to lessen the impacts of gun violence. The goal of this work is to find ways that community members could lead (as opposed to city leaders or police) to lessen the impact of gun violence in our community. We are talking to you because you live on a [street/block] where there hasn't been in recent years a shooting, even though lots of streets near you have had a shooting. So, I have a few questions for you.

Everything you tell me will be kept confidential and will not be linked to you in any way. Of course, if you have any questions for me as we go through, if anything is unclear, or if you would prefer to skip a question, please don't hesitate to stop me at any point. If it's alright with you, I would like to record our conversation so I can better remember all the important information you tell me. The recording won't be shared with anyone else and won't be linked to you. But it will help me stay engaged in our conversation instead of trying to write everything down. If you'd like me to stop the recording at any time please just say so.

Any questions before we begin?

### **Individual Sociodemographic Factors**

To start, I'm going to ask you a little bit about yourself.

1. How old are you?
2. What is the highest level of school or degree you have completed?
3. Are you currently enrolled in school?
4. Where is your high school located?
  - 4a. If attend/attended trade school or college: Where is your trade school/college located?
5. Where were you born?
  - 5a. Did you grow up in a place that is different from where you were born?
  - 5b. If yes: where?
6. How long have you lived in this neighborhood?
  - 6a. Are you the owner of the home you live in? [If NO, go to question 6b]
  - 6b. Do you rent?

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3 7. Where else have you lived?  
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5 8. How many times have you moved in the last five years?  
6 8a. If yes: Where did you most recently move from?  
7 8b. If yes: Can you tell each different place you have lived in the last five years?  
8 8c. If moved from another place in New Haven: Why did you move?  
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10 The next group of questions are about your family and living arrangements.

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12 9. Are you married?  
13 9a. If no: are you in a long-term relationship? [if NO-skip to question 10]  
14 9b. If yes, how long have you been in this relationship?  
15 10. Do you have any children? [If NO-skip to question 12]  
16 11a. If yes, how many?  
17 11b. What are their ages?  
18 11c. Do they live with you?  
19 11d. Do you pay child support?  
20 11e. How often do you see your children?  
21 12. Who [else] do you live with?  
22 13. Are you a caregiver for anybody else? For example, do you help to take care of a  
23 parent or grandparent?  
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29 The last group of questions are about work.

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32 14. Are you currently working?  
33 If yes:  
34 14a. Can you tell me a little bit about your job?  
35 14b. Is this job part time or full time?  
36 14c. How long have you been at your current job?  
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38 If no:  
39 14d. How long have you been out of work?  
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### 43 Narrative Questions Related to Gun Violence and Victimization

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45 Now I'd like to switch gears and talk to you about gun violence in New Haven. As I said  
46 before the objective of this study is to identify **strategies that might work for**  
47 **community members** to lessen the impacts of gun violence. You live on a  
48 block/street where there hasn't been in recent years a shooting, even though lots of  
49 streets near you have had a shooting.  
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1. What distinguishes your block from other blocks nearby which have had shootings recently? Do you think there are any specific reasons why there hasn't been a shooting on your block/street?
2. Why do you think some folks get involved in gun violence? [Why do you think some places are at higher risk of having a shooting?]
3. Can you provide specific examples of how you and your neighbors have worked to reduce gun violence on your block/street?
  - a. Are there specific people on your block/street who you feel are instrumental to keeping this block/street safe? Can you tell me about them?
  - b. Are there specific organizations you think are instrumental to keeping this block/street safe? (*school, church, sports, arts/music, clubs, YMCA, health centers*) Can you tell me about them?
  - c. Are there specific activities you think are instrumental to keeping this block/street safe? Can you tell me about them?
4. What do people on your block do when there is a nearby shooting?

END RECORDING

Now I'm going to turn the audio recorder off because this is the end of the questions that have open-ended answers. But, I have a few more quick survey questions to get more information about you, your friends, your neighborhood, and organizations that you may use. I can read the questions to you or you can read them on your own and select answers on this iPad. Do you have a preference?

### **Gun Violence Exposure Questions**

The next set of questions is about your experience with gun violence.

1. Have any of your family members been **hurt** by gun violence?
2. Have any of your close friends been **hurt** by gun violence?
3. Have you ever seen or been present when someone was shot?
4. Did you know the person or people who got shot? What was your relationship to this person?
5. Have you been shot (or shot at) before?
6. Has there been a shooting in your neighborhood/block?
7. Have you ever carried a gun on your person outside your house?

### **Views of Institutions/Legitimacy**

The next set of questions are related to how you feel about law enforcement and institutions such as the police.

As I read the following statements, please tell me how much you agree or disagree.

1. How about “I feel that I should accept the decisions made by legal authorities?”
  - Agree strongly
  - Agree somewhat
  - Disagree somewhat
  - Disagree strongly
  - Don’t know
  - Refused
2. How about, “People should obey the law even if it goes against what they think is right”
  - Agree strongly
  - Agree somewhat
  - Disagree somewhat
  - Disagree strongly
  - Don’t know
  - Refused
3. “People in power use the law to try and control people like me”
  - Agree strongly
  - Agree somewhat
  - Disagree somewhat
  - Disagree strongly
  - Don’t know
  - Refused

Our next questions are about the police in New Haven

On a scale from 0 to 10, how would you rate the police? The higher the number the warmer or more favorable you feel toward the police. The lower the number, the colder or less favorable you feel. If you feel neither warm nor cold, rate them a 5.

4. On a scale from 0 to 10, how would you rate the police in the **city**?
5. On a scale from 0 to 10, how would you rate the police in your **neighborhood**?
6. Is there a difference?
  - Yes
  - No
  - Don’t Know
  - Refused
7. If yes, in what ways?

As I read each of the following statements, please tell me how much you agree or disagree.



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2  
3 8. How about, "Most police in my neighborhood are dishonest"
- 4 • Agree strongly
  - 5 • Agree somewhat
  - 6 • Disagree somewhat
  - 7 • Disagree strongly
  - 8 • Don't know
  - 9 • Refused
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13 9. "Most police in my neighborhood treat some people better than others"
- 14 • Agree strongly
  - 15 • Agree somewhat
  - 16 • Disagree somewhat
  - 17 • Disagree strongly
  - 18 • Don't know
  - 19 • Refused
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23 10. "Most police in my neighborhood do their job well"
- 24 • Agree strongly
  - 25 • Agree somewhat
  - 26 • Disagree somewhat
  - 27 • Disagree strongly
  - 28 • Don't know
  - 29 • Refused
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32 11. "Most police in my neighborhood treat people with respect"
- 33 • Agree strongly
  - 34 • Agree somewhat
  - 35 • Disagree somewhat
  - 36 • Disagree strongly
  - 37 • Don't know
  - 38 • Refused
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### 42 **Civic Engagement**

43  
44 Now I am going to ask you some questions about involvement in your community.

- 45  
46  
47 1. In the past year, how often have you attended a meeting for a local board, council, or  
48 organization that deals with any community problems? Would you say (Never/Once/2-3  
49 times/About once a month/More than once a month)
- 50  
51 2. In the past year, have you served in a voluntary capacity on any local board, council,  
52 or organization that deals with community problems? (Yes/No)
- 53  
54 2a. If yes: Has the issue of gunshot violence been discussed by the  
55 board/council/organization in the past year?
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3 3. In the past year, have you gotten together informally with or worked with others in  
4 your community or neighborhood to try to deal with some community issues or  
5 problems? (Yes/No)

6  
7 4. How important do you consider voting to be? Would you say (Very  
8 important/Somewhat important/Not very important)  
9

### 10 11 **Neighborhood Perceptions of Safety**

12  
13  
14 1. For each of these statements, please tell me whether you strongly agree, agree,  
15 disagree or strongly disagree:

- 16 ○ This is a close knit neighborhood
- 17 ○ People around here are willing to help their neighbors
- 18 ○ People in this neighborhood do not share the same values
- 19 ○ People in this neighborhood can be trusted
- 20 ○ I feel safe in this neighborhood
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***Interview guide objectives: This interview guide is for people who we think might be community experts at avoiding gun violence. Objectives are to identify [hidden/unexpected] assets in the community, which have lessened or mitigated the impact of gun violence.***

Intro: Thank you so much for talking with me today. As you know, we're interested in learning how community members can work together to lessen the impacts of gun violence. The goal of this work is to find ways that community members could lead (as opposed to city leaders or police) to lessen the impact of gun violence in our community. So I have a few questions for you so I can better understand your experiences in New Haven and get your thoughts about how we might lessen gun violence in the community.

Everything you tell me will be kept confidential and will not be linked to you in any way. Of course, if you have any questions for me as we go through, if anything is unclear, or if you would prefer to skip a question, please don't hesitate to stop me at any point. If it's alright with you, I would like to record our conversation so I can better remember all the important information you tell me. The recording won't be shared with anyone else and won't be linked to you. But it will help me stay engaged in our conversation instead of trying to write everything down that you say. I can stop the recording at any time you'd like but will plan to do so after we have gone through the interview questions.

Any questions before we begin?

### **Individual Sociodemographic Factors**

To start, I'm going to ask you a little bit about yourself.

1. How old are you?
2. What is your race? (check one or more)
  - White
  - Black or African Am.
  - American Indian or Alaska Native
  - Asian Indian
  - Chinese
  - Filipino
  - Japanese
  - Korean
  - Vietnamese
  - Other Asian

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- Native Hawaiian
  - Guamanian or Chamorro
  - Samoan
  - Other Pacific Islander
  - Multi-racial
3. Are you of Hispanic, Latino, or Spanish origin? (check one)
    - No, not of Hispanic, Latino, or Spanish origin
    - Yes, Mexican, Mexican Am., Chicano
    - Yes, Puerto Rican
    - Yes, Cuban
    - Yes, another Hispanic, Latino, or Spanish origin
  4. What is your gender?
  5. Where were you born?
    - 5a. Did you grow up in a place that is different from where you were born?
    - 5b. If yes: where?
  6. How long have you lived in New Haven?
    - 6a. What neighborhood do you live in? What are the cross streets?
    - 6b. How long have you lived there?
  7. Where else have you lived?
  8. How many times have you moved in the last five years?
    - 8a. If yes: Can you tell me the different place(s) you have lived in the last five years?
    - 8b. If yes: Where did you most recently move from?
  9. Are you currently enrolled in school?
  10. What is the highest level of school or degree you have completed?
  11. Where is/was your high school located?

The next group of questions are about your family and living arrangements.

12. Are you married?
  - 12a. If no: are you in a long-term relationship? [if NO-skip to question 13]
  - 12b. If yes, how long have you been in this relationship?
13. Do you have any children? [If NO-skip to question 14]
  - 13a. If yes, how many?
  - 13b. What are their ages?
  - 13c. Do they live with you?
  - 13d. Do you pay child support?
  - 13e. How often do you see your children?
14. Who [else] do you live with?
15. Are you a caregiver for anybody else? For example, do you help to take care of a parent or grandparent?

The last group of questions are about work and education.

16. Are you currently working?

If yes:

16a. Can you tell me a little bit about your job?

16b. Is this job part time or full time?

16c. How long have you been at your current job?

If no:

16d. How long have you been out of work?

17. Have you ever served in the military?

**If referral (not seed):**

18. Have you ever been arrested?

18a. If yes, how many times have you been arrested?

18b. When was your most recent arrest?

### **Narrative Questions Related to Gun Violence and Victimization**

Now I'd like to switch gears and talk to you about gun violence in New Haven. There have been several initiatives aimed at reducing gun violence in New Haven, led by the mayor's office, New Haven police, or city hall. As I said before, the purpose of this discussion is to identify **strategies that might work for community members** to lessen the impacts of gun violence, so we are hoping to better understand **why people do and don't get involved** in gun violence.

1. Why do you think some folks get involved in gun violence?
2. Describe a particular situation when you think that a person is at high risk of getting involved in gun violence?
3. Why do you think some folks do NOT get involved in gun violence?

### **Gun Violence Exposure Questions**

The next set of questions is about your personal experience with gun violence.

1. Have any of your family members been **hurt** by gun violence?

2. Have any of your close friends been **hurt** by gun violence?

3. Have you ever seen or been present when someone was shot?

If yes: Did you know the person or people who got shot? What was your relationship to this person?

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5. Have you been shot (or shot at) before?
6. Have you ever carried a gun on your person outside your house? Why; why not?
7. How have you avoided getting involved in gun violence?
- a. What people were most influential in your life?
    - i. Are there specific people you feel helped you avoid getting involved in violence?
    - ii. (if not a family member) How and when did you meet them?
    - iii. When in your life were these people most influential?
  - b. What organizations were most influential in your life?
    - i. Are there specific organizations you think kept you from getting involved in violence?
    - ii. When in your life were these organizations most influential?
  - c. Are there any other people, places or factors you think influenced your decisions to avoid being involved in gun violence?
    - i. When in your life were these things most influential?
  - d. *Ask specifically about other types of organizations or institutions that have not been mentioned but are common, e.g., school, church, sports, arts/music, clubs, YMCA, health centers*
8. Think about the last shooting in your neighborhood that you remember: How did people in your neighborhood respond (what do people do)?

## END RECORDING

That is the end of the interview and discussion, but I have a few more quick survey questions to get more information about you, your friends, your neighborhood, and organizations that you may use. I can read the questions to you or you can read them on your own and select answers on this iPad. Do you have a preference?

## Views of Institutions/Legitimacy

The next set of questions are related to how you feel about law enforcement and institutions such as the police.

As I read the following statements, please tell me how much you agree or disagree.

1. How about "I feel that I should accept the decisions made by legal authorities?"
  - Agree strongly
  - Agree somewhat
  - Disagree somewhat
  - Disagree strongly
  - Don't know

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- Refused
2. How about, "People should obey the law even if it goes against what they think is right"
    - Agree strongly
    - Agree somewhat
    - Disagree somewhat
    - Disagree strongly
    - Don't know
    - Refused
  3. "People in power use the law to try and control people like me"
    - Agree strongly
    - Agree somewhat
    - Disagree somewhat
    - Disagree strongly
    - Don't know
    - Refused

Our next questions are about the police in New Haven

On a scale from 0 to 10, how would you rate the police? The higher the number the warmer or more favorable you feel toward the police. The lower the number, the colder or less favorable you feel. If you feel neither warm nor cold, rate them a 5.

4. On a scale from 0 to 10, how would you rate the police in the **city**?
5. On a scale from 0 to 10, how would you rate the police in your **neighborhood**?
6. Is there a difference?
  - Yes
  - No
  - Don't Know
  - Refused
7. If yes, in what ways?

As I read each of the following statements, please tell me how much you agree or disagree.

8. How about, "Most police in my neighborhood are dishonest"
  - Agree strongly
  - Agree somewhat
  - Disagree somewhat
  - Disagree strongly
  - Don't know
  - Refused
9. "Most police in my neighborhood treat some people better than others"

- Agree strongly
- Agree somewhat
- Disagree somewhat
- Disagree strongly
- Don't know
- Refused

10. "Most police in my neighborhood do their job well"

- Agree strongly
- Agree somewhat
- Disagree somewhat
- Disagree strongly
- Don't know
- Refused

11. "Most police in my neighborhood treat people with respect"

- Agree strongly
- Agree somewhat
- Disagree somewhat
- Disagree strongly
- Don't know
- Refused

### **Resilience and Coping**

This set of questions is about how you usually handle difficult or challenging situations. Consider how well the following statements describe your behavior and actions on a scale from 1 to 5, where 1 means the statement does not describe you at all and 5 means it describes you very well:

1. I look for creative ways to alter difficult situations.
2. Regardless of what happens to me, I believe I can control my reaction to it.
3. I believe I can grow in positive ways by dealing with difficult situations.
4. I actively look for ways to replace the losses I encounter in life.

### **Neighborhood Perceptions of Safety**

For each of these statements, think about the neighborhood you live in and please tell me whether you strongly agree, agree, disagree or strongly disagree:

1. This is a close-knit neighborhood
2. People around here are willing to help their neighbors
3. People in this neighborhood do not share the same values
4. People in this neighborhood can be trusted



## **Civic Engagement**

Now I am going to ask you some questions about involvement in your community.

1. In the past year, how often have you attended a meeting for a local board, council, or organization that deals with any community problems? Would you say (Never/Once/2-3 times/About once a month/More than once a month)
2. In the past year, have you served in a voluntary capacity on any local board, council, or organization that deals with community problems? (Yes/No)
  - 2a. If yes: Has the issue of gunshot violence been discussed by the board/council/organization in the past year?
3. In the past year, have you gotten together informally with or worked with others in your community or neighborhood to try to deal with some community issues or problems? (Yes/No)
4. How important do you consider voting to be? Would you say (Very important/Somewhat important/Not very important)

## **Organizational and Institutional Assets**

1. Can you name any services (organizations, groups, institutions) in New Haven that work to prevent gun violence or deal with the effects of gun violence?
2. Have you used any of these services?

## **Ego-Network Questions**

Next I want to ask you some questions about the people you interact with. This information will help to better understand the social support system of local residents. Please understand that I'm not interested in the full names of the people you interact with, so please just provide their first name or their nickname. For each question, list up to five names.

1. From time to time, most people discuss important matters with other people. Looking back over the last six months – who are the people with whom you discussed matters important to you?
2. If someone in your neighborhood threatened you, who would you call?
3. Who would you call if you needed to get bailed out of jail?

For each person listed above, could you tell me:

- What is their age?
- What is their race?
- What is their gender?
- Where do they live? Please note that we are not interested in exact addresses.
- How did you meet them?
- How long have you known them?
- Do they live in this neighborhood?
- How many times have you seen in past 6 months?

Lastly, we want to get an idea of how connected various people within your social network are to each other. Please think about the relationship between the people you just mentioned. Some of them may be total strangers in the sense that they wouldn't recognize each other if they bumped into each other on the street. Others may be especially close, as close or closer to each other as they are to you.

First, think about [NAME 1] and [NAME 2], your options include: strangers; not strangers but not close; and close.

### **Referral generation for sampling**

We're also interested in talking to other folks like yourself who may have experience with gun violence. We will give you [5] referral cards with our contact information. If you can think of anybody that might be interested in taking the survey, we would be grateful if you would pass on a referral card and ask them to reach out to us. Anybody that takes the survey based on your referral will be paid \$50 and you will be rewarded with an additional \$15

We will contact you again regarding payment only if one of your referrals participates in an interview.

# BMJ Open

## Building community resilience to prevent and mitigate community impact of gun violence: Conceptual framework and intervention design

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Secondary Subject Heading:	Emergency medicine, Public health, Qualitative research, Research methods
Keywords:	ACCIDENT & EMERGENCY MEDICINE, EPIDEMIOLOGY, PUBLIC HEALTH, STATISTICS & RESEARCH METHODS, TRAUMA MANAGEMENT

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3 **Building community resilience to prevent and mitigate community impact of gun**  
4 **violence: Conceptual framework and intervention design**  
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## Abstract

**Introduction:** The United States has the highest rate of community gun violence of any developed democracy. There is an urgent need to develop feasible, scalable, and community-led interventions that mitigate incident gun violence and its associated health impacts. Our community-academic research team received National Institutes of Health funding to design a community-led intervention that mitigates the health impacts of living in communities with high rates of gun violence.

**Methods and analysis:** We adapted “Building Resilience to Disasters,” a conceptual framework for natural disaster preparedness, to guide actions of multiple sectors and the broader community to respond to the manmade disaster of gun violence. Using this framework, we will identify existing community assets to be building blocks of future community-led interventions. To identify existing community assets, we will conduct social network and spatial analyses of the gun violence episodes in our community and use these analyses to identify people and neighborhood blocks that have been successful in avoiding gun violence. We will conduct qualitative interviews among a sample of individuals in the network that have avoided violence (N=45) and those living or working on blocks that have not been a location of victimization (N=45) to identify existing assets. Lastly, we will use community-based system dynamics modeling processes to create a computer simulation of the community-level contributors and mitigators of the effects of gun violence that incorporates local population-based data for calibration. We will engage a multi-stakeholder group and use themes from the qualitative interviews and the computer simulation to identify feasible community-led interventions.

**Ethics and dissemination:** The Human Investigation Committee at Yale University School of Medicine (#2000022360) granted study approval. We will disseminate study findings through peer-reviewed publications and academic and community presentations. The qualitative interview guides, system dynamics model, and group model building scripts will be shared broadly.

## Article Summary

### Strengths and limitations of this study:

- We use an assets-based, community resilience framework to understand and address a complex, socially-involved problem, such as community gun violence.
- We use systems science informed by a community-engaged, participatory approach to elicit community assets that might be protective from gun violence.
- We use a community-engaged design process throughout to increase the likelihood of intervention sustainability.
- System dynamics modeling allows for interventions to be tested and evaluated for impact in simulation before being implemented in reality.
- The system dynamics model can be adapted for use by other communities that are also looking for approaches to mitigate gun violence.

## Introduction

Community gun violence killed more than 28,000 people in the United States in 2017-18, with racial and ethnic minorities disproportionately affected.<sup>1</sup> These deaths have collateral impact, as families and neighbors of these victims and perpetrators are also affected, amplifying its long-term health impacts.<sup>2-4</sup> Living in violence-endemic neighborhoods is associated with chronic stress, poor cognitive performance, and poor health outcomes.<sup>5-7</sup> In a national study of adolescents, 38% reported witnessing community violence, and 7% and 10% of those who witnessed community violence were diagnosed with post-traumatic stress disorder and depression, respectively.<sup>8</sup>

In addition to the negative health effects among community members, violence is strongly associated with extreme socioeconomic disadvantage, and in turn exacerbates these disadvantages, creating a vicious cycle. Community-level risk factors for gun violence include poverty,<sup>9-11</sup> unemployment, and housing environments.<sup>12-13</sup> The association between these risk factors and violence is mediated by social cohesion and willingness to intervene in neighborhood events—broadly conceived as the collective efficacy<sup>14</sup> of a community—which is itself negatively impacted by community violence.<sup>15</sup> Exposure to violence is associated with lower high school graduation rates and lower rates of college attendance,<sup>16</sup> cementing long-term economic disadvantage.<sup>17</sup> Compounding the negative health effects of exposure to violence, aggressive policing tactics often used in communities with high levels of violent crime have a negative impact on test scores among African American boys,<sup>18</sup> while violent victimization increases the likelihood of subsequent gun-carrying behaviors.<sup>19</sup> As such, because the community environment is inextricably linked to the incidence and effects of community gun violence, using a community-based approach is necessary to curb the incidence and effects of gun violence.



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3 However, few studies have rigorously tested using an experimental design interventions to  
4 prevent and/or mitigate the broader health consequences of gun violence. The Cardiff Model is  
5 one notable example in the UK that utilizes real-time data to identify physical locations where  
6 violence occurs, and engages multi-sector partners to develop interventions such as improving  
7 street lighting to reduce violence in these areas.<sup>20-21</sup> There are also a few intervention studies  
8 that are focused on modifying the physical attributes of neighborhoods. Perhaps the strongest  
9 existing evidence supporting neighborhood interventions that reduce gun violence and improve  
10 community resident health is related to greening urban landscape. A recent cluster randomized  
11 study in Philadelphia found that the greening of urban lots was associated with reduced crime  
12 and violence and improved mental wellbeing of community members.<sup>22-23</sup> Some evidence also  
13 suggests that reducing alcohol availability<sup>24</sup> and improving street lighting can reduce  
14 neighborhood violent crimes.<sup>25</sup> These interventions are promising, but more study is needed.

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16 We do not yet know which of these interventions is the most effective or cost effective.

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18 Emerging evidence also suggests that other potential, untapped community-level social factors  
19 – such as neighborhood cohesion – that could influence the incidence or effects of gun violence  
20 but more research is needed.<sup>12,26-29</sup>

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One underappreciated path to identifying effective interventions that reduce community  
exposure to gun violence is designing and implementing them in partnership with community  
leaders and residents of violence-endemic neighborhoods. Emerging literature suggests  
community ownership of interventions and partnerships are important for sustaining reductions  
in gun violence.<sup>30-31</sup> In 2011, we convened a multi-sector partnership of city leaders, community  
members, and academic researchers in response to a marked increase in community gun  
violence in New Haven, CT. We conducted a study to determine if it were possible to activate  
community members and local officials to engage in a community-based approach to respond to  
gun violence.<sup>32</sup> Our results indicated that community members anticipate community gun

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3 violence and take action to mitigate the health impacts of community gun violence: parents were  
4 creating action plans with their children in the event of finding a stray gun or witnessing gun  
5 violence and building community coalitions to check in with neighbors after a shooting. Further,  
6 those that reported higher rates of neighborhood social cohesion and collective-efficacy had  
7 lower exposure to gun violence, even after adjusting for socio-demographics, home ownership  
8 status, employment status, and number of years living in the community.<sup>32</sup>  
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18 We received funding from the National Institutes of Minority Health and Disparities  
19 (1R01MD010403-01) to design an assets-based, community-led intervention to reduce gun  
20 violence that engages community members and that mitigates the health impacts of living in  
21 communities with high rates of gun violence. In this paper, we describe the history behind our  
22 community-academic partnership, the conceptual framework on which this work is grounded,  
23 and the methodology by which we will identify community assets and design an intervention.  
24 Our hypothesis is that a research process that uses an assets-based framework and that  
25 includes community partners from multiple sectors will lead to novel community-led  
26 interventions to prevent and mitigate the effects of gun violence for future development and  
27 testing.  
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### 41 **Conceptual Framework**

42 We embed this study protocol in a disaster preparedness framework that focuses on  
43 strengthening community assets and that addresses both the psychosocial and logistical  
44 aspects of potential responses to gun violence. Our group chose to adapt *Building Resilience to*  
45 *Disasters*, a framework developed for disaster preparedness by RAND, to guide multiple sectors  
46 and the broader community in response to natural disasters (**Fig 1**).<sup>33</sup> Our community-academic  
47 partnership recognized the strong parallels between a natural disaster and that of a “chronic,  
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3 manmade disaster” like gun violence, in terms of the immediate and long-term trauma and the  
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5 importance of a community-led response.  
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10 **Fig 1. Building Resilience to Disasters, a framework from RAND for natural disaster and adapted for man-**  
11 **made disaster like gun violence**  
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13 The framework identifies eight key levers of community resilience (wellness, access, education,  
14 engagement, self-sufficiency, partnership, quality and access), which, in turn, strengthen five  
15 core components of community resilience (red boxes). Each lever was adapted for preventing or  
16 mitigating the effects of gun violence: wellness was defined as assets that promote social and  
17 economic well-being (e.g., relationships with neighbors or family; barber shops or churches;  
18 parks); access was defined as individuals’ access to resources which promote physical, mental,  
19 and emotional well-being (e.g., access to a physician or therapist; a neighbor texting tree;  
20 having a mentor); education addresses communication around guns; engagement reflects  
21 social cohesion within community and with other organizations; self-sufficiency is the ability of a  
22 community member to take action in the community to create a safe and orderly environment  
23 (e.g., self-policing, starting a block watch, church organizes a gun buy back); partnerships refers  
24 to developing strong connections between individuals in planning response and recovery  
25 around gun violence; quality is associated with the use or promotion of data collection, analysis,  
26 and utilization for gun violence prevention or response activities; and lastly, efficiency is the  
27 efficient use of data for gun violence prevention and responsiveness. In particular, we chose this  
28 framework given that the levers of engagement and self-sufficiency (highlighted in orange, Fig  
29 1) spoke to the role that community members had in building the core component of social  
30 cohesion, which is critical to community resilience. This framework focuses on strengthening  
31 these eight levers for preparedness, thereby improving day-to-day systems and fortifying the  
32 positive relationships that allow a community to anticipate and respond effectively to community  
33 gun violence. Responsibility for preparedness is shared across communities and all levels of  
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3 government, with members of the public as full and active participants in the prevention of and  
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5 response to gun violence.  
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## 8 9 **Methods**

### 10 *Overview*

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12 Over the course of three years, we will use a set of novel and complementary methods to  
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14 identify and characterize existing community assets that build community resilience and may  
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16 also mitigate the incidence and impact of gun violence episodes in our community (Fig 2).  
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18 Specifically, we will use social network analyses, spatial analyses (year 1), qualitative interviews  
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20 (year 2), and system dynamics modeling (year 3) to first identify community assets, or protective  
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22 factors, and then model the effects of strengthening these assets on the anticipated rates and  
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24 effects of gun violence.  
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30 Social network analyses map and measure the number and strength of relationships among  
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32 people and have shown that a small proportion of individuals in any given community are  
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34 involved in gun violence.<sup>34</sup> Spatial analyses, where the unit of analysis is a neighborhood block,  
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36 have shown that gun violence takes place consistently on only a few blocks within cities. Both of  
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38 these analyses will be helpful in identifying what factors put people and places within  
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40 communities at risk for future gun violence, but also which ones are protective. We will use  
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42 these analyses to identify what we call “positive deviants”: people, organizations, and  
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44 neighborhood blocks that have been successful in avoiding gun violence despite being high risk  
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46 based on sociodemographic characteristics. We will then conduct qualitative interviews among  
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48 a sample of these people and individuals living or working on these blocks to identify existing  
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50 assets to prevent or mitigate the effects of gun violence. Lastly, we use a community-engaged  
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52 approach to design a system dynamics simulation model of the community-level contributors  
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54 and mitigators of the effects of gun violence in New Haven, CT. This simulation will incorporate  
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3 a community-generated casual loop diagram, data from the social network and spatial analyses,  
4 local population-based based data, and themes from the qualitative interviews in its design. We  
5 will use the model to test, *in silico*, the anticipated effects of feasible community-led  
6 interventions on the incidence and effects of gun violence.  
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## 11 **Fig 2. Incorporation of Data to Create a System Dynamics Model to Identify Resilience-Building Community**

### 12 **Assets**

#### 13 *Social Network Analysis of Victims and Perpetrators of Gun Violence*

14 We will first construct the social network of gun violence in New Haven, CT, thus allowing us to  
15 better understand individual and network factors that put individuals at risk for victimization.  
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17 Victims and perpetrators of gun violence concentrate within small and identifiable social  
18 networks of largely minority men. For instance, nearly 70% of shootings in Chicago occurred  
19 within networks constituting less than 6% of the city's population.<sup>35,36</sup>  
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21 We will conduct a social network analysis using disaggregated arrest records and police data on  
22 gun violence from 2011 – 2016 and determine the distribution of gunshot victimization in New  
23 Haven, CT within social networks. We will then model gun violence victimization using a random  
24 forest model, in which the probability of future victimization depends on individual-level  
25 attributes, the history of past victimizations, and the history of past victimizations among each  
26 individual's network peers.<sup>34,37-39</sup> The random forest model will be used to estimate the  
27 probability that each individual will be victimized in the future, given individual and network  
28 factors.  
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34 We will use these data in two ways; first, we will identify individuals within the social network of  
35 gun violence who have had a high risk of victimization, given individual, network, and  
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3 neighborhood risk factors, but have not been victimized (i.e., positive deviants). These  
4 individuals will be approached to participate in qualitative in-depth interviews to elicit community  
5 assets they utilized to remain safe from gun violence. Second, data from the social network  
6 analysis will be used to initialize relevant rates and parameters in the system dynamics model  
7 simulating the incidence and effects of gun violence in New Haven, CT. We will also be able to  
8 integrate the social network with the system dynamics model.  
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### 18 *Neighborhood Block-level Spatial Analysis of Gun Violence Events*

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20 Next, we will conduct a spatial analysis to identify blocks within the six high-violence  
21 neighborhoods of New Haven that are at high risk for being a location for a gun violence event  
22 but have not yet been a location of such an event. Data from Boston indicate that 50% of  
23 shootings occurred on less than 3% of all city streets.<sup>36</sup> We will use a point-process model to  
24 identify neighborhood blocks that have a lower or higher incidence of gun violence than would  
25 be expected based on socio-economic and demographic factors and the level of gun violence in  
26 surrounding blocks.  
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37 We will analyze the location and timing of gunshot victimizations in New Haven, CT, from 2011-  
38 2016 using a two-component spatio-temporal intensity model.<sup>40</sup> In the first component, we  
39 model the count of victimizations in each census block group as a function of neighborhood-  
40 level socioeconomic indicators (e.g., proportion of households with income below 50% of the  
41 poverty threshold; number of evictions) and demographic indicators (e.g., population aged 15-  
42 34). The second component is a “self-exciting” process, which allows for victimization events to  
43 temporarily increase the probability of secondary victimization events in spatial and temporal  
44 proximity. Based on the fitted model, we will simulate the frequency of victimizations in each  
45 census block group and identify the block groups with fewer victimizations than expected (i.e.,  
46 positive deviants). Like the social network analysis, we will use these data in two ways; first, we  
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3 will identify neighborhood blocks within the six high-violence neighborhoods of New Haven, CT,  
4 that are expected to have high risk for incident gun violence but where no shootings have  
5 occurred. We will approach individuals who live and/or work on these blocks to participate in  
6 qualitative interviews. Second, we will use these data to initialize parameters of the system  
7 dynamics model.  
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### 13 14 15 16 *Qualitative In-depth Interviews of “Positive Deviants”*

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18 A “positive deviance” approach is an approach to behavioral and social change based on the  
19 observation that in any community there are people whose uncommon but successful behaviors  
20 or strategies enable them to find better solutions to a problem than their peers, despite facing  
21 similar challenges and having no extra resources or knowledge than their peers.<sup>41</sup> A positive  
22 deviance approach has been applied successfully to complex problems, such as  
23 malnourishment in developing countries and hospital quality improvement projects targeting  
24 coronary heart disease,<sup>41</sup> but not to community gun violence. Our hypothesis is that these  
25 individuals or people who live or work on these neighborhood blocks may have leveraged  
26 community assets that have been effective in preventing gun violence.  
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39 We will conduct in-depth interviews among “positive deviant” individuals identified in our social  
40 network and spatial analyses to elicit factors protective against gun violence. Individuals will be  
41 selected for in-depth interview based upon identified positive deviant factors, such as not having  
42 personal involvement in gun violence, despite exposure to gun violence and being connected to  
43 people who have been involved in gun violence identified in our social network map (n=45). We  
44 will also conduct interviews among individuals living on the “positive deviant” blocks identified in  
45 our spatial analysis (n=45). We will use a combined inductive and deductive coding strategy for  
46 the network-based and block-based interviews, using our community resilience conceptual  
47 framework for categorization of factors by the eight levers and identify each lever as an  
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3 individual, organizational, or built environment asset.<sup>42</sup> Because the community members of our  
4 research team are especially interested in interventions that build on community engagement  
5 and self-sufficiency, we will probe especially for assets that are community-led. The interviews  
6 will address these questions, including: “If you have friends who have experienced violence or  
7 victimization, what do you think might be different between you and them?”; “How have you  
8 avoided getting involved in gun violence?,” “Why hasn’t this block had a shooting?” (S1 and S2  
9 Appendices).

### 20 *System Dynamics Modeling to Identify Effective Community-led Interventions*

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22 Recognizing that the community resilience conceptual model is more complex than depicted –  
23 levers interact with each other and with other community factors to contribute to the outcome –  
24 we will use a participatory process to better understand how these levers from the resilience  
25 model, and potentially other factors, together influence the community-wide impact of gun  
26 violence. Specifically, we will use group model building, a collaborative, participatory method for  
27 involving diverse stakeholders in the design of a system dynamics model.<sup>43</sup> Group model  
28 building has been used to explore the key determinants of community violence and has been  
29 useful, in particular, for bridging different racial experiences of gun violence.<sup>44</sup> System dynamics  
30 modeling is a method that describes dynamic, multilevel, linear, and nonlinear processes  
31 required so that solutions to challenging social problems like gun violence can be identified.<sup>45-51</sup>

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45 We will assemble a multi-sector group to engage in a series of these group model building  
46 sessions to create a causal loop diagram. A causal loop diagram is a visualization of how  
47 different variables in a system are interrelated. The group will include stakeholders that  
48 represent each lever of the community resilience framework, including but not limited to police,  
49 community leaders, educators, health professionals, researchers, and neighborhood residents.  
50 Together, participants will design a causal loop diagram that describes how community factors



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3 from all eight levers in the community resilience framework influence each other and influence  
4 exposure to gun violence. The group model building sessions will be overseen by facilitators, a  
5 process coach, an assistant modeler, and a community research assistant, who will provide  
6 feedback and reflection on the interactions that occurred during the modeling sessions. This  
7 additional layer of feedback and reflection will provide additional insight to which we can further  
8 adapt the model.  
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17 We will use the resulting causal loop diagram to inform the design of a system dynamics model.  
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19 Local data on gun violence rates, data from social network and spatial analyses, community-  
20 based assets related to the eight levers of community resilience, and rates of negative health  
21 outcomes related to living in violence-endemic neighborhoods will be further utilized to calibrate  
22 and validate the model.<sup>32,52,53</sup> We may link the social network into the system dynamics model,  
23 creating a hybrid model, if it is expected to significantly refine the output. We will review how  
24 well the structure of the system dynamics model reflects codes and themes elicited from the  
25 qualitative interviews (i.e., construct validity). We will iteratively present this model to our  
26 community stakeholder group for additional refinement and modification.  
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39 The model will then be used to simulate the impact of an intervention or set of interventions  
40 aimed at preventing and mitigating health outcomes related to exposure to community gun  
41 violence. Hypothesized multi-component community interventions will be simulated with greater  
42 or fewer of the actual components to identify the minimum set(s) of interventions required to  
43 achieve desired outcomes. We provide examples of potential neighborhood interventions  
44 categorized by the eight resilience levers (Table 1). Intervention(s) that are considered feasible  
45 by community stakeholders and effective in the simulation model will be the basis of future  
46 interventions that we will implement and test.  
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**Table 1. Examples of possible neighborhood interventions categorized by resilience levers**

Lever	Definition	Examples of Related Neighborhood Interventions
<b>Wellness</b>	Promote pre- and post-incident population health, including behavioral health	<ul style="list-style-type: none"> <li>• Creating green spaces from vacant lots to improve safety and visual appeal of neighborhood</li> <li>• Develop public health messaging to promote healthy lifestyles and bolster psychological wellness</li> </ul>
<b>Access</b>	Ensure access to high-quality health, behavioral health, and social services	<ul style="list-style-type: none"> <li>• Work with local community health centers to have extended hours for mental health services after an episode of gun violence</li> <li>• Provide psychological first aid immediately to community members in their homes after gun violence</li> </ul>
<b>Education</b>	Ensure ongoing information to the public about preparedness, risks, and resources before, during, and after a disaster	<ul style="list-style-type: none"> <li>• Educate children at local schools through theater about gun safety</li> <li>• Train community partners in proper risk communication and response to techniques to gun violence</li> </ul>
<b>Engagement</b>	Promote participatory decision-making in planning, response, and recovery activities	<ul style="list-style-type: none"> <li>• Engage local business owners, such as liquor store owners, in violence prevention efforts</li> <li>• Develop a community plan for re-establishing social routines and relationships, and reclaiming the space of the gun violence event</li> </ul>
<b>Self-Sufficiency</b>	Enable and support individuals and communities to assume responsibility for their preparedness	<ul style="list-style-type: none"> <li>• Promote programs that recognize the vital role community members can play as "first responders" to gun violence</li> <li>• Establish a phone or text tree that gets activated directly after an event of gun violence</li> </ul>
<b>Partnership</b>	Develop strong partnerships within and between government and nongovernmental organizations	<ul style="list-style-type: none"> <li>• Work with local police to develop texting programs to facilitate information exchange about events of gun violence</li> <li>• Determine what social networks exist and how to activate them during episodes of gun violence and to prevent gun violence</li> </ul>
<b>Quality</b>	Collect, analyze, and utilize data on building community resilience	<ul style="list-style-type: none"> <li>• Collect and monitor measures of social networks, community resilience, and gun violence to assess baseline levels and change over time</li> <li>• Share resilience and recovery-related data and lessons to improve resilience-building activities</li> </ul>
<b>Efficiency</b>	Leverage resources for multiple use and maximum effectiveness	<ul style="list-style-type: none"> <li>• Provide funding to NGOs to include planning response activities for gun violence</li> <li>• Develop plans to assess community needs for resource allocation at the onset of incident gun violence</li> </ul>

### *Patient/Public Involvement*

Community members were involved in grant writing and budgeting and will be involved in hiring team members, study design, implementation, analysis, and dissemination. Specifically, community research partners will reflect upon the high risk and low risk areas for gun violence in New Haven and will select the areas from which we should recruit participants for qualitative analyses. For the qualitative study, community research partners will be involved in designing the interview guide, administering interviews, analysis and coding. Finally, community stakeholders will be engaged in the group model building sessions with the aim of co-designing the system dynamics model. Findings will be regularly presented during monthly meetings of our community steering committee. Co-authorship is determined ahead of time and includes community members. Any decision making throughout the course of the study is guided by our community steering committee.

## Ethics and Dissemination

The Human Investigation Committee at Yale University School of Medicine (#2000022360) granted study approval. We will disseminate study findings through peer-reviewed publications and academic and community presentations. The qualitative interview guides, system dynamics modeling, and group model building scripts will be shared broadly.

## Discussion

Our academic-community partnership has uniquely framed gun violence as a chronic, manmade disaster and is seeking solutions in a strengths-based, disaster-preparedness model that builds community resilience in order to mitigate the long-term health effects of community gun violence.<sup>27</sup> Our approach is based on addressing the community context within which gun violence persists, builds on community strengths, addresses all community members -- rather than solely perpetrators or victims -- and allows for rigorous and structured planning and evaluation. Further, we will integrate data from formal social network and spatial analyses into a system dynamics model to identify feasible and effective community-led interventions. To the best of our knowledge, this will be one of the first times a formal application of systems science will contribute to interventions that build community resilience to mitigate the effects of community gun violence.

Also unique to our approach is identifying community assets that can be leveraged to mitigate the impacts of gun violence and related health sequelae. Rarely have gun violence prevention or mitigation strategies been designed to strengthen the existing assets within neighborhoods. To date, the majority of gun violence prevention efforts are focused on risk reduction, through gun buy backs and enforcement, illicit drug use and enforcement, and gang prevention and enforcement, but these types of interventions do not necessarily address the root causes of community violence and have only been found to have short-term impact, if any.<sup>31,33,54-57</sup>

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3 Instead, we apply an assets-based, community-driven framework, anticipating that solutions for  
4 community gun violence can originate from both preventing and mitigating impacts of gun  
5 violence, as well as building upon existing neighborhood assets. Specifically, we will identify  
6 “positive deviants,” who are closest to gun violence and can speak firsthand about community  
7 assets that may prevent and mitigate effects of gun violence. Using this framework is innovative  
8 and may identify novel interventions, which as of yet have not been applied to community gun  
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20 The utilization of participatory modeling to address the conceptual and analytical challenges  
21 inherent in identifying and estimating the impact of multiple community factors on chronic  
22 community gun violence is also a novel approach. Few prior interventions to reduce gun  
23 violence have been led by community or in full partnership with community, despite literature  
24 indicating the importance of community ownership and partnerships between informal  
25 (community) and formal (police and government) social control in creating sustainable  
26 reductions in gun violence.<sup>24</sup> We will use participatory modeling to not only engage the  
27 community, but also to identify and create informal and formal social control partnerships.  
28 Additionally, the system dynamics model that the group of community stakeholders create will  
29 be one of the first to address chronic community gun violence. Through its creation, key  
30 resilience levers can be identified and bolstered, and multi-faceted interventions can be  
31 explored in an inexpensive and non-harmful trial *in silico* before implementation and formal  
32 evaluation in the real world. This aspect is particularly useful for community gun violence  
33 because of the many severe and interrelated negative health outcomes associated with it. The  
34 system dynamics model could also be adapted by other communities interested in designing  
35 interventions to reduce exposure to gun violence and its health impacts.  
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3 Our proposed study plan has limitations to consider. First, as with any community engaged  
4 study, it is possible community priorities may diverge from the study proposed and that the time  
5 needed to complete the work will exceed the time allotted. However, gun violence has been a  
6 major problem in our community for decades, and we have been engaged with many of these  
7 committed partners since 2011, so we expect the issue to remain salient. Second, the social  
8 network analysis approach for this model seeks to maximize the quality of network data, which  
9 may limit broader generalizability of the social network analysis. Third, while we will rely on our  
10 social network data and community member input to identify “positive deviants” for the  
11 qualitative interviews, it is plausible that we may miss some important community stakeholders’  
12 perspectives on violence-mitigating community assets. However, we plan to sample until we  
13 reach theoretical saturation. Fourth, though we plan to use police data to conduct the spatial  
14 analyses, these data are incomplete and will miss shootings that were not reported to the police.  
15 Finally, it is possible that the group model building process and will not result in participant  
16 openness to challenging their mental models, which would make it challenging to identify novel,  
17 multi-sector, collaborative interventions.<sup>58,59</sup> However, we will engage the community  
18 stakeholders for multiple sessions over time in order to build cohesive relationships across  
19 sectors and will use the system dynamics model to increase participant openness to new ways  
20 of thinking and challenge the phenomenon of policy resistance.  
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43  
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2  
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### 11 12 13 **Author Contributions**

14 EAW, CR, BR, AG, AP, MW conceptualized the study design, and GW, NH, LB-R, and PV  
15 contributed to the study design. EAW, RB, BR drafted and led writing the manuscript, and all  
16 authors contributed to revising it for important intellectual content. All authors approved the final  
17 version of the manuscript.  
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### 24 **Competing Interests Statement**

25 Drs. Roy and Riley report personal fees from Heluna Health, personal fees from the Institute for  
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## Supporting Information

### S1 Appendix. Spatial Network Analysis Interview Guide.

For peer review only

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**S2 Appendix. Individual Interview Guide**

For peer review only



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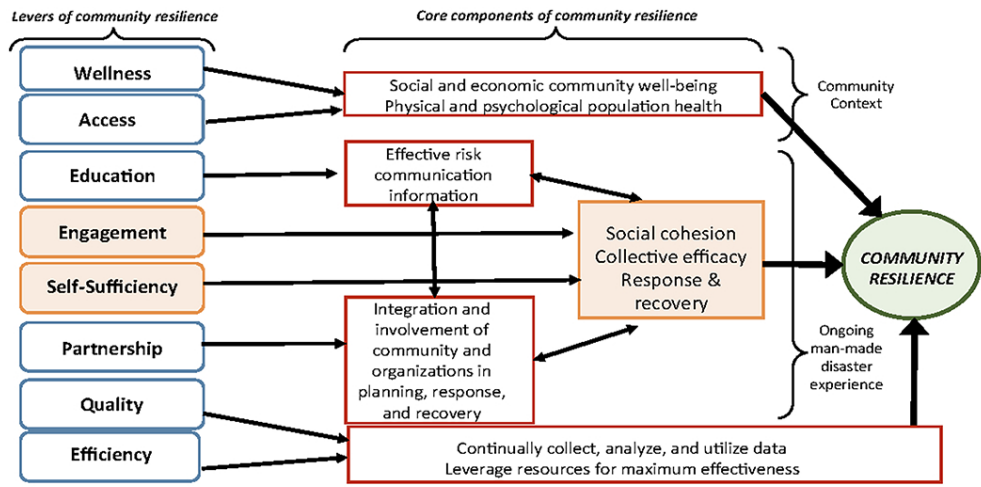


Fig 1. Building Resilience to Disasters, a framework from RAND for natural disaster and adapted for man-made disaster like gun violence

90x45mm (300 x 300 DPI)

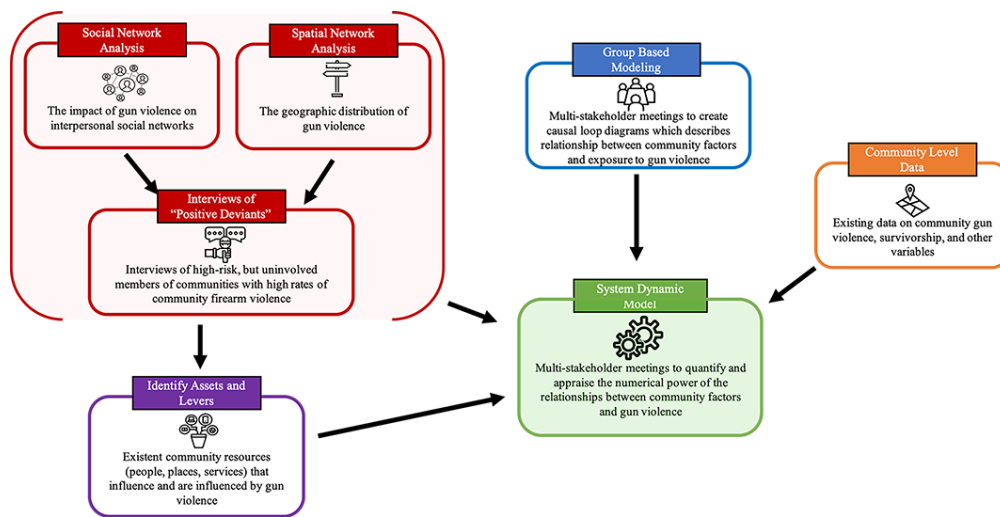


Fig 2. Incorporation of Data to Create a System Dynamics Model to Identify Resilience-Building Community Assets

90x45mm (300 x 300 DPI)



***Interview guide objectives: This interview guide is for people who we think might be community experts at avoiding gun violence. Objectives are to identify [hidden/unexpected] assets in the community, which have lessened or mitigated the impact of gun violence.***

Intro: Thank you so much for talking with me today. As you know, we're interested in learning how community members can work together to lessen the impacts of gun violence. The goal of this work is to find ways that community members could lead (as opposed to city leaders or police) to lessen the impact of gun violence in our community. We are talking to you because you live on a [street/block] where there hasn't been in recent years a shooting, even though lots of streets near you have had a shooting. So, I have a few questions for you.

Everything you tell me will be kept confidential and will not be linked to you in any way. Of course, if you have any questions for me as we go through, if anything is unclear, or if you would prefer to skip a question, please don't hesitate to stop me at any point. If it's alright with you, I would like to record our conversation so I can better remember all the important information you tell me. The recording won't be shared with anyone else and won't be linked to you. But it will help me stay engaged in our conversation instead of trying to write everything down. If you'd like me to stop the recording at any time please just say so.

Any questions before we begin?

### **Individual Sociodemographic Factors**

To start, I'm going to ask you a little bit about yourself.

1. How old are you?
2. What is the highest level of school or degree you have completed?
3. Are you currently enrolled in school?
4. Where is your high school located?
  - 4a. If attend/attended trade school or college: Where is your trade school/college located?
5. Where were you born?
  - 5a. Did you grow up in a place that is different from where you were born?
  - 5b. If yes: where?
6. How long have you lived in this neighborhood?
  - 6a. Are you the owner of the home you live in? [If NO, go to question 6b]
  - 6b. Do you rent?

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3 7. Where else have you lived?  
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5 8. How many times have you moved in the last five years?  
6 8a. If yes: Where did you most recently move from?  
7 8b. If yes: Can you tell each different place you have lived in the last five years?  
8 8c. If moved from another place in New Haven: Why did you move?  
9

10 The next group of questions are about your family and living arrangements.

- 11  
12 9. Are you married?  
13 9a. If no: are you in a long-term relationship? [if NO-skip to question 10]  
14 9b. If yes, how long have you been in this relationship?  
15 10. Do you have any children? [If NO-skip to question 12]  
16 11a. If yes, how many?  
17 11b. What are their ages?  
18 11c. Do they live with you?  
19 11d. Do you pay child support?  
20 11e. How often do you see your children?  
21 12. Who [else] do you live with?  
22 13. Are you a caregiver for anybody else? For example, do you help to take care of a  
23 parent or grandparent?  
24  
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29 The last group of questions are about work.

- 30  
31  
32 14. Are you currently working?  
33 If yes:  
34 14a. Can you tell me a little bit about your job?  
35 14b. Is this job part time or full time?  
36 14c. How long have you been at your current job?  
37  
38 If no:  
39 14d. How long have you been out of work?  
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### 43 Narrative Questions Related to Gun Violence and Victimization

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45 Now I'd like to switch gears and talk to you about gun violence in New Haven. As I said  
46 before the objective of this study is to identify **strategies that might work for**  
47 **community members** to lessen the impacts of gun violence. You live on a  
48 block/street where there hasn't been in recent years a shooting, even though lots of  
49 streets near you have had a shooting.  
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1. What distinguishes your block from other blocks nearby which have had shootings recently? Do you think there are any specific reasons why there hasn't been a shooting on your block/street?
2. Why do you think some folks get involved in gun violence? [Why do you think some places are at higher risk of having a shooting?]
3. Can you provide specific examples of how you and your neighbors have worked to reduce gun violence on your block/street?
  - a. Are there specific people on your block/street who you feel are instrumental to keeping this block/street safe? Can you tell me about them?
  - b. Are there specific organizations you think are instrumental to keeping this block/street safe? (*school, church, sports, arts/music, clubs, YMCA, health centers*) Can you tell me about them?
  - c. Are there specific activities you think are instrumental to keeping this block/street safe? Can you tell me about them?
4. What do people on your block do when there is a nearby shooting?

#### END RECORDING

Now I'm going to turn the audio recorder off because this is the end of the questions that have open-ended answers. But, I have a few more quick survey questions to get more information about you, your friends, your neighborhood, and organizations that you may use. I can read the questions to you or you can read them on your own and select answers on this iPad. Do you have a preference?

#### **Gun Violence Exposure Questions**

The next set of questions is about your experience with gun violence.

1. Have any of your family members been **hurt** by gun violence?
2. Have any of your close friends been **hurt** by gun violence?
3. Have you ever seen or been present when someone was shot?
4. Did you know the person or people who got shot? What was your relationship to this person?
5. Have you been shot (or shot at) before?
6. Has there been a shooting in your neighborhood/block?
7. Have you ever carried a gun on your person outside your house?

#### **Views of Institutions/Legitimacy**

The next set of questions are related to how you feel about law enforcement and institutions such as the police.



As I read the following statements, please tell me how much you agree or disagree.

1. How about “I feel that I should accept the decisions made by legal authorities?”
  - Agree strongly
  - Agree somewhat
  - Disagree somewhat
  - Disagree strongly
  - Don’t know
  - Refused
2. How about, “People should obey the law even if it goes against what they think is right”
  - Agree strongly
  - Agree somewhat
  - Disagree somewhat
  - Disagree strongly
  - Don’t know
  - Refused
3. “People in power use the law to try and control people like me”
  - Agree strongly
  - Agree somewhat
  - Disagree somewhat
  - Disagree strongly
  - Don’t know
  - Refused

Our next questions are about the police in New Haven

On a scale from 0 to 10, how would you rate the police? The higher the number the warmer or more favorable you feel toward the police. The lower the number, the colder or less favorable you feel. If you feel neither warm nor cold, rate them a 5.

4. On a scale from 0 to 10, how would you rate the police in the **city**?
5. On a scale from 0 to 10, how would you rate the police in your **neighborhood**?
6. Is there a difference?
  - Yes
  - No
  - Don’t Know
  - Refused
7. If yes, in what ways?

As I read each of the following statements, please tell me how much you agree or disagree.

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2  
3 8. How about, "Most police in my neighborhood are dishonest"
- 4 • Agree strongly
  - 5 • Agree somewhat
  - 6 • Disagree somewhat
  - 7 • Disagree strongly
  - 8 • Don't know
  - 9 • Refused
- 10  
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13 9. "Most police in my neighborhood treat some people better than others"
- 14 • Agree strongly
  - 15 • Agree somewhat
  - 16 • Disagree somewhat
  - 17 • Disagree strongly
  - 18 • Don't know
  - 19 • Refused
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23 10. "Most police in my neighborhood do their job well"
- 24 • Agree strongly
  - 25 • Agree somewhat
  - 26 • Disagree somewhat
  - 27 • Disagree strongly
  - 28 • Don't know
  - 29 • Refused
- 30  
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32 11. "Most police in my neighborhood treat people with respect"
- 33 • Agree strongly
  - 34 • Agree somewhat
  - 35 • Disagree somewhat
  - 36 • Disagree strongly
  - 37 • Don't know
  - 38 • Refused
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### 42 **Civic Engagement**

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44 Now I am going to ask you some questions about involvement in your community.

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47 1. In the past year, how often have you attended a meeting for a local board, council, or  
48 organization that deals with any community problems? Would you say (Never/Once/2-3  
49 times/About once a month/More than once a month)
- 50  
51 2. In the past year, have you served in a voluntary capacity on any local board, council,  
52 or organization that deals with community problems? (Yes/No)
- 53  
54 2a. If yes: Has the issue of gunshot violence been discussed by the  
55 board/council/organization in the past year?
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3 3. In the past year, have you gotten together informally with or worked with others in  
4 your community or neighborhood to try to deal with some community issues or  
5 problems? (Yes/No)

6  
7 4. How important do you consider voting to be? Would you say (Very  
8 important/Somewhat important/Not very important)  
9

### 10 11 **Neighborhood Perceptions of Safety**

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14 1. For each of these statements, please tell me whether you strongly agree, agree,  
15 disagree or strongly disagree:

- 16 ○ This is a close knit neighborhood
- 17 ○ People around here are willing to help their neighbors
- 18 ○ People in this neighborhood do not share the same values
- 19 ○ People in this neighborhood can be trusted
- 20 ○ I feel safe in this neighborhood
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3 ***Interview guide objectives: This interview guide is for people who we think might***  
4 ***be community experts at avoiding gun violence. Objectives are to identify***  
5 ***[hidden/unexpected] assets in the community, which have lessened or mitigated***  
6 ***the impact of gun violence.***  
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10 Intro: Thank you so much for talking with me today. As you know, we're interested in  
11 learning how community members can work together to lessen the impacts of gun  
12 violence. The goal of this work is to find ways that community members could lead (as  
13 opposed to city leaders or police) to lessen the impact of gun violence in our  
14 community. So I have a few questions for you so I can better understand your  
15 experiences in New Haven and get your thoughts about how we might lessen gun  
16 violence in the community.  
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18

19  
20 Everything you tell me will be kept confidential and will not be linked to you in any way.  
21 Of course, if you have any questions for me as we go through, if anything is unclear, or  
22 if you would prefer to skip a question, please don't hesitate to stop me at any point. If it's  
23 alright with you, I would like to record our conversation so I can better remember all the  
24 important information you tell me. The recording won't be shared with anyone else and  
25 won't be linked to you. But it will help me stay engaged in our conversation instead of  
26 trying to write everything down that you say. I can stop the recording at any time you'd  
27 like but will plan to do so after we have gone through the interview questions.  
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32 Any questions before we begin?  
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### 35 **Individual Sociodemographic Factors**

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37 To start, I'm going to ask you a little bit about yourself.  
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- 40 1. How old are you?  
41 2. What is your race? (check one or more)  
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43     • White  
44     • Black or African Am.  
45     • American Indian or Alaska Native  
46     • Asian Indian  
47     • Chinese  
48     • Filipino  
49     • Japanese  
50     • Korean  
51     • Vietnamese  
52     • Other Asian  
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- Native Hawaiian
  - Guamanian or Chamorro
  - Samoan
  - Other Pacific Islander
  - Multi-racial
3. Are you of Hispanic, Latino, or Spanish origin? (check one)
    - No, not of Hispanic, Latino, or Spanish origin
    - Yes, Mexican, Mexican Am., Chicano
    - Yes, Puerto Rican
    - Yes, Cuban
    - Yes, another Hispanic, Latino, or Spanish origin
  4. What is your gender?
  5. Where were you born?
    - 5a. Did you grow up in a place that is different from where you were born?
    - 5b. If yes: where?
  6. How long have you lived in New Haven?
    - 6a. What neighborhood do you live in? What are the cross streets?
    - 6b. How long have you lived there?
  7. Where else have you lived?
  8. How many times have you moved in the last five years?
    - 8a. If yes: Can you tell me the different place(s) you have lived in the last five years?
    - 8b. If yes: Where did you most recently move from?
  9. Are you currently enrolled in school?
  10. What is the highest level of school or degree you have completed?
  11. Where is/was your high school located?

The next group of questions are about your family and living arrangements.

12. Are you married?
  - 12a. If no: are you in a long-term relationship? [if NO-skip to question 13]
  - 12b. If yes, how long have you been in this relationship?
13. Do you have any children? [If NO-skip to question 14]
  - 13a. If yes, how many?
  - 13b. What are their ages?
  - 13c. Do they live with you?
  - 13d. Do you pay child support?
  - 13e. How often do you see your children?
14. Who [else] do you live with?
15. Are you a caregiver for anybody else? For example, do you help to take care of a parent or grandparent?

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4 The last group of questions are about work and education.  
5  
6

7 16. Are you currently working?

8 If yes:

9 16a. Can you tell me a little bit about your job?

10 16b. Is this job part time or full time?

11 16c. How long have you been at your current job?

12 If no:

13 16d. How long have you been out of work?

14 17. Have you ever served in the military?

15 **If referral (not seed):**

16 18. Have you ever been arrested?

17 18a. If yes, how many times have you been arrested?

18 18b. When was your most recent arrest?

### 19 **Narrative Questions Related to Gun Violence and Victimization**

20  
21 Now I'd like to switch gears and talk to you about gun violence in New Haven. There  
22 have been several initiatives aimed at reducing gun violence in New Haven, led by  
23 the mayor's office, New Haven police, or city hall. As I said before, the purpose of  
24 this discussion is to identify **strategies that might work for community members**  
25 to lessen the impacts of gun violence, so we are hoping to better understand **why**  
26 **people do and don't get involved** in gun violence.  
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1. Why do you think some folks get involved in gun violence?
  2. Describe a particular situation when you think that a person is at high risk of getting involved in gun violence?
  3. Why do you think some folks do NOT get involved in gun violence?

### 44 **Gun Violence Exposure Questions**

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46  
47 The next set of questions is about your personal experience with gun violence.  
48

49 1. Have any of your family members been **hurt** by gun violence?

50 2. Have any of your close friends been **hurt** by gun violence?

51 3. Have you ever seen or been present when someone was shot?

52 If yes: Did you know the person or people who got shot? What was your  
53 relationship to this person?  
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5. Have you been shot (or shot at) before?
6. Have you ever carried a gun on your person outside your house? Why; why not?
7. How have you avoided getting involved in gun violence?
- a. What people were most influential in your life?
    - i. Are there specific people you feel helped you avoid getting involved in violence?
    - ii. (if not a family member) How and when did you meet them?
    - iii. When in your life were these people most influential?
  - b. What organizations were most influential in your life?
    - i. Are there specific organizations you think kept you from getting involved in violence?
    - ii. When in your life were these organizations most influential?
  - c. Are there any other people, places or factors you think influenced your decisions to avoid being involved in gun violence?
    - i. When in your life were these things most influential?
  - d. *Ask specifically about other types of organizations or institutions that have not been mentioned but are common, e.g., school, church, sports, arts/music, clubs, YMCA, health centers*
8. Think about the last shooting in your neighborhood that you remember: How did people in your neighborhood respond (what do people do)?

## END RECORDING

That is the end of the interview and discussion, but I have a few more quick survey questions to get more information about you, your friends, your neighborhood, and organizations that you may use. I can read the questions to you or you can read them on your own and select answers on this iPad. Do you have a preference?

## Views of Institutions/Legitimacy

The next set of questions are related to how you feel about law enforcement and institutions such as the police.

As I read the following statements, please tell me how much you agree or disagree.

1. How about "I feel that I should accept the decisions made by legal authorities?"
  - Agree strongly
  - Agree somewhat
  - Disagree somewhat
  - Disagree strongly
  - Don't know

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- Refused
2. How about, "People should obey the law even if it goes against what they think is right"
    - Agree strongly
    - Agree somewhat
    - Disagree somewhat
    - Disagree strongly
    - Don't know
    - Refused
  3. "People in power use the law to try and control people like me"
    - Agree strongly
    - Agree somewhat
    - Disagree somewhat
    - Disagree strongly
    - Don't know
    - Refused

Our next questions are about the police in New Haven

On a scale from 0 to 10, how would you rate the police? The higher the number the warmer or more favorable you feel toward the police. The lower the number, the colder or less favorable you feel. If you feel neither warm nor cold, rate them a 5.

4. On a scale from 0 to 10, how would you rate the police in the **city**?
5. On a scale from 0 to 10, how would you rate the police in your **neighborhood**?
6. Is there a difference?
  - Yes
  - No
  - Don't Know
  - Refused
7. If yes, in what ways?

As I read each of the following statements, please tell me how much you agree or disagree.

8. How about, "Most police in my neighborhood are dishonest"
  - Agree strongly
  - Agree somewhat
  - Disagree somewhat
  - Disagree strongly
  - Don't know
  - Refused
9. "Most police in my neighborhood treat some people better than others"



- Agree strongly
- Agree somewhat
- Disagree somewhat
- Disagree strongly
- Don't know
- Refused

10. "Most police in my neighborhood do their job well"

- Agree strongly
- Agree somewhat
- Disagree somewhat
- Disagree strongly
- Don't know
- Refused

11. "Most police in my neighborhood treat people with respect"

- Agree strongly
- Agree somewhat
- Disagree somewhat
- Disagree strongly
- Don't know
- Refused

### **Resilience and Coping**

This set of questions is about how you usually handle difficult or challenging situations. Consider how well the following statements describe your behavior and actions on a scale from 1 to 5, where 1 means the statement does not describe you at all and 5 means it describes you very well:

1. I look for creative ways to alter difficult situations.
2. Regardless of what happens to me, I believe I can control my reaction to it.
3. I believe I can grow in positive ways by dealing with difficult situations.
4. I actively look for ways to replace the losses I encounter in life.

### **Neighborhood Perceptions of Safety**

For each of these statements, think about the neighborhood you live in and please tell me whether you strongly agree, agree, disagree or strongly disagree:

1. This is a close-knit neighborhood
2. People around here are willing to help their neighbors
3. People in this neighborhood do not share the same values
4. People in this neighborhood can be trusted

## **Civic Engagement**

Now I am going to ask you some questions about involvement in your community.

1. In the past year, how often have you attended a meeting for a local board, council, or organization that deals with any community problems? Would you say (Never/Once/2-3 times/About once a month/More than once a month)
2. In the past year, have you served in a voluntary capacity on any local board, council, or organization that deals with community problems? (Yes/No)
  - 2a. If yes: Has the issue of gunshot violence been discussed by the board/council/organization in the past year?
3. In the past year, have you gotten together informally with or worked with others in your community or neighborhood to try to deal with some community issues or problems? (Yes/No)
4. How important do you consider voting to be? Would you say (Very important/Somewhat important/Not very important)

## **Organizational and Institutional Assets**

1. Can you name any services (organizations, groups, institutions) in New Haven that work to prevent gun violence or deal with the effects of gun violence?
2. Have you used any of these services?

## **Ego-Network Questions**

Next I want to ask you some questions about the people you interact with. This information will help to better understand the social support system of local residents. Please understand that I'm not interested in the full names of the people you interact with, so please just provide their first name or their nickname. For each question, list up to five names.

1. From time to time, most people discuss important matters with other people. Looking back over the last six months – who are the people with whom you discussed matters important to you?
2. If someone in your neighborhood threatened you, who would you call?
3. Who would you call if you needed to get bailed out of jail?

For each person listed above, could you tell me:

- What is their age?
- What is their race?
- What is their gender?
- Where do they live? Please note that we are not interested in exact addresses.
- How did you meet them?
- How long have you known them?
- Do they live in this neighborhood?
- How many times have you seen in past 6 months?

Lastly, we want to get an idea of how connected various people within your social network are to each other. Please think about the relationship between the people you just mentioned. Some of them may be total strangers in the sense that they wouldn't recognize each other if they bumped into each other on the street. Others may be especially close, as close or closer to each other as they are to you.

First, think about [NAME 1] and [NAME 2], your options include: strangers; not strangers but not close; and close.

### **Referral generation for sampling**

We're also interested in talking to other folks like yourself who may have experience with gun violence. We will give you [5] referral cards with our contact information. If you can think of anybody that might be interested in taking the survey, we would be grateful if you would pass on a referral card and ask them to reach out to us. Anybody that takes the survey based on your referral will be paid \$50 and you will be rewarded with an additional \$15

We will contact you again regarding payment only if one of your referrals participates in an interview.