Quasi-experimental design for evaluation of CURE-Violence

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1 Model

1.1 The theory of change

Cure Violence is an implementation of The Chicago Project for Violence Prevention. The project was conceived by Gary Slutkin (Ransford, Kane, and Gary Slutkin, 2013; G Slutkin, 2012) at the public health school of the University of Illinois Chicago. The project has a coherent theory of change. This theory is built on specific social structures norms, risks and choices. The model is novel because it treats violence as an epidemic. People who engage in acts of violence are not regarded as bad people. They are regarded as sick (or infected by their environment). As such it runs counter to many established criminological theories and moral philosophy such as the Biological (Gibson, 2002; Gould, 1996; Lombroso, 1890a,b), Individual Trait (S. Glueck and E. Glueck, 1950, 1956), Self-control (Akers, 1991; Gottfredson and Hirschi, 1990) and Genetic Theory of Crime (Barkan, 1992; Moffitt, 1993, 2005). The theory also holds that as in the treatment of disease, punishment is likely to be overvalued as a method of behavior change which sets it apart from both Classical (Beccaria, 2009; Devine, 1981) and Rational Choice (Becker, 1974; Levitt, 2004) Criminiology.

These social structures act as inputs. The inputs are posited to be causally related to violence. Designing an evaluation and testing this theory is the point of this proposal. The theory of the program allows us to look at not just what participants actions are supposed to be but also what the influence are supposed to be (Leeuw, 2003).

1.2 Mechanism

The participants were told to stop shooting. Ceasefire did not demand that their clients cease all criminal activities just that they not use deadly violence

in their disputes. In fact, violence interuptors often reminded participants and gang leaders that violence was bad for their ostensible business, selling drugs. In this way, Cure Violence can be thought of as harm reduction not personal redemption.

1.3 Focus on highest risk people

Client selection tried to operationalize "high risk of being shot or being a shooter." Clients needed to be:

- between 16 and 15
- a person with history of arrests and imprisonment
- involved in drug trade
- a gang member
- a recent shooting victim

1.4 Mechanism to stop shooting

The three conditions the program seeks to change are the norms for settling disputes, the alternatives to deadly violence to settle disputes and the perceived risk of engaging in violence.

1.5 Causal Factors

1.5.1 Norm Change

Norms define a range of behavior that most in a community find acceptable even if self-adherence is not perfect. Norms vary from community to community. If the majority in a community feel that the institutions of civil society are inherently biased against them they will not avail themselves of those institutions. In many high crime areas people believe that crime against other persons is wrong and unacceptable. However deep suspicion of the police and criminal justice system may allow a culture of "no snitching" to prevail. Cure Violence sought to restore faith in the Criminal Justice system as an effective means of dealing with violence and disrupt the norms against talking to the police.

Encouraging debates over "what people will and won't accept" was a core strategy. This was done with rallies and local debates. This was consistent with wide distribution of anti-violence literature.

1.5.2 Decision Alternatives

Violence interruptors sought to disparage violence when it would be counterproductive. They also negotiated and promoted truces. They negotiated fines and occasionally steered conflict to physical altercations. This behavior severely reduced but did not eliminate injury.

1.5.3 Risk Enhancement

Focus potential shooters on the consequences of their actions on the community they still have, their mother, siblings and grandparents. Use the grief at gang funerals for a positive message and remind the potential shooter that they are not immune to the long-term consequences of gang involvement.

2 Evaluation

Suitable comparison tracts will be selected by matching Cure Violence areas with tracts with similar demographic features. The matching variables included racial composition, family organization, poverty, number of young men, unemployment and home ownership.

A prior evaluation of the program used a conventional Box-Jenkins-Tiao intervention analysis with a transfer function at the start of the intervention. As per Box and Tiao (1976) a difference of means test between the actual number and the predicted number of shootings during program operation. Kernel Density Estimation was used to detect change in spatial patterns of crime over time.

2.1 Comparison Sites

In Chicago for the prior evaluation each site had between two and four comparison sites. In NYC, there are 2 sites operational with 2 more funded to open. Each new site will be restricted to a single census tract. The evaluation team has been given data (under strict non-disclosure and non-dissemination from the New York Police Department "NYPD"). NYC is composed 2166 census tracts. We received data on homicide in 1130 census tracts, arrests for violent crimes in 745 census tracts, complaints of violent crimes in 792 census tracts and shootings in 1348 census tracts. Negotiation with the NYPD for more complete data is ongoing.

The approach of the prior evaluation was to use a limited number of “best matches”. This appears to waste information that may be contained in the

non "k-best" matches. We would propose to create a distribution of matches from all non-program and non-competing program sites by examining the similarity of the crime over time. The crime data rather than the demographics should take precedence in constructing the comparison. Missing data should be imputed through multiple imputation. An ARIMA model has the form:

$$Y_t = f(X_t) + N_t \tag{1}$$

The intervention is designated I_t. Enumerating the ARIMA(p,d,q) model:

$$\Delta^d y_t = \mu + \phi_1 \Delta^d y_{t-1} + \phi_2 \Delta^d y_{t-2} + \cdots + \phi_p \Delta^d y_{t-p} + \theta_{t-1}\epsilon_{t-1} + \theta_{t-2}\epsilon_{t-2} + \cdots + \theta_{t-q}\epsilon_{t-q} \tag{2}$$

where $\epsilon_t \sim N(0, \sigma_\epsilon^2)$. Time series analysis follows a standard protocol:

1. Perform a Dickey-Fuller test for stationarity
2. Check for seasonality, and if so, correct for it
3. Check for the presence of an integrated trend
4. Estimate the noise parameters
5. Check impact speed and duration

This is not appropriate for homicide because of the censoring problem at 0. In this case we will attempt a poisson regression and use negative binomial if variance is significantly greater than the mean.

2.2 Spatial inequality in the risk of crime over time

Kernel Density estimation has been used to create heat maps before and after an intervention. Prior evaluations have used a negative exponential density with a half mile grid. Also it is possible to create an inequality of spatial risk of crime. By using ordered crime index data we can also create a Lorenz Curve shooting risk. This allows us to calculate both overall and time weighted gini coefficients for each crime category.

3 References

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