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STRUCTURAL DETERMINANTS OF HOMICIDE: THE BIG THREE

Maria Tcherni, Ph.D.

STRUCTURAL DETERMINANTS OF HOMICIDE: THE BIG THREE

Building upon and expanding the previous research into structural determinants of homicide, particularly the work of Land, McCall and Cohen (1990), the current paper uses county-level data to disentangle three major influences on homicide rates: poverty, racial composition, and the disruption of family structure. Theoretical foundations of these influences are laid out, and the effects of the three factors on homicide rates are tested at two time periods as far removed from one another as possible: 1950-1960 and 1995-2005. All major variables typically used in homicide research are included as controls.

The results of analyses show that the effects of the Big Three – poverty, race, and divorce rates – on homicide rates in US counties remain remarkably strong and stable over almost half a century despite profound changes in the economic and social situation in the United States. Further tests find no statistically significant differences between the regression slopes in the two time periods for each of the three factors.

Keywords: homicide, poverty, divorce, race, counties, causes of violence, time periods.

INTRODUCTION

A 1990 paper by Land, McCall, and Cohen on structural covariates of homicide rates has become a milestone and a classic of homicide research. The authors' main goal was to explain the inconsistencies in the effects of structural variables such as poverty, population and family structure, and also racial composition, unemployment, and other related covariates, on homicide rates reported in different studies. The authors argue that multicollinearity among independent variables is the main culprit in conflicting findings. To deal with this problem, the authors used factor analysis to combine collinear variables into factors and tested their approach using several alternative units of analyses – cities, SMSAs, and states – at different points in time: 1960, 1970, and 1980. They also tested their conclusions on cities and states for 1950. The authors found that, when multicollinearity is taken care of, measures of resource deprivation, population size and density, and divorce rates show a consistent and significant positive relationship with homicide rates, across all datasets used.

However, the reduction in multicollinearity came at a price. Due to high correlations among such variables as racial composition, poverty, and single-parent households, the authors had to combine them into a single factor of resource deprivation. Merging these theoretically distinct variables into a single factor was a sound solution within the empirical framework that Land and his colleagues adopted. They intentionally based their research solely on investigating data patterns without imposing any theoretical structure onto their analyses.

Now, having more data available and having the direction of influence of the main structural forces on homicide firmly established, we can take the next logical step. The current study extends the work of Land et al. (1990) in several important respects. First and foremost, using different units of aggregation – counties, the current study disentangles distinct influences of poverty, family structure, and racial composition on homicide rate. Since counties are smaller and more homogenous

units of analyses than states, cities, and SMSAs used by Land and his colleagues, they allow finer distinctions and capture more diverse populations (including rural).

Second, besides using different units of analyses, the current study also uses different time periods (as far removed from one another as the data would allow): 1950-1960 and 1995-2005. This affords current research an additional benefit from a scientific and epistemological point of view: by confirming the consistency of effects of important structural determinants on homicide rates under various conditions (different units of analysis, time frames, specifications of variables/factors), this study strengthens the grounds for drawing inferences about causal relationships and for ruling out the possibility of spurious associations.

Another important contribution of the current work is that it lays out a theoretical framework that ties together different levels of influence of the three major structural factors (hereinafter called the Big Three) – poverty/low education, disruption of family structure, and racial composition – on violence in general and lethal violence in the form of homicide specifically. Three distinct levels of influence – individual, family/interpersonal, and neighborhood/community level – each with a unique set of causal pathways, are identified for the Big Three determinants of violence. The interplay between the effects of variables at the aggregate and at the individual level is discussed.

It is also illustrated algebraically how individual-level and aggregate-level effects contribute to the size of regression coefficients in aggregate-level analyses. The present study focuses specifically on the effect sizes for each of the three factors and their stability over time. Land and his colleagues (1990) proved that, after multicollinearity is taken care of, the influence of structural variables related to resource deprivation on homicide rates is consistently positive and statistically significant. Now, we can build on their findings and test the stability of the effect sizes for each variable/factor over time.

Thus, the effects of the proposed Big Three are tested in the current study using US counties as units of analysis at two different time periods: 1950-1960 and 1995-2005. The results of the analyses presented in the paper show that the effects of poverty, family disruption, and race on homicide rates in US counties as reflected in their respective regression slopes haven't changed over almost half a century, despite many changes in the socio-economic and political realities of life during this period of time. This is the most significant finding in this paper. Differences between the regression slopes in the two time periods for each of the three factors have been tested formally, and as expected, were found to be statistically indistinguishable from zero. This means that the sizes of the effects of poverty/low education, family disruption, and racial composition on homicide rates in US counties have remained virtually unchanged.

REVIEW OF PREVIOUS RESEARCH

Homicide research has a long history of looking into variations in structural factors as causally related to variations in homicide or violence rates (Porter, 1847; Shaw and McKay, 1942; Bullock, 1955; Quinney, 1965; Gordon, 1967). The general consensus has been that socio-economic indicators are strongly predictive of high rates of violent crime and homicide. However, since that early research, some alternative hypotheses had emerged. One of the most prominent "contenders" poverty and related structural factors have been consistently linked to violence both at the individual and at various kinds of aggregate levels.

Several competing hypotheses were suggested to explain the causal mechanisms of this link. Quinney (1955, p.405) summarized then-prevalent lines of thought on this matter, focusing on individual-level explanatory pathways from poverty to violence:

Lipset has recently suggested that populations with a low level of education, lack of sophistication, isolation from heterogeneous values, and a limited frame of reference are predisposed toward concrete and immediate solutions to problems [Lipset, 1959]. Homicide,

thus, may become institutionalized as the most appropriate solution to a number of interpersonal situations. Studies of homicide in undeveloped countries or among people in lower socioeconomic strata support this hypothesis [Bensing and Schroeder, 1960; Bullock, 1955; Driver, 1961; Svalastoga, 1956]. Another interpretation, consistent with this hypothesis, is that homicide as a response is learned through socialization in a subculture stressing aggression and violence [Brearly, 1932; Bohannon, 1960; Gold, 1958; Palmer, 1960; Pettigrew and Spier, 1962; Wolfgang, 1959].

More refined explanations along the same lines have been offered by several researchers lately. For example, Heimer (1997) describes the following mechanism by which poverty translates into violence: parents of low socioeconomic status have jobs that expose them to coercive control structures, which in turn spill over into their family life and discipline strategies that tend to be power-assertive and physically coercive. Also, Heimer notes that limited access to legal methods of dealing with problems in lower socioeconomic classes may lead to “alternative” methods of resolving conflicts – through physical force. Another possible pathway, suggested by Heimer and Matsueda (1987), is related to the lack of supervision of youths in low-income families: weak monitoring from parents leads to less control over their children’s friendships and to higher likelihood of their children associating with aggressive peers, from whom these children learn definitions favorable to violence. This explanation builds a bridge between personal-level and neighborhood-level characteristics.

Several other authors prove that neighborhood poverty exerts a unique negative influence on parental warmth and encourages tendency towards harsh discipline, and this effect is strong even when the effect of family income is controlled for (Klebanov et al., 1994; Pinderhughes et al., 2001; Simons et al., 2004). Without specifying a pathway or mechanism of influence, Lauritsen and White (2001) also report that in their analyses “neighborhood disadvantage does indeed have an independent influence on an individual’s risk for violence, controlling for individual factors and other area conditions” (p.49). The question about the exact explanatory mechanisms remains open to debate but the effect of high-poverty areas on violence seems to be established solidly.

The prominence of the neighborhood effect on a special case of violence – domestic violence – is also reported by Benson and his colleagues (2004) in the context of establishing the proper place for the race variable. They notice that “when neighborhood context is entered into the equation it substantially reduces the effect of race on intimate violence” (Benson et al., 2004, p.339).

Sampson and Wilson (1995) also focused on neighborhood-level mechanisms when explaining the link between race and violence. They argue that structurally induced social disorganization and spatial isolation of disadvantaged communities are the main culprits in the higher violence rates among blacks. Most scholars (Moses, 1947; Blau and Blau, 1982; Sampson and Wilson, 1995; Shihadeh and Ousey, 1998; Krivo and Peterson, 2000; McNulty, 2001; Lauritsen and White, 2001; Benson et al., 2004) believe that individual-level risk factors operate similarly for both blacks and whites and that differences in violent offending reflect the differences in ecological contexts/environments – so called “racial invariance assumption” (Ousey, 1999). As Thomas McNulty (2001) convincingly demonstrated at the neighborhood level, blacks and whites live in very different conditions, so different indeed that it basically precludes any possibility of meaningful comparisons. It is extremely rare that whites live in neighborhoods of high disadvantage typical for blacks. McNulty calls it “the problem of restricted distributions”. Bruce (2004, p.67) puts it even more explicitly: “antisocial behaviors that have been typically thought of as reflections of African American culture were, in fact, a reflection of the resource-deprived neighborhoods in which the group existed.”

The idea of a culture as responsible for violent behavior was given theoretical foundation as well as empirical testing in the works of Hackney (1969) and Gastil (1971) about a Southern “culture of violence”. Besides explaining why Southern folks rely on violence to solve interpersonal conflicts more so than people in other regions of the United States, both authors tested their theories using some version of a “Southernness” variable, based primarily or exclusively on regional location as a

measure of culture along with structural variables in regression analyses of homicide rates for 48 U.S. states. Both authors concluded that it is the Southern culture of violence rather than structural disadvantages of the Southern region that are responsible for the elevated homicide rates in that area.

Loftin and Hill (1974) replicated and refined the analyses done by Gastil (1971) and Hackney (1969). They pointed out some serious methodological mistakes and re-estimated the influence of the regional variables, supposedly representing the “culture”, on homicide rates. The authors concluded that if structural variables are specified properly, the regional variables do not contribute significantly toward homicide rates. Moreover, they cautioned that “unless culture can be measured distinctly and independently of region, the validity of our studies will always be threatened by the large number of non-cultural variables that are systematically related to region” (Loftin and Hill, 1974, p. 723). Loftin and Hill’s paper had a profound influence on homicide research and shaped the subsequent debate on determinants of homicide.

Several waves of debates around the Southern culture of violence theory ensued. One of the major contributions towards this discussion came from Land, McCall and Cohen (1990). By demonstrating the effects of multicollinearity, the authors were able to account for conflicting findings reported in homicide studies where structural factors served as independent variables. Land and his colleagues used factor analyses to reduce collinearity among independent variables and simplify the covariate space. Because of high correlation among several theoretically distinct variables, the authors were forced to combine these variables into empirically defined indices: (a) resource deprivation index merged 5 variables: median family income, percentage of families living below the official poverty line, Gini index of family income inequality, percentage of the unit population that is black, and percentage of children age 18 or under not living with both parents; (b) population structure index included logged population size and logged population density. Using 3 different units of analysis (cities, SMSAs, and states) at 3 different points in time (1960, 1970 and

1980), they found that the most consistent effects on homicide rates were exhibited by three factors: resource deprivation index, population structure index, and percentage males who are divorced. For each of these three factors, increases in the factor were associated with increases in homicide rates across all 3 levels of analysis for all 3 time periods. All other variables, including location in the South, exhibited either weak or inconsistent pattern of relationships with the homicide rates. Location in the South decreased in its significance as a predictor of homicide over time. It also failed to exhibit a consistent pattern of strong relationships with homicide rates once the structural variables were taken into account.

Around the same time, several research papers were published that challenged the old view of the South as standing out in regional patterns of homicide (O'Carroll and Mercy, 1989; Kowalski and Petee, 1991; Nelsen et al., 1994). These authors claimed that the West had emerged as a major contender to the South for leading the nation in homicide rates. Later, Parker and Pruitt (2000) continued exploring similarities and differences between the West and the South, trying to explain the convergence of city-level homicide rates in the two regions.

Now we can turn to the next major structural influence on homicide rates – a prominent factor that has been shown to have a consistent positive effect on violent crime in general and homicide in particular – divorce rate. More often than not, divorce rate is used in empirical tests as a control variable, but there are a few studies that focused specifically on the link between divorce rate and homicide (Blau and Blau, 1982; Lester, 1986; Kowalski and Stack, 1992; Greenberg, 2001). The curious fact is that, although very strong connections are found between divorce rate and homicide rate, just a handful of authors try to explain this link. Peter and Judith Blau (1982), Lester (1986), and Kowalski and Stack (1992) all use the Durkheimian theory (or its variations) and see divorce as some measure of anomie: “Populations with a high rate of divorce will presumably have lower levels of social integration” (Lester, 1986, p.103). Greenberg (2001) uses a different variation of the same

“anomie” logic (without naming it as such) but he interprets the relationship between divorce rate and homicide as spurious rather than causal: “Divorce is an indicator of a strain in a fundamental social institution – the nuclear family. It is this strain that leads some individuals to kill, whether or not they themselves divorce.” (p.304). He sees the source of the strain in some major transformations of gender roles and ideologies that occurred in 1960-1980. This explanatory path might work reasonably well when interpreting the cointegration of time series for divorce rates and homicide rates (since both time series experience a huge rise between 1965 and 1980, as Greenberg shows) but the “strain” explanation surely needs another source when comparing homicide rates for different areas in cross-sectional studies.

Consequences of divorce for children residing in those “broken homes” provide an alternative way to look at the mechanism of influence that divorce rates exert on violent crime. Monahan (1957) cites several studies, including a famous one by the Gluecks (1950), showing that “children in families marked by desertion, divorce, or illegitimacy tend to drift into delinquency more often than do children in conventional families” (Monahan, 1957, p. 362). This pathway – from divorce to violence through single-parent families – may imply the same processes of disciplinary inconsistency, lack of parental warmth, and lack of supervision that were mentioned above in studies of the poverty-violence link. In addition, the effects of family disruption may be amplified at the neighborhood level through the weakening of informal social control.

In the following sections of the paper, theoretical framework is laid out to describe the effects of the three main structural forces – poverty, family structure, and race – on violence in general and homicide rates in particular.

THEORY

Based on the existing knowledge about structural roots of violence, we can expect that poverty, divorce rate, and racial composition of population in the area would be predictive of homicide rates in that area. The effects of all three variables would be expected, in line with the previous research reviewed above, to operate at several levels: neighborhood/community level, family/social interpersonal level, and individual level.

As can be inferred from the theoretical perspective of social disorganization, the first two variables – poverty and divorce (resulting into disruption of a traditional two-parent family, or “broken home”) – when operating at the neighborhood level, lead to lack of community structures of support and supervision, lack of social control and cohesion, and ultimately, to the state of disorganization in the community. Due to absence of educational programs and after-school activities, coupled with lack of supervision in most poor communities, the youths have opportunities to occupy their time with activities of their choice. And, predictably, those choices are mostly shaped by the processes going on within the community. Disorganization in poor communities means higher tolerance for vice and disorder such as prostitution, drug trade and drug use, gambling, proximity of drinking establishments, and so on. Living in the neighborhood where this kind of activities is going on, the young people are inevitably exposed to higher incidences of all sorts of interpersonal conflicts leading to violence and occasionally resulting into homicide.

At the interpersonal/family level, both poverty and family disruption lead to harsher and less consistent discipline, frequent use of physical force, higher levels of conflict in relationships plagued by competing for scarce resources, lack of hope for a brighter future as poverty goes hand in hand with education of low quality and insufficient quantity.

At the individual-level, poverty and family structure operate through different processes. Because of pervasive and entrenched poverty, as well as lack of education in poor communities, “life

in these areas has been reduced largely to organic survival; and the reflex of this is an organic plane of living” (Moses, 1947, p.420). This “organic plane of living” involves simple pleasures (mostly physical) and simple reactions (again, mostly physical) in the pursuit of those pleasures. One would not expect things to have changed much in this regard since Earl Moses wrote about this phenomenon more than 60 years ago. If anything, poor communities have become an even more entrenched phenomenon, they are more isolated from the mainstream and their inhabitants have even less hope of succeeding in the modern technology- and knowledge-based markets.

The divorce rate variable would operate at the individual level as an indicator of an increased volume of conflicts. First, more divorces conceivably mean there are more people in a state of conflict (either prior, during, or after divorce), possibly lacking interpersonal skills and patience to resolve “irreconcilable differences” and get along as a family. Second, a higher level of divorce means more people involved in love triangles, disputes over property, custody of children, etc. Third, in line with the routine activities theory, divorce implies a higher likelihood that divorced people would go out more, frequent places where they would be able to meet potential mates, engage in more activities outside of the house, thus increasing the volume of interpersonal encounters and possible grounds for conflict. Even if the majority of conflicts are resolved peacefully, some of them still escalate into violence. Thus, from a purely statistical perspective, the larger the volume of all conflicts (as indicated by higher divorce rates), the larger the number of conflicts resulting into violence would be.

The third variable proposed to exert considerable influence on homicide rates – racial composition of the area – deserves a special discussion. As mentioned earlier in the paper, the racial invariance assumption holds that structural factors work similarly for all races and thus any effects attributable to race can be explained away by common structural forces. The author of the current

study firmly shares this assumption. The only caveat in trying to explain the effects of race away seems to be the fact that structural forces, though common in theory, are not that comparable for blacks and whites in reality. It is not only that a much larger proportion of Blacks than Whites are poor and live in high-poverty high-crime neighborhoods, their social heritage is also exacerbated by much higher rates of family disruption and instability of living arrangements¹, low quality of education and high unemployment for generations of family members, high segregation and low social capital, striking levels of imprisonment and mortality from unnatural causes. Pettit and Western (2004) estimated that among black men born between 1965 and 1969, 20% had served time in prison by their early thirties (compared to only 3% of white man). This number – already unbelievably high – further climbs to 30% for black men without college education, and to 60% for high school dropouts.

Putting this into perspective, it is important to consider the immensity of changes in the pattern of areas inhabited by blacks 100 years ago and currently. Before the “Great Migration” (roughly from 1910 through 1970), nearly 90% of blacks in the US lived in rural areas of the South (White et al., 2005). According to the latest available census data (U.S. Census Bureau, Census 2000, SF-2), only 10% of blacks live in rural areas now (9.5% of all blacks live in the rural areas of the South). As Katz and his colleagues (2005) put it, the “bulk of African Americans started the twentieth century clustered in America’s poorest spaces, rural southern farms; they ended it again concentrated disproportionately in the nation’s least promising spaces—now, central cities” (p.80).

Thus, the problem of compounded disadvantages and accumulated adversities for blacks versus whites makes it extremely difficult to measure structural factors in a way that would capture the racial inequality of circumstances. This is especially true for analyses at an aggregate level. As a result, the variable of racial composition of the area (percent black) stands as a proxy for all the spill-over effects of racial disparities that are not captured by other variables in the model.

The summary of the proposed theoretical framework is presented in Table 1.

[Table 1 about here]

The empirical part of this paper describes aggregate-level analyses that tested the effects of the Big Three structural determinants (poverty, family disruption, and race) on homicide rates in US counties at two different points in time. Though aggregate-level analyses would not allow us to test the exact mechanisms by which these three factors affect homicide rates, but it is possible to determine the magnitude and test the stability of these influences using aggregate-level data.

It is important to mention that the issue of “ecological fallacy” often arises when aggregate-level data are used to test individual-level processes. This question should be addressed here. As Jargowsky (2005) convincingly argues in his excellent discussion of the ecological fallacy problem, the correct specification of the model is much more important than “ecological fallacy” worries. Moreover, aggregate-level data may even have some benefits over individual-level data in that aggregation often reduces the correlation between independent variables and the error term. “Indeed, in certain specific situations, aggregate data may be better than individual data for testing hypotheses, even if those hypotheses are about individual behavior” (Jargowsky, 2005, p.721).

Fortunately, in the current paper we are testing effects of variables at several different levels, not just individual level. So, it is important to show how different levels of influence of the independent variables contribute to the size of regression coefficients in the model. If we were to test an individual-level model with one independent variable and one group-level effect (for simplicity of illustration), it would look like this:

$$Y_{ij} = \beta_0 + \beta_1 X_{ij} + \beta_2 \bar{X}_j + \varepsilon_{ij} \quad (1)$$

The same model at the aggregate level becomes:

$$\begin{aligned} \bar{Y}_j &= \beta_0 + \beta_1 \bar{X}_j + \beta_2 \bar{X}_j + \bar{\varepsilon}_j = \\ &= \beta_0 + (\beta_1 + \beta_2) \bar{X}_j + \bar{\varepsilon}_j \end{aligned} \quad (2)$$

And with three main independent and several control variables and three levels of influence, the model tested in this study is

$$\bar{Y}_j = \beta_0 + (\beta_1 + \beta_2 + \beta_3)\bar{X}_{1j} + (\beta_4 + \beta_5 + \beta_6)\bar{X}_{2j} + (\beta_7 + \beta_8 + \beta_9)\bar{X}_{3j} + \dots + \bar{\varepsilon}_j \quad (3)$$

Thus, each regression coefficient in the model represents the sum of effects on all three levels: individual, family/interpersonal, and neighborhood/community levels. This is perfectly fine for the purposes of this study since we are not specifically interested in separating these effects. Moreover, whether it is possible to separate these effects, considering how interconnected all three levels are (see the discussion about the race variable above), remains a question that is better left for future empirical testing.

Detailed specifications of the variables and the description of data and methods are provided in the section that follows.

DATA AND METHODS

In the current study, counties are used as a unit of analysis. There are several advantages of using counties as opposed to cities, SMSAs or states. First, counties are smaller and more homogenous units of analysis than states or SMSAs. Second, counties allow for wider variations in the independent variables and for the inclusion of rural populations that are typically ignored when cities and SMSAs are chosen for analyses.

On the other hand, there is a price to pay for the use of counties rather than bigger units. Population counts in some counties are rather small and thus these counties cannot be used in the analyses since they would produce inconsistent and often times extreme values on the homicide rate variable since homicide is a rare event. To guard against this problem, several procedures and checks were implemented.

First, a period of 11 years was used to record homicide events and calculate homicide rates in counties²: 1950 through 1960 (historical dataset) and 1995 through 2005 (contemporary dataset). Second, various population cut-off thresholds were used to test the robustness of results: counties over 10,000 population, counties over 5,000, and counties over 1,000 (as measured by the corresponding mid-point decennial census or arithmetic mean of census values at end-points). Also, a thorough check for outliers has been done to ensure the stability of estimates. Since the results of analyses remain essentially identical for all 3 thresholds, the lowest threshold (counties over 1,000 residents) is used for the data reported here since it enables to include more counties, and a larger variety of them.

Initially, the 1950-1960 dataset included 3,081 counties, and the 1995-2005 dataset included 3,075 counties. However, to make the two datasets as comparable as possible, only counties that existed in both periods of time (and had all necessary data available) were used for analyses (for more details, see Appendices A and B). Thus, for example, Alaska and Hawaii were excluded from analyses since data for these two states are not available in the 1950-60 dataset.

The dependent variable was constructed using data on homicide mortality by county from the Vital Statistics provided by the National Center for Health Statistics (Centers for Disease Control and Prevention, 1950-60 and 1995-2005). Since Supplementary Homicide Reports by the FBI only go back as far as the 1970s, the only source of comparable homicide data for the 1950s and the 2000s is the Vital Statistics. The years 1950 through 1960 were chosen because this is the earliest historical point for which good data on both homicide and structural factors are available.

Data on structural factors were taken from the Vital Statistics and from the corresponding decennial censuses (most variables archived by Haines and the ICPSR, 2005). Structural variables from the 1950 and 1960 censuses were averaged for the first dataset, and data for year 2000 were used for the second dataset.

The independent variables included the three main variables of interest: poverty/low education (percent families in poverty and percent people aged 25+ with low education – hereinafter, percent uneducated – were summed up to form an index of poverty³), divorce rate⁴, and percent black⁵. Also, a set of control variables was included into the model along with the independent variables. The following measures that proved consequential for homicide rates in previous studies were included as control variables:

- percent urban (alternatively: population density was used, producing almost identical results);
- percent unemployed in civilian labor force;
- residential mobility;
- percent young (percent people aged 15 to 29);
- percent old (percent people aged 65 and above); and
- region⁶.

Detailed descriptions of variables, data sources, and variable correlation matrices are provided in Appendix A for the 1950-60 dataset and in Appendix B for the 1995-2005 dataset.

To make sure that none of the control variables loaded excessively onto any of the Big Three variables of interest, a principal components factor analysis was estimated on all independent and control variables. This procedure was applied to both datasets separately. The only consistent pattern involving a substantial correlation of variables in both datasets, as expected, was found for the percent families in poverty and percent uneducated. The correlation was .72 for the historical dataset and .75 for the contemporary dataset (both statistically significant at a .001 level). These two variables were summed up to form an index of poverty. Since these results are pretty straightforward and since there is nothing illuminating in the specifics of the above-described factor analyses, they

are not included into the current paper to save space and avoid distracting the reader with unnecessary details.

After frequency distributions for all variables in both datasets were examined, it became clear they were overwhelmingly positively skewed, which in turn affected the linearity (or rather non-linearity) of relationships between the dependent and most of the independent/control variables. Thus, logarithmic transformation of the skewed variables was warranted. All continuous variables – dependent, independent, and control – in both datasets were subject to natural log transformation⁷. This had an additional benefit for the interpretation of regression coefficients – *elasticity*.

Besides logarithmic transformation, there are other ways to ameliorate the situation with excessive zeros in the distribution of homicide rates. One of them is to use negative binomial regression (NBR) analyses in addition to ordinary least squares (OLS) regression. Thus, NBR analyses were performed and they yielded very similar results to the results of OLS regressions. However, since NBR analyses do not produce some useful information, for example, the coefficient of determination, and NBR coefficients are not as easily interpretable, the OLS regressions are still preferred⁸. Thus, in the section that follows, OLS regression results are reported.

RESULTS AND DISCUSSION

The effects of the Big Three determinants – poverty index (poverty + low education), racial composition (percent black), and the family structure variable (percent divorced/separated) – on logged homicide rates, along with the effects of control variables included into all analyses, are presented in Table 2. Now we can compare the regression coefficients (slopes) to see if the amount of influence that each of the Big Three contributes towards homicide rates remains about the same over time. Amazingly, the regression slopes seem to be very similar for the two time periods despite

the changes that occurred in almost a half-century. Even if all the social, economic, and political changes that occurred since the 1950s are left outside of the current discussion, just by looking at the descriptive statistics and correlations for our main variables of interest, we can see some drastic changes: divorce rate has almost quadrupled from 1960 to 2000 (see Table 3), percent of families in poverty is about one quarter of what it used to be 45 years ago while percent “uneducated” has almost doubled (see Table 3); the correlation between poverty and divorce has grown from very weak to solid medium (Table 4) and the correlation between percent black and divorce has dropped almost one third (see Table 4).

[Table 2 about here]

However, despite all these changes, the regression coefficients – that is, the amount of influence on homicide rates – remain stable. As shown in Table 2, each percent rise in the percentage of families in poverty or people with low education produces about a half percent increase (0.43%-0.54%) in homicide rates. Each percent change in the percentage of divorced/separated people produces about three quarters of a percent (0.73%-0.82%) change in the same direction in homicide rates. Each percent rise in the percentage of blacks produces about a one fifth of a percent rise (0.18%-0.20%) in homicide rates. Explained variance of the model is also quite high for both time periods ($R^2 = 0.69$ for the 1950-1960 dataset, $R^2 = 0.58$ for the 1995-2005 dataset).⁹

[Table 3 about here]

[Table 4 about here]

Thus, Table 2 provides some face validity for the argument that the effect sizes of our three main predictors of homicide remain stable over time. However, to draw firm conclusions about the similarity of the regression slopes, we have to corroborate the impression of stability of regression coefficients with some solid statistical evidence. Unfortunately, there is no straightforward

comparison test for regression coefficients from two non-independent samples, unlike the one applicable to independent samples (see Brame et al., 1998). Since here we have the same sample measured twice, though with a 40-50-year interval, we cannot expect to meet the independence requirement.

One remedy would be to pool the two datasets together and estimate the OLS regression on the combined dataset (N=6,088), including interactions of the main three variables with period and taking into account the “paired” clustering of observations when calculating standard errors. This can be done using the Huber-White method (so called “sandwich” estimator) that adjusts the covariance matrix correcting for the lack of independence of observations within clusters. Essentially, clusters are used as units of observation when standard errors are calculated¹⁰. Thus, robust standard errors, and consequently, corrected t-statistics are obtained. To execute the plan properly, all variables in the dataset should be mean-centered around the period mean to ensure that changes in the levels of homicide, divorce, etc. over time would not affect the comparisons¹¹. After the period-mean-centering, the OLS regression on the pooled dataset is estimated using the same three main variables, along with the same control variables (see Table 5).

[Table 5 about here]

Now we can examine the interaction terms (highlighted in bold in Table 5). Since we have all reasons to be concerned with the possibility of committing a Type I error (finding a difference where there is none) when such a large dataset is used, we set the level of significance at 0.01. Using this threshold, 99% confidence intervals around the regression coefficients are calculated (shown in the two right-most columns in Table 5). Since the confidence intervals for all three interaction terms include zero, it can be concluded that none of the three interactions is statistically significant. We can safely reaffirm that there is no substantive difference in the coefficients between the two time periods. Considering the vast social and economic changes in the United States that occurred since

the 1950s, it is startling that each percent change in poverty/education, racial composition, and divorce rates in US counties roughly produces about the same effect on percent change in homicide rates.

One interesting issue that deserves mentioning here is the amount of cultural/regional influence. In line with other researchers' claims that the West is becoming what the South used to be in terms of elevated homicide rates, we see from Table 2 that the regression slope for the South does indeed drop about one third (from 0.42 to 0.27) while the regression slope for the West rises about one third (from 0.22 to 0.30) from 1950-60 to 1995-2005. So, now homicide rates are almost the same for these two regions (actually, even slightly higher in the West than in the South). Judging by the effect of excluding the region variable on the other coefficients in the model, it seems that these changes in the allocation of homicide rates between the South and West are primarily due to changes in the distribution of poverty/low education among the regions. Poverty was heavily concentrated in the South back in the 1950s, and now poverty is more evenly spread between the South and the West. This fact brings us back to the main point of this line of work – the importance of structural forces in determining violence/homicide rates.

CONCLUSIONS

This study separated the effects of three primary structural factors on homicide and tested the stability of these effects over time using US counties as units of analysis. All three factors – poverty, family disruption, and racial composition – proved to be extremely powerful predictors of homicide rates at both time periods examined. Moreover, all three factors exhibit an amazing stability over time in the amount of their influence on homicide rates: regression slopes for each of the Big Three remain virtually unchanged from the 1950s to the 2000s despite fairly drastic changes in the

economic and social situation that occurred in the United States over this period of time. This is the most significant finding presented in the paper. It implies something basic about the human nature and its response to certain structural conditions.

However, the current study is not equipped to test the exact mechanisms by which poverty, racial composition, and family disruption generate such stable and prominent increases in the incidence of homicide. The regression coefficients represent the sum of effects at all levels of influence – neighborhood, family, and individual level – for each variable. What exactly it is about these structural conditions that produces effects on homicide remains to be an open question for future research and theory.

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Appendix A. Detailed Information on Variables Included into Initial Analyses: Historical Dataset (1950–1960).

Table A1. Descriptions and Data Sources for Variables in Their Original Form: 1950-1960 dataset (N=3,044)

Variable	Description	Source of data
Homicide rate	Homicide mortality rate: data for years 1950 through 1960 summed up and divided the number of years, and then calculated per 100,000 using the average county population size per year (calculated from 1950 and 1960 decennial censuses).	Vital Statistics in the US, 1950 through 1960
Population size	Average of 1950 and 1960 decennial census values.	Haines and the ICPSR, 1995
Percent in poverty	Average of percent families with family income less than \$2000 in 1950 (from 1950 census) and percent families with family income less than \$3000 in 1959 (from the 1960 census).	Haines and the ICPSR, 1995
Percent "uneducated"	Average of percent with less than 5 years of education among persons aged 25 years and over in 1950 (from 1950 census) and percent with less than 4 years of education in 1960 (from 1960 census).	Haines and the ICPSR, 1995
Percent divorced	Percent divorced and separated among persons aged 14 years and over: data from 1960 census only ^a .	US Census Bureau, 1960
Percent nonwhite	Average of 1950 and 1960 decennial census values.	Haines and the ICPSR, 1995
Percent urban	Average of 1950 and 1960 decennial census values.	Haines and the ICPSR, 1995
Percent unemployed	Percent unemployed in civilian labor force among persons aged 14 years and over, average of 1950 and 1960 censuses.	Haines and the ICPSR, 1995
Residential mobility	Average of percent people "living in different house than in 1949" (from 1950 census) and percent people who "moved into present house after 1958" (from 1960 census).	Haines and the ICPSR, 1995
Percent aged 15-29	Average of 1950 and 1960 decennial census values.	Haines and the ICPSR, 1995
Percent aged 65+	Average of 1950 and 1960 decennial census values.	Haines and the ICPSR, 1995

^a In the 1950 census, a corresponding category is comprised of divorced and widowed together, and it is heavily influenced by widowed, so it couldn't be meaningfully combined with the divorced/separated category from the 1960 census.

Table A2. Descriptive Statistics for Variables in Their Original Form: 1950-1960 dataset
(N=3,044)

Variable	Minimum	Maximum	Mean	Standard Deviation
Homicide rate	0.00	41.61	4.74	4.60
Population size	1,230	5,095,229	53,470	186,598
Percent in poverty	3.45	84.60	40.09	17.10
Percent "uneducated"	0.85	55.75	12.83	9.89
Percent divorced	0.39	13.59	3.21	1.35
Percent black	0.00	84.20	10.87	16.75
Percent urban	0.00	100.00	30.65	27.40
Percent unemployed	0.43	20.31	4.55	2.24
Residential mobility	2.18	33.00	10.88	3.14
Percent aged 15-29	13.64	59.63	20.64	2.96
Percent aged 65+	0.99	22.17	9.69	2.82

Appendix B. Detailed Information on Variables Included into Initial Analyses: Contemporary Dataset (1995-2005).

Table B1. Descriptions and Data Sources for Variables in Their Original Form: 1995-2005 dataset (N=3,044)

Variable	Description	Source of data
Homicide rate	Homicide mortality rate: data for years 1995 through 2005 summed up and divided by the number of years, and then calculated per 100,000 using county population size from the 2000 census.	Centers for Disease Control and Prevention, National Center for Health Statistics (1995-2005)
Population size	Calculated based on census 2000 data.	US Census Bureau, 2000
Percent in poverty	Percent families with income below poverty level in 1999.	US Census Bureau, 2000
Percent "uneducated"	Percent with less than high-school education among persons aged 25 years and over, 2000	US Census Bureau, 2000
Percent divorced	Percent divorced and separated among persons aged 15 years and over, 2000.	US Census Bureau, 2000
Percent black	Calculated based on census 2000 data.	US Census Bureau, 2000
Percent urban	Calculated based on census 2000 data.	US Census Bureau, 2000
Percent unemployed	Percent unemployed in civilian labor force among people aged 16 years and over, 2000	US Census Bureau, 2000
Residential mobility	Percent of people aged 5 years and over who "lived in a different house in 1995", 2000	US Census Bureau, 2000
Percent aged 15-29	Calculated based on census 2000 data.	US Census Bureau, 2000
Percent aged 65+	Calculated based on census 2000 data.	US Census Bureau, 2000

Table B2. Descriptive Statistics for Variables in Their Original Form: 1995-2005 dataset
(N=3,044)

Variable	Minimum	Maximum	Mean	Std. Deviation
Homicide rate	0.00	48.76	4.66	4.23
Population size	1,199	9,519,338	90,613	293,580
Percent in poverty	1.61	55.74	10.73	5.79
Percent "uneducated"	3.04	65.30	22.74	8.70
Percent divorced	3.75	21.18	11.29	2.24
Percent black	0.00	86.13	8.86	14.60
Percent urban	0.00	100.00	40.42	30.59
Percent unemployed	0.21	41.67	5.79	2.69
Residential mobility	19.40	84.56	41.10	7.37
Percent aged 15-29	10.60	53.36	19.43	4.06
Percent aged 65+	1.80	34.72	14.80	4.08

Footnotes

¹ On the issue of significant differences between races in family situation dynamics, Ruth Cavan's (1959) comparison of white and black institutionalized delinquents provides a good illustration:

Many boys had lived in several types of families during their lives (e.g., with both parents at one time, with a parent and step-parent at another, with relatives at some other time, and so on). Negro boys had a median of 2.1 different family situations, whites a median of 1.0. Half of the whites but only a fifth of the Negroes had continuously lived in the same family situation; at the other extreme, 17 per cent of the Negro boys but only 5 per cent of the white boys had lived in four or more different types of families. Moreover, almost four times as many Negro boys as white (37 and 10 per cent) had lived at some point with relatives and 18 and 4 per cent respectively had at some time resided in the homes of people to whom they were not related. (Cavan, 1959, pp.235-236)

² MA and NYC exceptions for the historical dataset: for counties in the state of Massachusetts, homicide counts were available for 6 years out of 11 (1950-52, 1955, 1959-60); and for New York City counties, separate homicide counts were available for 8 years out of 11 (1950, 1954-1960). No imputation procedures were used. Homicide rates were calculated using the available number of years in the denominator.

³ To form the index of poverty, the variables for percent of families in poverty and percent "uneducated" were summed up in their original metric (non-standardized). This has been done for several reasons: 1) to preserve the absolute zero of the original scales, 2) to let the original distributions determine which of the two variables contributes more to the index of poverty, depending on the time period; 3) for easier interpretability of results in further analyses (slopes for logged variables in OLS regressions are interpreted as a percent change impact on the dependent variable).

⁴ Ideally, "percent children in single-parent families" needs to be included along with the divorce rate to form the index of family structure. However, this measure is available for the 1995-2005 dataset but not for the historical, 1950-60 dataset. Thus, only divorce rate remained as a measure of family disruption in our model.

⁵ "Percent non-white" from 1950 and 1960 census data is essentially equivalent to "percent black" in the 2000 census data.

⁶To accommodate some recent sentiments that the West is now becoming what the South used to be (described above in the review of literature) and also to measure regional peculiarities in a more comprehensive manner, all four regions are designated by dummy variables using traditional census divisions: South, West, and Midwest, with Northeast being the reference category.

⁷All variables had one added to all their values before the log transformation was applied (to eliminate zero or near-zero values since logarithm of zero does not exist). As a result of the log transformation, frequency distributions for logged variables were much closer to the shape of the normal distribution compared to the original variables (see Figure 1) and their relationships with the dependent variable straightened out as well. The only variable whose frequency distribution was not significantly improved by the logarithmic transformation was the dependent variable - homicide rate. Because of the heavy clustering of values around zero, there is no readily available way to transform this variable to bring it closer to the shape of the normal distribution. However, log transformation still seems beneficial in this case because it draws the long right tale of the original homicide rate distribution closer to the more frequent values and thus, gets rid of potential outliers.

⁸As an additional check, the residuals in all OLS regression analyses were examined for possible heteroscedasticity that may have resulted from excess zeros in the dependent variable. Upon examination, the presence of heteroscedasticity was ruled out.

⁹If all control variables are removed from the model, with only the Big Three determinants left, the model still explains about 65% of variance in the dependent variable for the 1950-60 dataset, and about 55% for the 1995-2005 dataset. The inclusion of any other single control variable into the equation does not improve the explanatory power of the model by much more than about 2%. If all of the control variables are included, in addition to the Big Three, they together contribute only an extra 2% to 4% towards the explained variance.

¹⁰ Though with so few observations within each cluster (in this case, each cluster is comprised of two counties, or the same county measured twice 45 years apart) and a huge number of clusters (3,044), the robust standard errors would not be very different from the ones produced by usual OLS estimation.

¹¹ Another good reason for mean-centering is that it removes the collinearity between the original independent variables and the dummy variable for the period. If there was a big change in the means of some variables from one time period to the other, then even in their logged form these variables would be highly correlated with the dummy variable for the period unless they are centered around the period mean. For example, the divorce rate has almost quadrupled since 1960 – from 3% to 11% of adult population (compare tables A2 and B2 in Appendices A and B, respectively). Either in its original form or in its log-transformed metric, the divorce rate variable has a correlation of more than 0.90 with the period dummy variable, so including the period dummy and the logged divorce rate (uncentered) into the same equation would lead to hugely inflated statistics of collinearity (*VIF* over 10 for the divorce variable). On the other hand, if the logged divorce rate is centered around the period mean, this solves the problem of collinearity.

Table 1

Theoretical Model: The Big Three determinants of homicide and levels of their influence

Variable Level	Poverty / low education	Family disruption (divorce rate)	Racial composition
Neighborhood / Community	<ul style="list-style-type: none"> • lack of community structures of support and supervision • lack of social control and cohesion • disorganization in the community – as a result, higher tolerance for vice and disorder (<i>social disorganization perspective</i>) 		<p>Non-comparability of circumstances for blacks and whites. Larger proportion of blacks:</p> <ul style="list-style-type: none"> • live in high-poverty, high-crime, high-segregation neighborhoods (<i>social capital perspective</i>)
Family / Interpersonal	<ul style="list-style-type: none"> • harsher and less consistent discipline • frequent use of physical force • higher levels of conflict in relationships (competition for scarce resources) 	<ul style="list-style-type: none"> • higher levels of conflict in relationships (divorce-related conflicts over property, custody, etc.) • insufficient supervision and monitoring of children's activities/friendships 	<ul style="list-style-type: none"> • experience low quality of education and high unemployment for generations of family members
Individual	<ul style="list-style-type: none"> • lack of hope for a brighter future • lack of skills to solve conflicts in a non-physical way • “organic plane of living” (physical pleasures/reactions) 	<ul style="list-style-type: none"> • lack of interpersonal skills and patience to resolve “irreconcilable differences” • more frequent visits to bars, pubs, etc. (<i>routine activities perspective</i>) 	<ul style="list-style-type: none"> • have striking levels of imprisonment and mortality from unnatural causes <p>Race stands as a proxy for compounded disadvantages and adversities for blacks versus whites.</p>

Table 2

Estimates of the Effects of the Big Three Independent Variables on Homicide Rate: Comparison across two periods (the dependent variable in natural log form, control variables included and shown)

Variable	1950-1960 (n=3,044)			1995-2005 (n=3,044)		
	<i>B</i> (<i>SE B</i>)	<i>t</i>	<i>p</i>	<i>B</i> (<i>SE B</i>)	<i>t</i>	<i>P</i>
Logged poverty index	.43 (.030)	14.45	<.001	.54 (.043)	12.36	<.001
Logged percent divorced	.73 (.043)	17.01	<.001	.82 (.060)	13.67	<.001
Logged percent black	.18 (.010)	17.25	<.001	.20 (.009)	20.95	<.001
Logged percent urban	<.01 (.006)	.65	.514	.01 (.006)	1.43	.153
Logged percent unemployed	.03 (.026)	1.00	.317	.14 (.037)	3.62	<.001
Logged residential mobility	.09 (.045)	2.07	.039	.05 (.078)	0.61	.544
Logged percent young	-.30 (.098)	-3.07	.002	-.29 (.081)	-3.60	<.001
Logged percent old	-.42 (.047)	-8.93	<.001	-.34 (.047)	-7.21	<.001
South	.42 (.046)	9.24	<.001	.27 (.040)	6.68	<.001
West	.22 (.045)	4.93	<.001	.30 (.043)	7.01	<.001
Midwest	.15 (.037)	4.02	<.001	.18 (.036)	5.07	<.001
(Constant)	-.16 (.039)	-.42	.673	-1.63 (.387)	-4.22	<.001

Note. 1950-1960 analysis: $R^2 = 0.69$; $F = 613.03$ ($p < .001$). 1995-2005 analysis: $R^2 = 0.58$; $F = 375.59$ ($p < .001$)

Table 3. Descriptive Statistics for the Key Variables in Their Original Form (important changes between the two time periods are highlighted in bold)

Variable	1950-1960 (n=3,044)		1995-2005 (n=3,044)	
	Mean	Standard Deviation	Mean	Standard Deviation
Homicide rate	4.74	4.60	4.66	4.23
Percent in poverty	40.09	17.10	10.73	5.79
Percent "uneducated"	12.83	9.89	22.74	8.70
Percent divorced	3.21	1.35	11.29	2.24
Percent black	10.87	16.75	8.86	14.60

Table 4. Bivariate Correlations among the Big Three and Homicide Rate (all variables are log-transformed, important changes between the two time periods are highlighted in bold).

1950-1960 (n=3,044)	Homicide rate	Poverty index	Percent divorced	Percent black
Homicide rate	1.00			
Poverty index	0.53	1.00		
Percent divorced	0.58	0.08	1.00	
Percent black	0.75	0.50	0.58	1.00
1995-2005 (n=3,044)	Homicide rate	Poverty index	Percent divorced	Percent black
Homicide rate	1.00			
Poverty index	0.55	1.00		
Percent divorced	0.54	0.33	1.00	
Percent black	0.61	0.38	0.40	1.00

Table 5

Results of OLS Regression Analysis with Huber-White Estimate of Standard Errors to Test the Significance of the Differences between the Slopes for Two Periods: Combined Dataset (the dependent variable in natural log form, control variables included but not shown, n=6,088)

Variable	B	Robust SE (B)	t	99% confidence interval	
Logged poverty index (period-mean-centered)	.49	.027	18.11	.42	.55
Logged percent divorced (period-mean-centered)	.70	.046	15.11	.58	.82
Logged percent black (period-mean-centered)	.20	.012	17.51	.17	.23
Period (0 = 1950-1960; 1 = 1995-2005)	<0.001	.012	-0.29	-.03	.03
Period/Poverty Interaction	.08	.035	2.17	-.01	.17
Period/Divorced Interaction	.12	.068	1.76	-.06	.29
Period/Black Interaction	-.03	.013	-2.10	-.06	.01
...
(Constant)	-.23	.022	-10.33	-.28	-.17

Note. $R^2 = .64$; $F = 887.81$ ($p < .001$); Number of clusters = 3,044.