The Age Structure-Crime Rate Relationship: Solving a Long-Standing Puzzle

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Abstract:

Objectives: Develop the concept of differential institutional engagement and test its ability to explain discrepant findings regarding the relationship between the age structure and homicide rates across ecological studies of crime. We hypothesize that differential degrees of institutional engagement—youths with ties to mainstream social institutions such as school, work or the military on one end of the spectrum and youths without such bonds on the other end—account for the direction of the relationship between homicide rates and age structure (high crime prone ages, such as 15–29).

Methods: Cross sectional, Ordinary Least Squares regression analyses using robust standard errors are conducted using large samples of cities characterized by varying degrees of youths' differential institutional engagement for the years 1980, 1990 and 2000. The concept is operationalized with the percent of the population enrolled in college and the percent of 16–19 year olds who are simultaneously not enrolled in school, not in the labor market (not in the labor force or unemployed), and not in the military.

Results: Consistent and invariant results emerged. Positive effects of age structure on homicide rates are found in cities that have high percentages of disengaged youth and negative effects are found among cities characterized with high percentages of youth participating in mainstream social institutions.

Conclusions: This conceptualization of differential institutional engagement explains the discrepant findings in prior studies, and the findings demonstrate the influence of these contextual effects and the nature of the age structure-crime relationship.

Keywords: Homicide rates | Ecological study | Cities | Age structure

Article:

Introduction

The age-crime relationship has been the subject of extensive study in criminological research. At the individual level, most studies conclude that, relative to other age groups, young persons are more likely to be involved in crime as offenders and/or victims (Hirschi and Gottfredson *1983*; Nagin and Land *1993*). However, while many criminologists agree that violent offending peaks between the ages of 15–29 and then declines over the life course, the trajectory of offending across the life course has been the subject of some debate. In fact, investigations of the age dependence of criminal offending have noted variations in trajectories over the life course suggesting that the aggregated age-crime curve masks significant differences in individual offense patterns.[1] Findings at the macro-level are even more inconsistent with regard to the nature of the age structure-crime rate relationship. These studies typically measure age effects via the size of the youth population and have established significant variation in homicide rates by changes in the size of this population (Cohen and Land *1987*; Fox and Piquero *2003*; Sagi and Wellford *1968*; Steffensmeier and Harer *1987*, *1991*). As a result, a theoretical debate has ensued concerning the nature of age-crime relationship at both the individual and macro levels. Much of this literature draws on control theories, where the development of social ties for individuals typically means less participation in crime. These ideas will be discussed in this paper, but largely as they relate to addressing the inconsistencies in ecological studies of the age structure-crime rate relationship.

Criminologists have long acknowledged the inconsistency of findings on this macro relationship both with theoretical predictions and across studies, which have found evidence of null, negative and positive associations (Land et al. *1990*; Marvell and Moody *1991*; Parker et al. *1999*; McCall et al. *2010*). For example, the effects of proportion young on homicide rates has been found to be positive (Land et al. *1990*; Loftin and Hill *1974*), null (DeFronzo *1983*; Huff-Corizine et al. *1986*; Parker *1989*; Messner *1983a*, *b*; McCall et al. *2010*), and sometimes negative (Crutchfield et al. *1982*; Land et al. *1990*; Lee and Slack *2008*; Loftin and Parker *1985*; McCall et al. *2010*) in studies utilizing various levels of aggregation in their analyses. In their meta-analysis of macro-level predictors of crime, Pratt and Cullen (*2005*) assessed the relative predictive ability of 31 predictors of crime and found that age effects ranked 19 out of the 31 (Pratt and Cullen *2005*: Table 1) and that the nature of the relationship between age effects and crime rates was characterized by weak predictive strength and moderate stability across studies (Pratt and Cullen *2005*: Table 3).

The life course literature has established the effects of social ties, in the form of marriage (Sampson and Laub *1990*; Laub et al. *1998*), time away from deviant peers (Warr *1998*), and labor force stability (Laub and Sampson *1993*; Sampson and Laub *1990*) on the age-crime relationship. Scholars have recently demonstrated that age structure effects on homicide rates depend on varying social and economic conditions within which these relationships are observed (Brown and Males *2011*; Pampel and Gartner *1995*; Phillips *2006*). As such, research continues to clarify the contingent effects between age and homicide. In the present paper, we go beyond

these studies to develop and introduce a conceptual framework that explains the varying age structure-homicide rate relationship. (Note, hereafter “age structure” is used interchangeably in this study with reference to the size of the young population.)

The aim of the present study is to address the incongruous findings of the age structure-crime relationship in ecological studies. Focusing on homicide, we address the question: Is it possible to find a statistically significant and invariant relationship between age structure and homicide rates for a given ecological unit, in particular, cities? We posit *differential institutional engagement* of youths as an underlying dimension that may account for the inconsistent age structure-homicide rate findings. After examining the overall relationship of homicide rates and structural covariates, including age structure, for large samples of cities at time periods 1980, 1990 and 2000, we offer empirical tests of the differential institutional engagement-homicide rates relationship by comparing findings based on cities characterized by large proportions of institutionally disengaged youths with those of cities characterized by large proportions of the population participating in normative social institutions. Our examination reveals statistically significant and invariant results consistent with theoretical prediction once we account for the extent to which youthful populations are institutionally engaged within ecological units. A discussion of these findings as it relates to the age structure-crime rates relationship concludes the piece.

Differential Institutional Engagement

Social control theory has long informed the age structure-crime relationship and provides a theoretical basis of our notion of differential institutional engagement.[2] Individual-level studies have noted the importance of social bonds in predicting delinquent behaviors (Hirschi *1969*). Specifically, participation of criminal activity is explained by ineffective social control such that individuals with weak social bonds are less likely to conform to normative behaviors than individuals with strong social bonds.

Proponents of life-course theories have further shown that age-graded social bonds are significant predictors of criminal desistance (Sampson and Laub *1990*). These studies indicate that individuals attached to the labor market, college, marriage and the military have a greater stake in conformity, thus lowering their likelihood of participation in criminal behavior (Laub and Sampson *1993*; Laub and Sampson *2003*; Laub et al. *1998*).

Beyond these micro-level approaches to examining the age-crime relationship, it is important to consider the emergent structural properties of geographic locales (e.g., neighborhoods, cities, etc.) that contextualize the aspirations, values, and behaviors of individuals living in communities with access to varying mechanisms of social control. Researchers have proposed and found some support for the effect of parochial and public social control (Bursik and Grasmick *1993*), community social ties (Sampson *1988*; Sampson and Groves*1989*) and community trust (Morenoff et al. *2001*; Sampson et al. *1997*; Maxwell et al. *2011*) on

neighborhood crime rates. Although neighborhood-level explanations are not directly related to city-level studies of the age-crime relationship, there is reason to believe that the level of engagement in conventional institutions may condition the effects of the size of the youth population on crime rates. In fact, the original formulation of the social disorganization perspective acknowledged that social processes were influenced by the strength of institutional controls; therefore, we suggest that institutional controls are important contingencies to consider in predicting the nature of the age-homicide relationship. Our paper emphasizes the importance of these contingencies by suggesting that some areas, such as college towns, are likely to have a higher level of institutional engagement which alters the relationship of age structure to homicide.

College towns offer various structural avenues to attain mainstream lifestyles in the community as well as the college itself, for example, by means of internship collaborations with business and industry, employment fairs, post-baccalaureate educational resources and the myriad of social networks they entail. Furthermore, the sentiments and values of communities with a large proportions of the population enrolled in college reinforce not only youths' aspirations and stakes in conformity but also their vision for attaining culturally-valued success in conventional labor force participation. These emergent sentiments are shared by community residents such as faculty and university employees as well as by students. Hence, it is plausible that cities with a large proportion of youths *institutionally engaged* in conventional social institutions such as higher education, are more likely to foster collective efficacy and neighborhood contexts in which community members are bonded to conventional others, goals, and behaviors. To the extent such community sentiments are shared, crime rates in those areas should be lower. Not only do the relative institutional attachments of youths in cities have an impact on their likelihood of criminal involvement, so too does the social capital that is available to youths across communities.

Conversely, in a city that has a large proportion of youths *institutionally disengaged*, the rates of violent crime are expected to be relatively high. Disadvantaged communities are less able to support quality educational opportunities for their youths and to provide ready evidence of the rewards of conventional pursuits (Anderson *1999*). Based on Sampson and his colleagues' contributions (Sampson and Groves *1989*; Sampson et al. *1999*), communities with large concentrations of disengaged youths would likely be found in areas lacking social capital and with poor collective efficacy manifested in the communities' organizational resources, networks and opportunities—communities that might otherwise encourage youths toward conventional lifestyles and provide means for them to attain mainstream goals by participating in educational and economic institutions.

Two recent empirical studies are especially instructive in shedding light on the elusive age structure-crime rate relationship. McCall et al. (*2011*) applied latent trajectory analysis (Nagin and Land *1993*) to trends in annual homicide rates among 157 large US cities between the years 1976 and 2005 to determine whether there was hidden heterogeneity among those cities in levels

and patterns of homicide rate trends. Distinct trajectories ranging from very low to very high homicide rates were identified for four groups of cities. When examining the four distinct groups, a pattern emerged—a large proportion of cities in the lowest homicide rate trajectory group were comprised of university or college towns.

Pursuing this logic further, McCall et al. (*2011*) found that cities with high percentages of their population enrolled in college were less likely to be associated with (have membership in) higher homicide rate trajectory groups. This finding is consistent with institutional engagement as discussed above—in this case, a bonding of college students to conventional goals and behaviors and, accordingly, a lower likelihood of involvement in serious, violent criminal offending such as homicide. That is, to the extent that a city's population is comprised of a relatively large proportion of *institutionally engaged youths*, the rates of serious violent crime in that city remain relatively low over time.

Focusing on the opposite end of the continuum, Shihadeh and Thomas (*2007*) introduced the concept of disengaged youths and examined the relationship between concentrations of *institutionally disengaged youth* in urban areas and violent crime rates. They argued that concentrations of young persons who are transitioning from adolescence to adulthood and who lack mainstream institutional attachments to school and/or the labor force are more likely to be involved in crime. In those places, communities lack the capacity to direct youths into normative adult lifestyles. Shihadeh and Thomas (*2007*) defined institutionally disengaged youths as teenagers who are (1) not enrolled in school and (2) not in the military or in the labor force. They found that urban areas with concentrations of institutionally unattached youths have higher levels of homicide.

Taken together, these studies suggest that differential institutional engagement among youthful populations within geographic locations may affect the nature of the age structure-crime rate relationship posited in macro-level studies. That is, to the extent researchers examine geographic units with distinctive social and economic characteristics, such as cities characterized with large proportions of youth at either end of this continuum of institutional engagement, results could reveal positive or negative effects of age structure on crime rates or the countervailing forces *across* these cities could cancel the posited positive association between the proportion young and crime rates and generate null findings. The purpose of this study is to offer a systematic examination of that claim and, by doing so, determine whether a statistically significant and invariant relationship between age structure and crime can be established within a set of ecological units (cities).

For our purposes, then, differential institutional engagement is a macro-level indicator of involvement/participation, or lack thereof, in conventional, mainstream society within an ecological unit. We capture the level of institutional engagement at one extreme by youths disengaged from the labor market and schools and, at the other, by those engaged in conventional institutions, such as college students. To the extent that cities are comprised of high

proportions of young people who are engaged with, or attached to, mainstream social institutions of school, work or military, we expect to find a consistently negative relationship between age structure and homicide rates. Conversely, high proportions of disengaged youth in the population should result in a positive relationship between age structure and homicide rates consistently over time. Evidence of differential institutional engagement should then account for the inconsistent relationships found in the macro-level literature on age-crime. Specifically, this leads to the:

Differential Institutional Engagement Hypothesis: In samples of cities with high levels of institutionally disengaged (engaged) youths, the age structure-homicide rate relationship, net of other structural covariates, will be positive (negative).

We next describe the data and methods used to assess this hypothesis.

Data and Methods

Sample and Data Sources

Most prior ecological studies of homicide have been based on relatively small samples (e.g., largest 150 cities or metropolitan areas). By comparison, the present study analyzes large samples of cities. The selection of cities is based on places with populations over 10,000 in 1980 for which the FBI's Uniform Crime Report offenses known to the police were available. The resulting samples of cities included 874 cases in 1980, 930 in 1990 and 839 in 2000 after missing data were taken into account. These samples provide enough cases to conduct analyses on sub-samples of cities restricted by our differential institutional engagement construct, which is operationalized below.

Homicide data were derived from published UCR volumes for the 3 years circa 1980 and from Supplemental Homicide files for the 3 years circa 1990 and 2000.[3] The data source from which most covariates were collected is Sociometrics' Contextual Data Archive (CDA) from the 1980 and 1990 Census Extract Data (1998). The 2000 data, which were not available from CDA, were derived online from the US Bureau of the Census American Fact Finder's 2000 STF3 detailed tables. Some measures for 1980 and 1990 were also obtained from the US Census. Data on other covariates were obtained from the Minnesota Population Center's National Historical Geographic Information System (NHGIS). See "Appendix 1" for detailed descriptions of the measures and their sources.

Measurement

The dependent variable is the city *homicide rate per 100,000 population* computed as the 3-year average centered on each decennial year. Because evidence of heteroscedasticity was detected in residual diagnostics of initial regression analyses, this variable is log-transformed. Two measures are employed to tap differential institutional engagement, which we conceptualize as capturing

youths' institutional educational engagement and participation in mainstream society at the aggregate level. This first measure is*college enrollment*, measured by the percent of the population enrolled in public and private colleges. Following Shihadeh and Thomas (*2007*), *disengaged youth* is calculated as the percent of 16–19 year olds who are simultaneously not enrolled in school, not in the labor market (not in the labor force or unemployed), and not in the military. These measures are readily available for this age group only.

Our research also controls for classic structural covariates of homicide rates (Land et al. *1990*; McCall et al.*2010*). The effects of population are captured in a *population structure index* that is an additive index created by combining the z-score of the total resident population and z-score of population per square mile variables, both log transformed. The financial strain associated with economic deprivation is measured using an additive *deprivation/affluence index* of the factor score-weighted component variables: percent families living below the poverty level, median family income (log transformed) and the percent of families with children that are headed by females.[4] As in prior studies, these variables were combined to reduce problems associated with collinearity and partialling fallacies. In order to assess their unique contributions to the variation in the homicide rate, unemployment and Gini variables were entered separately into the model and not included in the economic deprivation index. While an examination of the Variance Inflation Factors for these regressors indicated some relatively high scores, preliminary regression analysis did not indicate estimation problems.[5] Therefore, the *Gini index* and the *unemployment rate* have been included in the model as separate regressors.

Although the percent black population in urban areas is highly correlated with urban homicide rates, arguments have been made in the criminological literature that percent black is an exogenous factor and social forces such as racial discrimination and racial inequality mediate its relationship with homicide. Traditional measures used to capture these racial dynamics—that is, racial income inequality and racial residential segregation, are incorporated into the model as more proximate covariates of homicide rates than percent black.[6] *Racial income inequality* is measured using the ratio of white to black per capita income, and*racial segregation* is operationalized using the Dissimilarity Index comprised of two racial categories, whites and blacks, with respective white and black Latinos allocated to each. Because the percent black measure, often used to operationalize population heterogeneity, was not included, it is replaced with Blau's*heterogeneity index* comprised of three racial groups, whites, blacks and Latinos.

Ecological theories of crime imply that increased immigration rates and high concentration of immigrants would be associated with higher crime rates in some areas through poverty and weakened community engagement mechanisms (Sampson et al. *1999*; Shaw and McKay *1942*); however, empirical research suggests that this is not always the case. Martinez (*2002*) and his colleagues have proposed that immigration concentration of Latinos in US cities in recent years are associated with lower violent crime (Lee and Martinez *2002*; Lee et al. *2001*; Neilson et al. *2005*). Accordingly, we control for the effect of immigration on homicide using the percent of the city population that is *foreign born* as a measure of immigration concentration.

Other common structural covariates of homicide are included in the model. These include the *percent divorced males*, the *sex ratio* (males to females) and a dichotomous indicator of *location in the southern region* as defined by the Bureau of the Census. All the covariates included in the model are theoretically predicted to be positively related to homicide.

Methods and Analysis

Three models (one corresponding to each time period) were analyzed using multiple regression techniques. Ordinary Least Squares (OLS) regression with robust standard errors is used to estimate the parameter coefficients for each model for 1980, 1990 and 2000. Supplemental regression analyses were also conducted that take into account state-level clustering. These results did not significantly alter the substantive findings; therefore, only the findings from the OLS estimation with robust standard errors are presented.[7]

Results

Descriptive Statistics: Full Samples

Table 1 contains descriptive statistics—means, standard deviations, and ranges—for the full sample of all variables for the 3 years of the analysis. A number of characteristics of the data merit comment. First, the average city homicide rate for each sample of cities declines from 1980 through 2000 (8.8, 8.1 and 6.0 per 100,000 population). But the range of variation of the rates is highest for 1990, with an upper bound of 136 as compared to upper bounds for 1980 and 2000 of 75 and 82, respectively. The means, standard deviations, and ranges of these rates also are indicative of highly skewed frequency distributions that, after natural logarithmic transformations, are much more bell-shaped.

Table 1

Descriptive statistics of all predictors and dependent variables for full sample of US cities, 1980, 1990 and 2000

	1980	**1990**	**2000**
Variables			
Homicide rate (per 100,000 population)	8.8 [9.8] (0, 75.2)	8.0 [11.0] (0, 136.0)	5.9 [7.7] (0, 81.6)
Logged homicide rate	1.6 [1.3] (−.7, 4.3)	1.6 [1.1] (−.7, 4.9)	1.3 [1.0] (−.7, 4.4)
Population structure index	.08 [1.5] (−6.2, 8.9)	.03 [1.5] (−4.7, 8.9)	.06 [1.5] (−4.2, 8.8)
Economic deprivation	.33 2.6	.003 2.6	.09 2.5

	(−5.9, 11.6)	(−6.2, 11)	(−8.1, 8.8)
Gini index	.37 [.04] (.24, .55)	.39 [.05] (.27, .59)	.41 [.05] (.29, .58)
Percent divorced males	5.9 [1.8] (1.4, 12.7)	7.7 [2.3] (1.8, 15.2)	9.0 [2.6] (1.8, 20.5)
Percent aged 15–29	29.4 [7.1] (9.6, 74.0)	24.8 [6.6] (11.8, 66.3)	22.5 [6.8] (8.4, 74.4)
Unemployment rate	6.5 [2.9] (2, 25)	6.5 [2.8] (2, 31)	6.4 [2.8] (1.5, 19.7)
Ratio of white to black per capita income	1.6 .9 (.4, 23.2)	1.7 .65 (.5, 7.9)	1.6 .52 (.3, 4.6)
Dissimilarity index (racial residential segregation)	.49 .18 (0, 1)	.44 .17 (0, .9)	.39 .14 (.05, .8)
Male/female sex ratio (ages 16–34)	98.6 13.8 (64, 373)	100.5 12.3 (62, 305)	100.4 9.6 (52, 155)
Heterogeneity index	.02 .04 (0, .7)	.04 .06 (0, .7)	.08 .08 (.01, .8)
Percent foreign born	7.3 7.3 (0, 62)	9.3 9.9 (0, 70)	13.0 12.2 (.7, 72)
Percent enrolled in college	9.1 9.1 (1.4, 82.2)	9.26 7.5 (2.8, 63.2)	6.75 6.2 (2, 62.4)
Disengaged youth	11.6 5.4 (.3, 29.9)	9.43 4.6 (.3, 26.4)	8.82 4.5 (0, 21.9)
South	.27 [.44] (0, 1)	.26 [.44] (0, 1)	.27 [.44] (0, 1)
Index components			
Population size	102,255 [305,908] (25,075, 7,071,639)	105,003 [306,398] (6,379, 7,322,564)	119,599 [346,367] (7,602, 8,008,278)
Population per square mile	4,038 [3,555] (52, 39,709)	3,960 [3,515] (129.5, 45,822)	4,082 [4,007] (153.4, 52,978)
Median family income (in 2000 constant	43,894	50,057	51,671

dollars)	[10,775] (19,630, 95,156)	[16,008] (18,196, 126,873)	[17,730] (23,519, 155,246)
Percent families in poverty	15.1 [7.2] (2.3, 45.6)	10.0 [6.6] (.51, 40.4)	10.2 [6.0] (1.1, 32.8)
Percent families with kids, female headed	19.6 7.9 (5, 57)	22.3 9.5 (4, 68)	25.4 10.3 (4.6, 67)
N	874	945	867

Means, standard deviations [in brackets], ranges (in parentheses), and sample sizes (Ns)

Second, the mean percentages of population enrolled in college are comparable for 1980 and 1990 (about 9.2 percent) but decline in 2000 (6.7). The standard deviations for this variable declines from 1980 to 2000, and the ranges are quite comparable for 1990 and 2000 with the upper bounds for 1980 relatively high (82 %). On the other hand, the disengaged youth index declines from 1980 through 2000. The population structure index shows the most stability of all the regressors, with means, standard deviations and ranges that are quite comparable from one decennial year to the next.

As displayed in the table, the economic deprivation index is higher in 1980 than 1990 and 2000.[8] The measures that comprise the index show similar trends, with the exception of family composition (percent of families with children that are female headed) which increases over the three time periods. This upward pattern is found for a number of the other indicators, including the Gini index of income inequality, the percent of the population consisting of divorced males, the racial composition (via heterogeneity index) and the percent foreign born. By comparison, the mean of the percent of the population aged 15–29 shows a decline since 1980, relatively constant standard deviations, and peak ranges in 1980 and 2000. The means for the unemployment rate and the mean value for the ratio of white to black per capita income remain fairly constant across the time periods. A similar pattern is found for the sex ratio index.

Baseline Model: All Cities

We begin our statistical analysis with an examination of the influence of age structure on homicide rates for the full sample of cities available in each of the three time periods.[9] This model serves as a baseline for comparison with subsequent analyses involving sub-samples of cities that capture the spectrum of institutional engagement, ranging from high levels of disengagement to high levels of institutional engagement.

Table 2 shows the Ordinary Least Squares regression results estimated using robust standard errors for the full sample of cities for the three decennial periods—1980, 1990 and 2000. Consistent with established findings in ecological studies of city homicide rates (McCall et al. *2010*), the population structure index, economic deprivation index, percent divorced males

and the southern region[10] are all statistically significant in the theoretically predicted direction in each of the three time periods. Also consistently significant across all three models are the coefficients for the unemployment rate, the dissimilarity index (racial segregation), and the heterogeneity index (population heterogeneity). Among the variables that are statistically significant as theoretically posited in at least one of the 3 years are the Gini index for 1990 and 2000, percent foreign born in 1980 and 1990, the ratio of white to black per capita income (racial inequality) in 1990 (although negatively related to the homicide rate), and the sex ratio in 1990.

Table 2

Multivariate regression estimates with robust standard errors for predictors on homicide rates[a] using full sample of US cities, 1980, 1990, 2000

	1980	**1990**	**2000**
Constant	−.384 (−0.75)	−1.027 (−2.66)**	.203 (0.51)
Population structure	.136 [.157] (5.11)**	.150 [.202] (8.08)**	.112 [.164] (6.11)**
Economic deprivation (poverty, %families w/kids female headed, med. family income)	.134 [.261] (6.14)**	.124 [.202] (5.46)**	.226 [.543] (12.37)**
Gini index	1.274 [.044] (1.23)	1.774 [.083] (2.70)**	1.59 [.072] (2.03)*
Percent divorced males	.151 [.212] (7.86)**	.087 [.180] (6.58)**	.039 [.096] (3.17)**
Percent aged 15–29	−.016 [−.087] (−2.63)	−.009 [−.054] (−1.76)	−.016 [−.103] (−3.83)
Unemployment rate	0.044 [.096] (2.70)**	.074 [.192] (4.64)**	.026 [.070] (1.70)*
Ratio of white to black per capita income	−.020 [−.014] (−0.85)	−.072 [−.042] (−1.65)*	−.055 [−.027] (−0.88)
Dissimilarity index (racial residential segregation)	.844 [.117] (3.62)**	.525 [.080] (3.10)**	.616 [.085] (3.00)**
Male/female sex ratio	−.000 [−.003] (−0.10)	.005 [.060] (2.72)**	−.000 [−.003] (−0.12)
Heterogeneity index	3.013 [.100]	1.603 [.090]	1.459 [.116]

	(3.90)**	(4.38)**	(4.65)**
Percent foreign born	.011 [.063] (2.40)*	.008 [.071] (2.09)*	−.003 [−.032] (−0.86)
South	.830 [.280] (8.26)**	.682 [.269] (11.16)**	.369 [.156] (6.35)**
R^2	.481	.618	.612
N	874	945	867

Regression coefficients, standardized coefficients [in brackets], and *t* ratios (in parentheses)

[a]Homicide rates, transformed with natural logarithm. *$p \leq .05$; **$p \leq .01$, $^{+}$ $p \leq .10$ one-tailed test. *t* ratios estimated with robust standard errors. Percent Black omitted from these models

As reviewed above, much of the criminological research literature and opportunity based theories would lead to the prediction that age structure (percent ages 15–29) would have a positive, statistically significant net regression relationship to homicide rates due to high levels of offending among this age group relative to other age groupings. Contrary to these predictions, the estimated regression coefficients for the age structure (percent 15–29) regressor in Table 2 are consistently negative for all three time points.[11], [12] This, again, is illustrative of the puzzling age structure-homicide rate relationship to which this paper is addressed.

Restricted Sample Analyses: Cities with High Levels of Institutionally Disengaged Youths

In the next set of analyses, we use the disengaged youth index originated by Shihadeh and Thomas (*2007*) in order to define a sub-sample of the cities. For each of the three time periods, sub-samples of cities that have high levels of institutionally disengaged youth are analyzed. Specifically, the samples of cities are restricted to those that have values for the disengaged youth index that are greater than the mean for the corresponding full samples of cities. In addition, the samples are further restricted by omitting those cities with large proportions of their populations enrolled in college and arguably with great attachment to conventional norms. Of course, there is overlap in the cities that are characterized by these two restrictions. Yet these criteria ensure that the cities included in this set of analyses have characteristics of youths who are less engaged in mainstream schooling and work institutions and thus at greater risk of involvement in serious violent crimes such as homicide. These selection criteria yield 374 cities in 1980, 399 in 1990 and 380 in 2000. The descriptive statistics for these sub-samples of cities are provided in “Appendix 2”.

Table 3 displays the results for the OLS regression analyses of these cities. Turning first to the focus of this study, the coefficients for the age structure covariate—the percent ages 15–29—now are statistically significant and positively associated with the homicide rate in all 3 years. That is, when cities have a relatively larger youthful population with weak bonds to mainstream

social institutions, the theoretically predicted positive relationship between age structure and homicide rate is corroborated.

Table 3

Multivariate regression estimates with robust standard errors for predictors on homicide rates[a] using sample restricted to cities with greater than the mean disengaged youth and to cities with less than the mean percentage of population enrolled in college, 1980, 1990, and 2000

	1980	**1990**	**2000**
Constant	−1.49 (−1.37)	−1.66 (−2.88)**	−.897 (−1.47)
Population structure	.074 [.109] (1.96)*	.096 [.181] (4.00)**	.056 [.107] (2.07)*
Economic deprivation (poverty, %families w/kids female headed, med. family income)	.103 [.201] (3.11)**	.081 [.197] (2.83)**	.102 [.226] (2.71)**
Gini index	5.11 [.188] (2.49)**	1.760 [.092] (1.49)$^{+}$	2.52 [.121] (1.76)*
Percent divorced males	.095 [.131] (2.62)**	.044 [.099] (2.05)*	.020 [.052] (0.96)
Percent aged 15–29	.060 [.178] (3.14)**	.069 [.242] (5.67)**	.039 [.115] (2.51)**
Unemployment rate	.004 [.011] (0.19)	.069 [.232] (4.00)**	.075 [.225] (2.87)**
Ratio of white to black per capita income	−.084 [−.042] (−0.77)	.162 [.101] (2.00)*	−.068 [−.036] (−0.50)
Dissimilarity index (racial residential segregation)	1.51 [.233] (3.75)**	.917 [.172] (3.69)**	1.26 [.212] (4.22)**
Male/female sex ratio	−.018 [−.182] (−2.74)**	−.006 [−.080] (−1.46)$^{+}$	−.006 [−.072] (−1.34)
Heterogeneity index	2.39 [.087] (1.58)$^{+}$	2.41 [.149] (4.94)**	1.67 [.088] (2.07)*
Percent foreign born	.024 [.183] (3.78)**	.008 [.101] (2.07)*	−.004 [−.066] (−1.00)
South	.364	.458	.249

	[.152] (2.48)**	[.242] (5.43)**	[.133] (2.51)*
R^2	.392	.535	.487
N	374	399	380

Regression coefficients, standardized coefficients [in brackets], and *t* ratios (in parentheses)

Sample represents cities with $>\bar{x}$ disengaged youth and cities $<\bar{x}$ population enrolled in college)

[a]Homicide rates transformed with natural logarithm

**$p \leq .01$, *$p \leq .05$, $^{+}$ $p \leq .10$ one-tailed test; *t* ratios estimated with robust standard errors

Other substantive relationships in Table 3 generally are consistent with those found using the full samples of cities in Table 2, and thus not reiterated here. The exceptions are that (1) the estimated regression coefficients of the Gini index are statistically significant for two of the 3 years and marginally so for the third year (1990), (2) the parameter coefficients for the percent divorced males in the 2000 model and for the unemployment rate in 1980 are not statistically significant, (3) the ratio of white to black income is significant in 1990 but positively rather than negatively correlated to the homicide rate as it was in the total sample, and (4) the sex ratio is significantly related to homicide in both 1980 and 1990.

Restricted Sample Analyses: Cities with High Levels of Institutionally Engaged Youths

To further explore the role that ties to conventional social institutions and the associated stakes in conformity play in the relationship between age structure and homicide activity, we next focus on the other end of the spectrum. That is, the results reported in Table 4 are based on restricted samples of cities with higher percentages of the population involved in conventional activities as measured by higher than average percentages enrolled in college and lower than average percentages of disengaged youth than what was found in the full samples of cities. “Appendix 3” displays the means, standard deviations and ranges for all measures represented in these subsamples of cities consisting of 187 cities in 1980, 165 in 1990 and 158 in 2000.

Table 4

Multivariate regression estimates with robust standard errors for predictors on homicide rates[a] using sample restricted to cities with greater than the mean percentage of population enrolled in college and to cities with less than the mean disengaged youth, 1980, 1990, and 2000

	1980	**1990**	**2000**
Constant	−1.04 (−1.01)	−.095 (−0.08)	.840 (0.86)
Population structure	.179 [.196] (2.82)**	.116 [.162] (2.09)*	.187 [.317] (4.49)**

Economic deprivation (poverty, %families w/kids female headed, med. family income)	.104 [.181] (1.76)*	.167 [.352] (2.69)**	.268 [.569] (7.66)**
Gini index	1.85 [.059] (0.80)	2.16 [.091] (1.28)	2.78 [.121] $(1.47)^{+}$
Percent divorced males	.102 [.153] (2.60)**	.075 [.154] $(1.91)^{+}$	.019 [.046] (0.54)
Percent aged 15–29	−.020 [−.179] (−1.77)*	−.022 [−.230] (−2.14)*	−.012 [−.144] $(-1.57)^{+}$
Unemployment rate	−.006 [−.008] (−0.10)	−.021 [.036] (−0.34)	−.028 [−.078] (−1.25)
Ratio of white to black per capita income	−.016 [−.006] (−0.09)	−.186 [−.132] (−2.02)*	−.042 [−.026] (−0.32)
Dissimilarity index (racial residential segregation)	1.723 [.222] (2.75)**	.795 [.112] (1.14)	.378 [.052] (0.73)
Male/female sex ratio	.007 [.061] (0.82)	.004 [.052] (0.69)	−.008 [−.100] (−1.42)+
Heterogeneity index	4.60 [.156] (2.04)*	.398 [.033] (0.68)	1.42 [.218] (2.62)**
Percent foreign born	−.016 [−.072] (−0.83)	.017 [.150] (1.97)*	−.006 [−.087] (−1.04)
South	1.056 [.365] (4.79)**	.934 [.408] (5.97)**	.545 [.263] (4.25)**
R^2	.483	.529	.585
N	187	165	158

Regression coefficients, standardized coefficients [in brackets], and *t* ratios (in parentheses)

Sample represents cities with $<\bar{x}$ disengaged youth and cities $>\bar{x}$ population enrolled in college)

[a]Homicide rates transformed with natural logarithm

$^{**}p \leq .01$, $^{*}p \leq .05$, $^{+}p \leq .10$ one-tailed test; *t* ratios estimated with robust standard errors

Table 4 contains parameter estimates for the regression models based on the samples of cities with proportionately higher levels of youth engaged in mainstream social institutions within the

city populations. In contrast to previous models, the estimated regression coefficients for the youthful population covariate now are negative and statistically significant for all three times points. That is, for cities in which larger proportions of their youthful populations have strong ties to social institutions, the relationship between the young population and the homicide rate reverses and becomes negative consistently over time. This finding provides further support for the importance of mainstream institutional participation to determining the nature of the age-crime relationship at the aggregate level and also provides support for our differential institutional engagement hypothesis. Following Paternoster et al. (*1998*), a Chow test for differences in the age structure coefficients in Tables 3 and 4 was performed and supports the inference that they are statistically significantly different from each other (parameter coefficients and test statistics available upon request).

Turning to the estimated regression coefficients for the other structural covariates in these models, note that those for population structure, the economic deprivation index, and the South are statistically significant and in the directions posited in all three decennial periods. By comparison, the percent divorced males is statistically significant only in 1980 and 1990, the Gini coefficient is significant in the posited direction only in 2000, the unemployment rate is not significant in any of the three models, the dissimilarity index is only significant in 1980 as opposed to all 3 years, the male/female sex ratio is significant and negatively correlated with the homicide rate in 2000 rather than positive in 1990, and the heterogeneity index is significant as theoretically predicted in only 1980 and 2000. Changes in the influence of these social and economic forces on city homicide rates across the three samples will be discussed further below.

Summary

To systematically examine our differential institutional engagement hypothesis, we first reported estimates of the influence of the relative size of the youth population on homicide rates for large samples of cities (over 800 cities with populations of 10,000 or more) across three decennial time periods, 1980, 1990, and 2000. These models serve as a baseline for comparison with two sets of restricted sample analyses—one set of models capturing those cities with high percentages of youth actively engaged in mainstream social institutions (enrolled in college and/or not disengaged from the labor force) and another set of models containing only those cities with large proportions of disengaged youth and few enrolled in college.

Overall, our findings show strong support for the differential institutional engagement hypothesis in all 3 years. In cities with large proportions of their populations comprised of institutionally disengaged youths (approximately 45 % of the corresponding total samples of cities), the relationship between youth population and the homicide rate is positive and statistically significant as predicted. On the other end of the continuum of institutional engagement, cities with relatively high levels of youths engaged and bonded to mainstream social institutions such as higher education (approximately 20 % of the total samples of cities) are characterized with a consistently negative relationship between the percent young population and homicide rates.

Discussion and Conclusion

We introduced the concept of differential institutional engagement, which draws heavily on the conceptual underpinning of control theories. Control theories posit that the level of control exerted over individuals varies, and the causes of delinquency can be understood by accounting for this variation. This perspective posits that individuals who are not subject to control mechanisms are at a greater risk of participation in criminal activities. Consequently, involvement in pro-social activities reduces the likelihood of engaging in criminal behavior through the individual's bonds to conventional persons and institutions. The deterrent effect of social ties in individual level investigations support control theory's propositions that persons with strong pro-social bonds are less likely to participate in crime.

Following this logic, we propose that social ties to conventional others through engagement or participation in normative social institutions will reduce individuals' involvement in crime (both as victims and offenders).[13] We contend that commitment to and involvement in status-attaining institutions deter violent crime; therefore, aggregate indices of youths' participation in normative social institutions should account for the anomalous findings in prior research on the relationship between age structure and homicide rates.[14] Prior studies have assumed that the youth population across locales is a homogenous group who are similarly institutionally engaged. This assumption may explain the contradictory and inconsistent findings in previous aggregate-level studies. Our conception of differential institutional engagement acknowledges possible contingent effects of the age structure-crime rate relationship by recognizing that the youth population is a heterogeneous group with varying levels of pro-social institutional commitment, as posited by control theories.

Note that it should not be inferred that our findings of a macro-level relationship between the level of institutionally engaged youths in a city and its homicide rate imply a corresponding relationship at the individual level, namely, that individual youths in a city with different degrees of institutional involvement are more or less likely to be involved in a homicide, as that is a potentially fallacious ecological inference. Rather, at the community level, our proposition is that indicators of youthful institutional (dis)engagement represent the community's (in)ability to regulate deviant behavior and criminal involvement among any and all individuals connected with that community. In those communities where a large proportion of youth are institutionally engaged, organizations and activities of community members provide a context for shared mainstream values which facilitate community social control. We propose that youthful institutional engagement or participation in normative social institutions indicates an area's shared sentiments, close social networks and bonds to conventional others and behaviors. Communities with these social properties are characterized with lower levels of individuals' involvement in crime (both as victims and offenders). In other words, aggregate indices of youths' participation in normative social institutions should reflect the contextual support for mainstream lifestyles and should account for the anomalous findings in prior research on the relationship between age structure and homicide rates.

Our data reveal that inconsistent results found in prior ecological studies examining age structure and crime rates may be due to the failure to consider the youth population's level of engagement in conventional institutions and the related contextual influence on patterns of interaction and opportunities that hinder or enhance community control in these settings. Given our findings, we join others (Greenberg *1985*; Phillips *2006*) who have suggested that the universal age-crime relationship proposed by Hirschi and Gottfredson (*1983*) may be exaggerated.

Building upon the theoretical and empirical contribution of this paper, future studies should investigate the effect of differential institutional engagement in predicting homicide rates and other crime types in other spatial contexts. Even though the large sample of cities we investigate provide enough variability to test our hypotheses, the question remains as to whether similar relationships exist at levels of analysis below or above the city level. Therefore, additional analyses at other levels of ecological aggregation, from neighborhoods to larger levels such as counties, metropolitan areas or states, should be conducted so that the range of application of this hypothesis can be more fully established. Hence, future ecological studies of the age-crime relationship at the neighborhood level also should explore the emergent structural properties of communities on crime rates over and above the aggregated relationships demonstrated in this study.

Appendix 1: Data Definitions and Sources

The data source from which most covariates were collected is Sociometrics' CDA from the *1970, 1980, and 1990 Census Extract Data (1998)*. The 2000 data (not available from CDA) were derived online from the US Bureau of the Census American Fact Finder's 2000 STF3 detailed tables (Census); and a few measures for 1980 and 1990 were also obtained from the US Bureau of the Census. Other covariates were collected from the Minnesota Population Center's NHGIS. The variables in these analyses were obtained from sources specified below. More specific information is available upon request from the authors.

Data Definitions

Homicide rate: (Number of murder and non-negligent manslaughter offenses/total resident population) × 100,000. Source: FBI and/or Fox 2008, Victim file.

Population size: Number of total resident population. Source: CDA, Census.

Population per square mile: (Total population/land area in square miles). Source: CDA, Census.

Population structure: (z-score of Population size + z-score of Population per square mile).

Economic Deprivation: (factor-score − weighted z-scores of following three measures).

Percentage of families with children that are female headed families: (Female single parent households with children/(Married couple families with children + Male single parent

households with children + Female single parent households with children)) × 100. Source: CDA, Census P046.

Median family income (in 2000 constant dollars): Source: Census (1980, 2000), NHGIS (1990).

Percentage of families living below the official poverty level: Source: Census (1980, 2000), NHGIS (1990).

Gini index of income concentration for families: For 1980, 17 category family income distribution used; for 1990, 25 category family income distribution used; and for 2000, 16 category family income distribution used to compute the Gini Index of Income Concentration:

$Gi = (\sum X_i Y_{i+1}) - (\sum X_{i+1} Y_i)$ where X_i and Y_i are respective cumulative percentage distributions; (Shryock et al.*1976*:98–100). Source: CDA, Census.

Percentage divorced males: (Number divorced males/number males 16 years old and over) × 100. Source: NHGIS.

Percentage of the population 15–29 years of age: (Number of 15–29 year olds/total resident population) × 100. Source: NHGIS.

Unemployment rate: (Number employed in civilian labor force/number in civilian labor force) × 100. Source: CDA, Census.

Ratio of White to Black per capita income: (Per capita income for Whites/Per capita income for Blacks). Source: NHGIS.

Dissimilarity index: $\sum[t_i|p_i - P|/2TP(1 - P)]$, computed using Stata's "seg …, d" command. Source: CDA, Census; Massey and Denton (*1988*:284).

Male/Female sex ratio: (Males age 16–34/Females ages 16–34) × 100. Source: CDA, Census.

Heterogeneity index: (1 − (Proportion of population non-Latino Whites + Proportion non-Latino Blacks + Proportion Latinos)). Source: CDA, Census.

Percent foreign born: (Foreign born population/total resident population) × 100. Source: CDA, Census.

Percent enrolled in college: (College enrollment, private and public/Total resident population) × 100. Source: NHGIS (1980 & 1990), Census (2000).

Disengaged youth: ((High school grad, not in labor force, ages 16 to 19 + High school grad, Unemployed, ages 16 to 19 + Non-high school grad, not in labor force, ages 16 to 19 + Non-high school grad,Unemployed, ages 16–19)/Population ages 16–19) × 100. Source: NHGIS (1980 & 1990), Census (2000).

South region: Dummy variable for southern geographic location as defined by US Census bureau. Source: Census.

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Appendix 2

See Table 5.

Table 5

Descriptive statistics for sample restricted to cities with greater than the mean disengaged youth and to cities with less than the mean percentage of population enrolled in college

	1980	**1990**	**2000**
Variable			
Homicide rate (per 100,000 population)	13.1 [11.2] (0, 75.2)	12.9 [14.0] (0, 136)	9.1 [9.5] (0, 81.6)
Logged homicide rate	2.2 [1.1] (−.7, 4.33)	2.2 [.9] (−.7, 4.92)	1.9 [0.9] (−.7, 4.4)
Population structure index	.18 [1.7] (−6.23, 8.92)	.24 [1.7] (−4.7, 8.9)	.22 [1.7] (−4.1, 8.8)
Economic deprivation index	1.66 [2.2] (−3.4, 11.6)	1.64 [2.2] (−3.0, 11)	1.62 [2.0] (−3.6, 8.8)
Gini Index	.38	.41	.42

	[.04] (.25, .55)	[.05] (.30, .59)	[.04] (.29, .57)
Percent divorced males	6.6 [1.6] (2.1, 10.7)	8.8 [2.0] (3.6, 13.9)	10.0 [2.4] (3.1, 16.6)
Percent aged 15–29	27.7 [3.3] (11.1, 46.4)	23.6 [3.2] (11.8, 38.3)	21.7 [2.7] (12.2, 31.7)
Unemployment rate	8.1 [3.1] (2, 25)	8.4 [3.0] (4, 31)	7.7 [2.7] (2.6, 19.7)
Ratio of white to black per capita income	1.6 [.6] (.5, 7.6)	1.8 [.6] (.55, 4.1)	1.6 [.5] (.6, 3.8)
Dissimilarity index (racial residential segregation)	.54 [.17] (0, .94)	.48 [.17] (0, .88)	.43 [.15] (.05, .84)
Male/female (sex ratio ages 16–34)	97.6 [11.1] (71, 211)	99.9 [11.3] (79, 186)	100.4 [10.3] (74, 155)
Heterogeneity index	.02 [.04] (0, .7)	.03 [.06] (0, .68)	.06 [.05] (.01, .33)
Percent foreign born	7.3 [8.8] (0, 55)	9.7 [11.9] (0, 70)	13.4 [13.4] (.7, 72.1)
Percent enrolled in college	5.1 [1.7] (1.4, 8.7)	6.2 [1.4] (3.2, 9.3)	4.6 [1.1] (2.2, 6.8)
Disengaged youth	16.3 [3.6] (11.5, 29.9)	13.6 [3.0] (9.4, 26.4)	12.8 [2.8] (8.8, 21.9)
South	.33 [.5] (0, 1)	.35 [.48] (0, 1)	.37 [.48] (0, 1)
Index components			
Population size	128,462 [428,665] (25,234, 7,071,639)	143,983 [454,767] (20,121, 7,322,564)	161,169 [504,622] (8,671, 8,008,278)
Population per square mile	4,270 [4,264] (52, 39,709)	4,280 [4,260] (129.5, 45,822.3)	4,419 [5,041] (153, 52,978)
Median family income (in 2000 constant dollars)	38,452 [6,652]	40,969 [8,690]	41,992 [8,813]

	(19,630, 64,194)	(18,196, 74,823)	(23,519, 80,379)
Percent families in poverty	19.0 [6.4] (4.7, 45.6)	14.0 [6.4] (2.5, 40.4)	13.8 [5.6] (2.4, 32.8)
Percent families with kids, female headed	22.8 [7.8] (8, 57)	27.4 [9.1] (12, 68)	30.5 [10.1] (10, 67)
N	374	399	380

Means, standard deviations [in brackets], ranges (in parentheses), and sample Ns

Sample represents cities with $>\bar{x}$ Disengaged Youth and cities $<\bar{x}$ Population Enrolled in College of the percentage enrolled in college

Appendix 3

See Table 6.

Table 6

Descriptive statistics for sample restricted to cities with greater than the mean percentage of population enrolled in college and to cities with less than the mean disengaged youth

	1980	**1990**	**2000**
Variable			
Homicide rate (per 100,000 population)	5.3 [5.8] (0, 29.6)	4.9 [4.7] (0, 24.3)	3.5 [3.3] (0, 14)
Logged homicide rate	1.1 [1.3] (−.69, 3.4)	1.3 [1.0] (−.69, 3.2)	1.0 [0.9] (−.7, 2.7)
Population structure index	.00 [1.4] (−3.5, 5.3)	.01 [1.4] (−2.7, 5.4)	.08 [1.5] (−3, 5.3)
Economic deprivation index	−.17 [2.2] (−5.9, 5.3)	−.39 [2.2] (−6.2, 6.1)	−.35 [1.9] (−6.8, 3.5)
Gini index	.39 [.04] (.28, .49)	.41 [.04] (.31, .52)	.42 [.04] (.34, .52)
Percent divorced males	5.2 [1.9] (1.4, 10.9)	6.7 [2.1] (1.8, 13.9)	7.5 [2.1] (1.8, 12.8)
Percent aged 15–29	36.3 [11.1] (18.7, 74)	33.0 [10.6] (14.7, 66)	30.3 [10.7] (16, 74)

Unemployment rate	5.2 [1.7] (2, 11)	5.6 [1.8] (2, 11)	6.5 [2.5] (2.6, 15.5)
Ratio of white to black per capita income	1.6 [.4] (.7, 3.8)	1.8 [.7] (.8, 7.9)	1.7 [.6] (.6, 4.4)
Dissimilarity index (racial residential segregation)	.45 [.16] (.1, .87)	.40 [.14] (.1, .82)	.37 [.12] (.1, .74)
Male/female (sex ratio ages 16–34)	100.3 [11.6] (64, 149)	101.5 [11.6] (62, 140)	100.7 [11.7] (52, 143)
Heterogeneity index	.03 [.04] (0, .34)	.06 [.08] (0, .7)	.12 [.14] (0, .8)
Percent foreign born	7.4 [5.9] (1, 33)	9.5 [8.9] (1, 47)	14.3 [13.5] (.7, 56)
Percent enrolled in college	20.6 [14] (8.8, 82)	20.4 [12.6] (9.3, 63)	15.1 [10.3] (6.8, 62)
Disengaged youth	6.4 [3.0] (.27, 11.5)	5.0 [2.6] (.3, 9.4)	4.8 [2.5] (0, 8.8)
South	.25 [.4] (0, 1)	.27 [.45] (0, 1)	.25 [.43] (0, 1)
Index components			
Population size	77,231 [100,598] (25,075, 875,538)	90,482 [126,266] (24,927, 1,110,549)	102,529 [149,300] (24,610, 1,223,341)
Population per square mile	3,805 [2,749] (386, 19,839)	3,753 [2,803] (453, 18,537)	4,031 [3,251] (541, 18,868)
Median family income (in 2,000 constant dollars)	46,503 [11,974] (28,074, 95,156)	53,533 [17,157] (27,711, 126,195)	53,908 [15,491] (31,882, 134,769)
Percent families in poverty	13.9 [6.1] (2.3, 28.2)	9.3 [5.1] (.5, 28.3)	9.4 [4.2] (1.6, 22.6)
Percent families with kids, female headed	18.6 [6.3] (5, 37)	21.4 [7.4] (4, 42)	23.5 [8.3] (7, 47)
N	187	165	158

Means, standard deviations [in brackets], ranges (in parentheses), and sample Ns

Sample represents cities with $<\bar{x}$ Disengaged Youth and cities $>\bar{x}$ Population Enrolled in College of the percentage enrolled in college

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Footnotes

1 Although we do not engage in the debates about the individual-level variations in the age-crime relationship, these studies represent a substantively crucial aspect of this covariate of crime. For an extensive discussion, see Piquero et al. (*2003*) and Piquero (*2008*). Nevertheless, scholars engaging in this debate would find the implications of the research herein relevant.

2 Although we choose to focus on control-based theoretical developments, other theoretical perspectives may be applied to the logic underlying differential institutional engagement.

3 Published volumes for the latter two decennial periods were referenced to determine when missing homicide data for cities actually represented zero homicides. Furthermore, a few cases were retained by ensuring that at least two years of data comprised the homicide rate by retrieving data from the five year period circa each decennial period.

4 Cronbach's alpha scores for the economic deprivation index were .63, .62 and .58 for 1980, 1990 and 2000, respectively. Alpha scores were greater than .8 with median family income omitted.

5 One model in Table 2 (for 1990) exhibited a VIF approaching 7, and two models in Table 4 (for years 1990 and 2000) produced a VIF of 5.6—all three associated with the economic deprivation index which is highly correlated with the unemployment rate (approximately .8). Nevertheless, parameter estimates for all three regressors, economic deprivation, Gini and unemployment rate, were statistically significant in the posited direction in those models. To ensure the reliability of these findings, the models were also estimated after excluding the unemployment rate and the results were compared with the original model specification. There were few substantive differences between the models and particularly none with regard to the percent young variable. No other VIF values exceeded 5.

6 Additional analyses were conducted to determine whether including percent black in the model affected the regression results. Principle components analyses indicated that percent black loaded with the economic deprivation index, therefore an alternative deprivation index was created that also included percent black. Few parameter estimates from regression analysis of this model specification were substantively different from those that excluded percent black from the model. In particular, there were no substantive differences with regard to the age structure measure. Results from these analyses are available upon request.

7 The parameter estimates presented in the tables were estimated using Stata 11.0's regression command with the "robust" option. These models were also estimated with the "vce (cluster)" option specifying a state identifier which allows for intragroup correlation using the state within which the cities are located as the group. The results from this estimation technique showed no substantive differences in estimates for the age structure coefficient. Furthermore, the 1980 models were also estimated using negative binomial regression techniques because there were a substantial number of zero homicide cases in that year and because tests for over dispersion in Poisson regression analyses indicated the assumptions of equal mean and variance were not met. The results of these analyses differed little from the regression results reported in the tables and none produced substantive differences for the age structure measure. Results of these supplemental regression analyses are available upon request.

8 The mean economic deprivation index values for 1990 and 2000 are .24 and .25, respectively when considering those cities for which data are available for the 1980 measures (in comparison with 1980's mean of .33). This difference is largely due to missing homicide rate data for smaller cities in 1980. For example, when restricting the sample to those cases for which data are available in 1980 the component values are only slightly higher than those shown in this table for 1990 and 2000.

9 In cross-sectional analyses, age effects cannot be distinguished from cohort effects. Accordingly, the relationship between age structure and homicide rates cannot be disentangled from that of cohort and homicide rates in the present study.

10 The analyses were replicated using two other model specifications to examine the notion that the West region of the US should be the focus of regional controls rather than the South. One set of nine models replaced South with West region dummy variable and the other set of nine models included three region dummies: West, South, and Northeast. Fifteen of the 18 models upheld the age-structure-crime relationship reported in these analyses. When substituting the West region for the South, one of the nine coefficients for age structure changed to not statistically significant—the engaged youth model for 2000 with 158 cases ($p = .283$). After including region dummy measures for South, West and Northeast in the models, two of the nine coefficients for age structure changed to not statistically significant—both engaged and disengaged youth models for 2000, one with 158 cases ($p = .237$) and one with 380 cases ($p = .360$). Furthermore, the West region dummy variable was negatively correlated with the homicide rate when statistically significant (13 of 18 models) as opposed to positively associated. Because of this and to maintain consistency with the majority of ecological studies of homicide which control for southern region, we report the findings for the model specifications using the South dummy variable for region.

11 Blalock (*1979*: 163) states: "If one is interested in showing a theory to be correct, one will make significance tests only when results occur in the predicted direction. If they occur in the opposite direction, one need make no test since the data obviously do not support the theory anyway." Accordingly, while we report the estimated *t* statistics for the $b_{\%15–29}$ coefficients for 1980, 1990, and 2000 in Table 2, we do not use them in a formal test.

12 McCall et al. (*2010*) found that the percent young age structure covariate was not statistically significant for a city-level analysis of 1970 data. Because there are no data for measures of disengaged youths in 1970, the present analyses are restricted to 1980, 1990, and 2000.

13 The institutional engagement mechanism may have broad applicability: Simon (*2011*) has linked recent cutbacks in youth services, and the mainstream institutional involvements that go therewith, in the United Kingdom with the youth riots that occurred in London and other UK cities in early August 2011. According to his account (Simon *2011*: 40), "Youth clubs have already closed, youth workers have been sacked, and programs that in previous years have occupied urban youngsters in the long summer break are not running. As a result, many young people have 'nothing to do.'"

14 Persons outside the ages analyzed here are also expected to be influenced by differential institutional engagement; however, we focus on the youth population for two reasons. First, the empirical ambiguities we seek to clarify center on the inconsistent findings of the relationship between percent youth population and homicide rates. Second, prior research by Warr

(*1998*, *2002*) indicates that youth are more likely to be in closer physical and social proximity to other institutionally disengaged youth due to their life course stage.