Anticipating the Future Based on Analysis of the Past: Intercity Variation in Youth Homicide, 1984-2006

FINAL REPORT
September, 2010

Submitted to

National Institute of Justice
Carrie Mulford, Project Officer
Grants.gov Upload

Submitted by

RTI International
Kevin J. Strom
Kelle Barrick
3040 Cornwallis Road
Research Triangle Park, NC 27709

Vera Institute of Justice
Angela Browne, PI
1330 Connecticut Ave NW
Suite B
Washington, DC 20036

University of California, Riverside
Kirk R. Williams
Robert Nash Parker
110 College Building South
Presley Center for Crime and Justice Studies
University of California at Riverside
Riverside, CA 92521
March 31, 2010

Administrative Point of Contact:

David Faucette
Office of Research Contracts
RTI International
3040 Cornwallis Road
Research Triangle Park, NC 27709-2194
Telephone: (919) 541-7176
Fax: (919) 316-3911
E-mail: dhf@rti.org

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ABSTRACT

Homicide researchers at the *Vera Institute of Justice*, *RTI International*, and the *Presley Center for Crime and Justice Studies*, University of California conducted a comprehensive study of trends in youth homicide offending from 1984-2006 for youth 13 to 24 years of age in 91 of the 100 largest cities in the United States (based on the 1980 Census). The study extends previous work on the perpetration of youth violence by modeling city-specific explanatory predictors influencing annual changes in youth homicide offending within cities during the youth homicide epidemic in the mid-1980s and early 1990s, applying the specified model to emerging trends in youth homicide perpetration for 2000-2006, assessing whether the model applies equally well for juveniles 13 to 17 and young adults ages 18 to 24, and analyzing whether the scope of the model can be extended to perpetration of nonlethal youth violence, particularly robbery and aggravated assault. A unique comprehensive data file representing youth lethal *and* nonlethal offending by males ages 13 to 24 at the city-level over this 23-year period was also constructed for public use.

Findings showed that homicide, robbery, and aggravated assault trends for both juveniles and young adults followed the same general trend between 1984 and 2006. There was an escalation in lethal and nonlethal violence arrest rates in the early years, followed by a significant downturn after the early 1990s, and then a subsequent and significant upturn in the more recent years of the time period. While some factors were consistently associated with youth violence across offense type, time period, and analytic technique, others were significant in only certain situations. Specifically, structural disadvantage was consistently associated with variation in homicide and robbery among juvenile and young adult perpetrators during both the initial escalation of violence in the mid-1980s and early 90s and in more recent years. Additionally, gang presence –activity and drug market activity were consistently associated with the escalation in homicide offending among both juveniles and young adults during both early and later years.

EXECUTIVE SUMMARY

Introduction

Youth involvement in lethal and nonlethal violence has varied substantially over the past two and a half decades, including recent variation since the new millennium. Most previous studies of youth homicide analyzed trends at the *national* level (e.g., Blumstein, 1995; Messner, et al., 2001, 2005) or calculated youth homicide rates during a specific period for a sample of cities and assessed whether city characteristics accounted for *intercity* variation of those rates (e.g., Ousey, 2000; Strom & MacDonald, 2007). More recently, McCall and her colleagues (2008) assessed relationships of *within-city* changes in structural conditions in 83 of the largest U.S. cities and changes in overall homicide rates from 1970-2000.

Extending current research on homicide trends within cities or groupings of cities (e.g., Blumstein & Rosenfeld, 1998; Cork, 1999; Grogger & Willis, 2000; McCall, Parker, & Macdonald, 2008; Messner, et al., 2005; Ousey & Lee, 2002), this study addressed previously neglected issues by estimating the temporal trend in youth homicide offending from 1984-2006 and then modeling city-specific explanatory predictors influencing this trend. Specifically, the study:

- Estimated temporal trends in youth homicide offending ***within cities*** during the period in which the United States experienced dramatic shifts in youth homicide (1984-2006).
- Explored whether city characteristics identified in previous studies of overall homicide rate variation across cities account for variation of these trends ***between cities***, using multilevel statistical modeling techniques (Hierarchical Linear Modeling and Pooled Cross Section Time Series Analysis).
- Determined whether the specified model applies equally well for juveniles ***13 to 17 years of age*** and young adults ***ages 18 to 24***.
- Investigated whether the scope of the model can be extended to perpetration of ***serious nonlethal youth violence***, particularly robbery and aggravated assault—an issue not addressed by previous homicide research.
- The project also developed a unique data file that represents lethal *and* nonlethal offending at the city level by youth ages 13 to 24 over the 23-year period. This file includes key social and economic indicators for 1980, 1990, and 2000, as well as city-specific measures of drug market activity, gang presence-activity, and firearm

availability. The construction and availability of this file for NIJ represents an important and high-utility contribution to the criminal justice field.

Research Design and Methods

The initial study sample consisted of the 100 largest cities in the United States in 1980. Youth homicide data were acquired from the Supplementary Homicide Report (SHR; see Riedel, 1999 for a detailed description), a component of the FBI's Uniform Crime Reporting Program (UCR). Measures of youth arrests for the nonlethal violent crimes of robbery and assault were acquired from UCR city arrest data. Annual homicide, robbery, and assault arrest rates per 100,000 age-specific (i.e., 13 to 17 and 18 to 24 year olds) population were calculated by year. Partial reporting during the time period resulted in dropping 9 cities from the homicide analyses and 10 cities from the robbery and assault analyses. City-level characteristics included in the models—structural disadvantage, drug market activities, gang presence-activity, and firearm availability—were derived from the County and City Data Books, SHR, and the Vital Statistics Multiple Cause of Death File, respectively.

The basic design for the analysis utilized the Hierarchical Linear Modeling (HLM) framework developed by Raudenbush and Bryk (2002) and effectively used in city-level homicide research by Ousey and Lee (2002). In this approach, a set of models for nested data was estimated simultaneously, such that the influence of the independent predictors of the dependent variable is estimated and, simultaneously, the factors that measure differences among the clusters of cases at level 2 are assessed as to their influence on the effects of the independent variables at the lower level (level 1). A second multilevel analytical approach, Pooled Cross Section Time Series, was used to determine if the results generated from the HLM could be replicated using a different technique.

Summary of Key Findings

One principal finding from the study is that the perpetration of *lethal violence* (murder and non-negligent manslaughter) and serious *nonlethal violence* (robbery and aggravated assault) offending for both juveniles and young adults followed the same general trend between 1984 and 2006: an escalation in both lethal and nonlethal violence arrest rates in the early years, with a significant downturn after the early 1990s, followed by a subsequent and significant upturn in the more recent years of the time period. City-level predictors significantly associated with these

trends in perpetration of youth violence varied by (a) time period (early vs. more recent upturn), (b) offense type (homicide, robbery, and aggravated assault), and (c) age of perpetrator (juvenile vs. young adult).

- ***Structural disadvantage*** and ***gang presence and activity*** had consistent and positive effects on *homicide* trends during the initial escalation of violence in the mid-1980s and early 90s and in the more recent years.
- ***Structural disadvantage*** was also significantly associated with trends in *robbery* during both periods of escalation for both age groups. In the pooled cross section time series analysis, with its greater power (but not the HLM analysis), structural disadvantage also demonstrated significant and positive effects on trends in *assault* perpetration for both juveniles and young adults.
- ***Drug market activity*** in cities and over time also demonstrated consistent and positive effects on trends in youth *homicide* for the 13 to 17 year old and 18 to 24 year old age groups in the pooled cross section time series analysis (but not the HLM analysis).
- ***Firearm availability*** in the pooled cross section time series analysis (but not the HLM analysis) demonstrated significant and positive effects on trends in *homicide* perpetration for young adults ages 18 to 24 years old over the time period. No statistically significant estimated effects were found for perpetrators ages 13 to 17.
- ***Gang presence-activity*** was not consistently associated with *robbery* trends, however. In the pooled cross section time series analysis, gang presence-activity demonstrated a positive effect on trends in robbery among juveniles ages 13 to 17, but a negative effect on robbery trends for young adults ages 18 to 24. (In the HLM analysis, gang presence also had a negative effect on robbery rates for the 18 to 24 year old age group in the more recent upturn, but not during the initial escalation, and there were no significant effects on robbery rates for the 13 to 17 year old age group.)
- ***Drug market activity*** demonstrated a positive effect on *robbery* among 18 to 24 year olds **i**n the pooled cross section time series analysis, but had no effect for the younger 13 to 17 year old group. (In the HLM analysis, drug market activity was not associated with trends in robbery perpetration by either age group.)
- ***Firearm availability*** had a negative effect on trends in *robbery* perpetration among juveniles ages 13 to 17 in both the pooled cross section time series analyses and the HLM

analyses, and among young adults ages 18 to 24 in the pooled cross section time series analyses.

- ***Drug market activity and gang presence-activity*** was positively associated with trends in *assaults* perpetrated by the 18 to 24 year old group, but not in younger 13 to 17 year old age group in the pooled cross section time series (but were not associated with assault trends during either time period in the HLM analysis).

Taken together, these findings suggest that measures related to drug market activity and gang presence-activity are more important for predicting lethal than nonlethal youth violence.

Implications and Conclusions

Results from this study of lethal and nonlethal violence perpetration by youth ages 13 to 24 in 91 of the nation's largest cities provide important information for police departments, local officials, legislators, and community leaders that they can then use to inform strategic planning and prevention efforts related to urban-based juveniles and young adults. The study's findings can be used as a first step by cities, states, and national practitioners/policy makers to:

- Inform preparedness and prevention activities more proactively;
- Enhance the timeliness of both crime data and structural indicator data;
- Improve the quality of crime and city-level indicator data;
- Develop comprehensive and multi-disciplinary approaches for addressing gangs;
- Create prevention initiatives and programs that target not only at at-risk juveniles but also young adults ages 18 to 24; and
- Support at-risk youth, particularly youth living in structurally disadvantaged areas.

Other research indicates that at risk youth in structurally disadvantaged areas should be supported by community-level, school-level, family-level, and individual-level interventions designed to strengthen their "core competencies" as well as the social contexts in which they reside. Having such supports for this population will help them more effectively—without violence—"beat the odds" (e.g., Guerra & Williams, 2005; Kim, Guerra, & Williams, 2008; Guerra & Bradshaw, 2008). The research reported here identifies both the *need* for such interventions and the targeted *areas* that should be the focus of these interventions.

Particular attention should be paid to the following findings:

1. Study results show that the ***recent upswing*** in juvenile and young adult violence offending was real and occurred for both juveniles and young adults. The findings also demonstrate that, despite two uniquely distinct periods in time, there have been consistent predictors for escalations in youth violence.

2. The study's strong and consistent findings on the association of ***structural disadvantage and perpetration of violent crime*** across age groups, periods of escalation, and types of offense are important from a preparedness and prevention standpoint. If these factors were associated with two periods of violence escalation, they may well help predict subsequent upturns in offending. Given the ubiquitous and severe recession affecting the nation that began in 2008 and its impact on urban areas, city officials, police departments, legislators, and community leaders will need to be particularly vigilant to offset a potential escalation in lethal and nonlethal violence by youth related to ongoing recession effects over time.

3. The ***presence and activity of gangs*** at the city level also proved to be a key component in cross sectional and time dynamic variation in youth homicide for both age groups and both periods of escalation. Residents in communities with concentrated levels of unemployment, a high proportion of single-parent households, and economic deprivation may be less able to challenge delinquent youth and to control illicit activities. Again, the consistent association with gang activity and youth homicide offending across time periods and age groups in this study suggests the urgency of effective and preventive measures to avoid the escalation of youth homicide seen in the previous two time periods.

4. Finally, there were marked ***similarities*** in city-level predictors associated with juvenile and young adult violence trends. Based on these findings in discrete areas and results of this study across age groups, time periods, and types of offenses, it is crucial that any interventions or initiatives seeking to prevent or reduce youth violence perpetration not simply focus on juveniles under age 18. They must also address criminally involved young adults with whom juveniles come in contact if the younger youth are to be deterred and protected.

By identifying and better understanding the factors that drive increases in homicide, robbery, and assault, policy makers, researchers, and community leaders can in turn develop more proactive and targeted strategies for responding to youth violence *before* periods of acceleration.

ANTICIPATING THE FUTURE BASED ON ANALYSIS OF THE PAST: Intercity Variation in Youth Homicide, 1984-2006

We are pleased to present this **Final Report** to the National Institute of Justice (NIJ) on a comprehensive analysis of youth homicide trends for the 91 of the 100 largest cities in the United States (based on the 1980 Census) for the years of 1984-2006. This report (a) describes the relevant literature, (b) provides a full description of the study design, data, and methodology, (c) details the research findings, and (d) discusses implications for criminal justice policy and practice.

STUDY GOALS AND OBJECTIVES

Most previous studies of youth homicide analyzed trends at the *national* level (e.g., Blumstein, 1995; Messner, et al., 2001, 2005) or calculated youth homicide arrest rates during a specific period for a sample of cities and assessed whether city characteristics accounted for *intercity* variation of those rates (e.g., Ousey, 2000; Strom & MacDonald, 2007). More recently, McCall and her colleagues (2008) assessed relationships of *within-city* changes in structural conditions in 83 of the largest U.S. cities and changes in overall homicide rates from 1970-2000.

Extending current research on homicide trends within cities or groupings of cities (e.g., Blumstein & Rosenfeld, 1998; Cork, 1999; Grogger & Willis, 2000; McCall, Parker, & Macdonald, 2008; Messner, et al., 2005; Ousey & Lee, 2002), this study addressed previously neglected issues by estimating the temporal trend in youth homicide from 1984-2006, and then modeling city-specific explanatory predictors influencing this trend. Specifically, this study:

- Estimated temporal trends in youth homicide ***within cities*** during the period in which the United States experienced dramatic shifts in youth homicide (1984-2006).
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- The project also developed a unique data file that represents lethal and nonlethal offending at the city level by youth ages 13 to 24 over the 23-year period. This file includes key social and economic indicators for 1980, 1990, and 2000, as well as city-specific measures of drug distribution/sales, gang activity, and firearm availability. The construction and availability of this file for NIJ represents an important and high-utility contribution to the criminal justice field.

Given the historically unique trajectories of youth homicide trends over the past 23 years and the intensity of serious youth violence faced by some U.S. cities, it is critical to extend our scientific knowledge on temporal trends for lethal and nonlethal youth violence and their precursors.

BACKGROUND

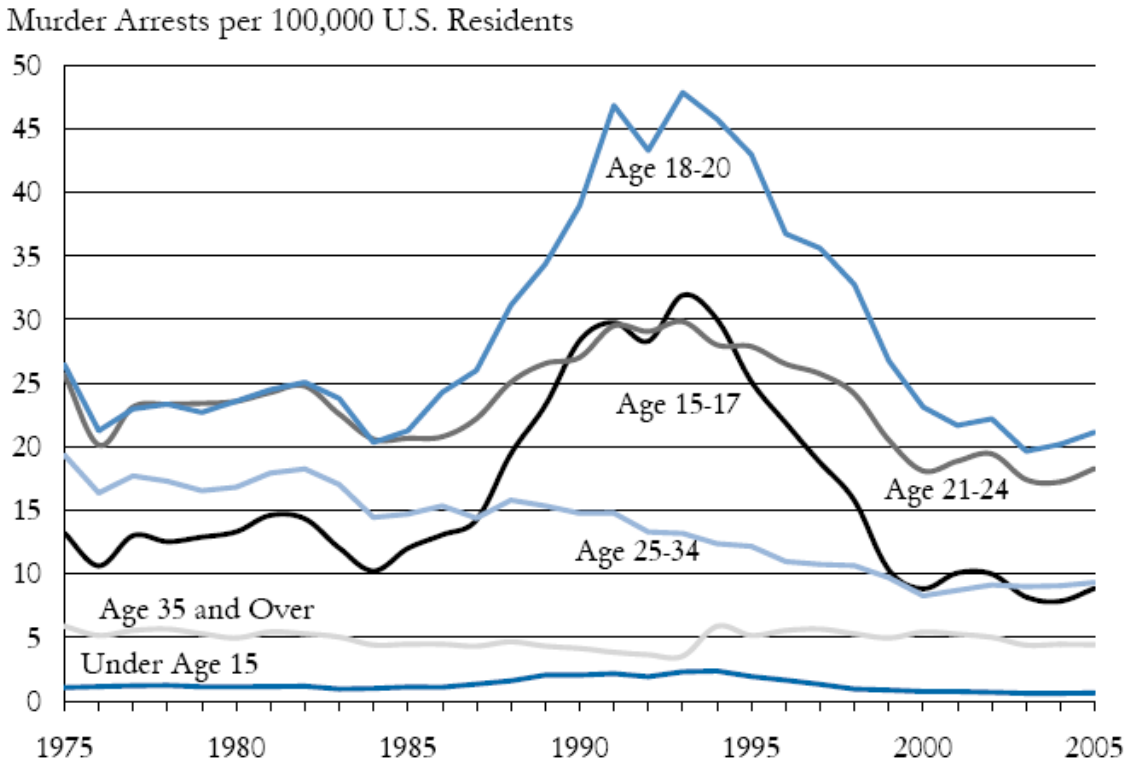
After the drastic rise in youth homicide offending in late 1980s and early 1990s, rates declined precipitously for the rest of the decade. By 2002, juvenile murder arrests rates had fallen to their lowest level since 1984. Juvenile Violent Crime Index arrest rates also peaked in 1994 and then declined 47% by 2002 (Snyder, 2004). However, homicide perpetration rates for Black males started to increase again in 2000 (Snyder & Sickmund, 2006). Overall arrests of 15 to 24 year olds for robbery and weapons offenses rose from 2004 to 2005 for the first time in a decade (Butts & Snyder, 2006). Other national youth violence indicators changed directions during this time period as well. For example, although based on a very different type of data, the Centers for Disease Control Youth Risk Behavior Surveillance Survey (YRBSS), a national school-based self-report survey of 9th to 12th-graders conducted every 2 years, showed a steady decline in perpetration of violent behavior from 1993 to 2003 (Kann, et al., 1995). Youths' self-reported involvement in violence increased on the 2004-2005 survey, however, representing the first increase in overall self-reported violence on the YRBSS in 14 years.

The juvenile arrest rate for murder also increased each year from 2005-2007, then declined 5% in 2008. Juvenile arrests for the Violent Crime Index increased overall in 2005 and 2006 as well, before declining slightly in 2007 and 2008 (e.g., Puzzanchera, 2009). Over the 26 years from 1980-2006, the number of juveniles arrested for violent crimes increased 9% (Butts & Snyder, 2008).

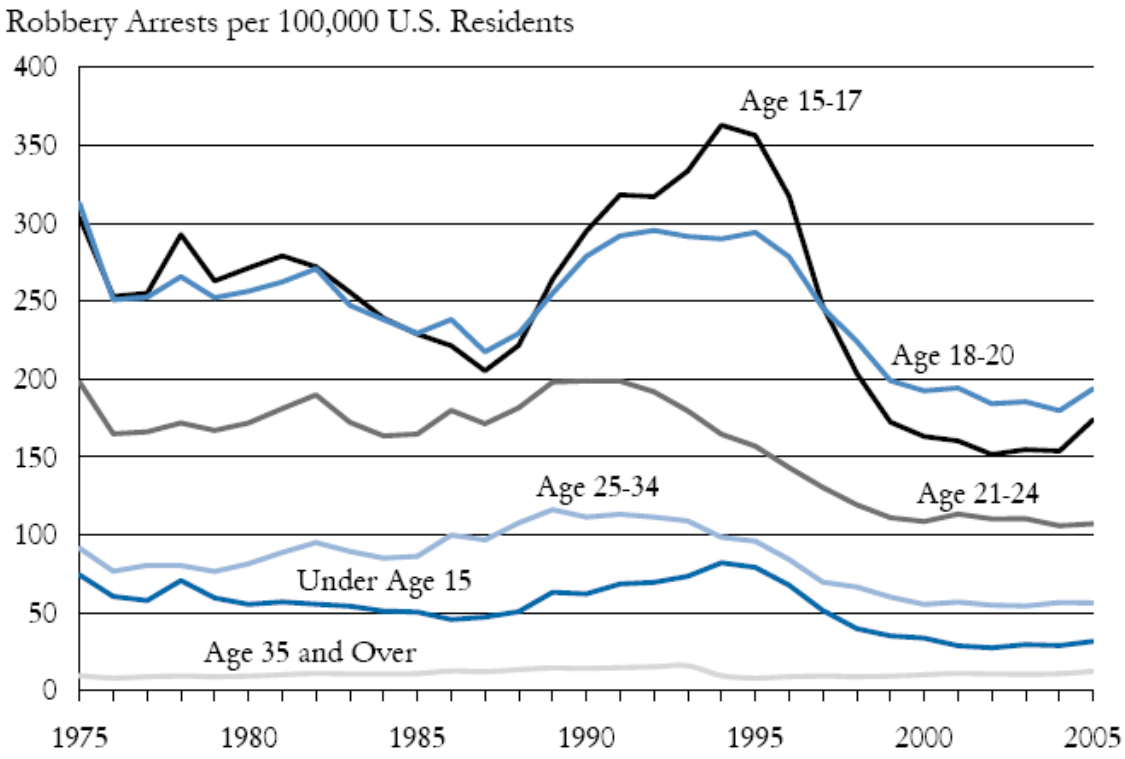
In 2008—the most recent year for which numbers are available—there were an estimated 2.11 million arrests of youth under age 18, down 16% from 1999. When their representation in

the population is taken into account by analyzing per capita arrest rates, the murder arrest rate for juveniles ages 10 through 17 (3.8 per 100,000) was 17% higher than the low point in 2004, but 74% less than the peak of the epidemic in 1993 (14.4 per 100,000). Arrests for weapons offenses increased 35% between 2002 and 2006, and then decreased 16% by 2008. In contrast, arrests for robbery increased 44% from the low in 2002 (Puzzanchera, 2009). In sum, youth involvement in the perpetration of lethal and nonlethal violence has varied substantially over the past two and a half decades, including recent variation since the new millennium. This variation is the subject of our research.

Exhibit 1. Homicide Graphs



Source(s): Analysis and weighting of sample-specific data from the Federal Bureau of Investigation. Crime in the United States, annual. Washington, DC: FBI, U.S. Department of Justice. Cited in Butts, J.A., and H.N. Snyder (2006). ***Too Soon to Tell: Deciphering Recent Trends in Youth Violence***. Issue Brief #110. Chicago: Chapin Hall Center for Children, University of Chicago.



Source(s): Analysis and weighting of sample-specific data from the Federal Bureau of Investigation. Crime in the United States, annual. Washington, DC: FBI, U.S. Department of Justice. Cited in Butts, J.A., and H.N. Snyder (2006). ***Too Soon to Tell: Deciphering Recent Trends in Youth Violence***. Issue Brief #110. Chicago: Chapin Hall Center for Children, University of Chicago.

Theories About the Rise and Fall in Youth Homicide

The increase in youth homicide rates that culminated in 1993 was unanticipated. Characterized as an epidemic by some scientists (Cook & Laub, 1998; Messner, et al., 2005), it was fairly widespread throughout the nation, concentrated among males (especially minority males), and predominantly involved firearms (Cook, 1998; Cork, 1999; Fox & Zawitz, 2002; Messner, et al., 2005). Juveniles were critically involved in the epidemic and experienced the greatest increase in perpetration and victimization, culminating in an all-time peak in rates of offending and victimization for young men in 1993-1994 (Cook & Laub, 1998; Moore & Tonry, 1998). From the mid-1980s to the peak in 1993, the arrest rate of juveniles for murder more than doubled (Puzzanchera, 2009).

Many explanations have been offered for the spike in homicides, with varying opinions about the relative weights of specific indicators and the importance of context (e.g., Blumstein, 2000; Cook & Laub, 1998; Ousey & Augustine, 2001; Ousey & Lee, 2002; Rosenfeld, 2002). Explanatory factors for the increase included greater availability, carrying, and use of firearms; increased gang activities; greater prevalence of drug trafficking and open air drug markets; increasing prevalence of divorce and female-headed households; changes in labor market structures; diminishing economic opportunities for those in marginalized communities; and diminished social and monetary support for families living in poverty.

The precipitous drop in rates that followed the epidemic was also unanticipated, strengthening concerns about our ability to identify precursors and accurately predict trends (Blumstein & Rosenfeld, 1998; Blumstein et al, 2000; LaFree, 1999; Levitt, 2004.) Although subject to some controversy, explanations for the decline in youth homicide rates ranged from lessening demand and reduced activity in illegal drug markets, improved economic conditions, greater access to housing and employment, and changes in alcohol consumption to increased emphasis on law enforcement and imprisonment (e.g., Blumstein, 1995; Blumstein & Wallmann, 2006; Blumstein, et al., 2000; Cook & Laub, 2002; Grogger & Willis, 2000; Ousey & Lee, 2002; Parker & Cartmill, 1998; Tonry & Moore, 1998).

The discussion below is intended to draw from the previous homicide research literature to provide a justification for this study's focus on urban settings, youth ages 13 to 24, and covariates used to account for between city variation in youth homicide trends from 1984-2006. We begin with the focus on urban settings.

Homicide in Urban Settings

There is a long history of findings indicating that urban settings exacerbate or engender social problems including alienation, undesirable group behavior, social disorganization, and the perpetration of violence (e.g., Shaw & McKay, 1942; Wirth, 1938). A consistent finding in empirical literature is a strong association between urbanization and homicide rates (e.g., Cubbin, et al., 2000; LaFree, 1998; Pridemore, 2002). Cities are central to the investigation of youth homicide, due to the high proportion of U.S. homicides that occur in urban areas and the dominance of young perpetrators and victims in city-based homicide events. Social dynamics and patterns of homicide vary significantly between urban and rural settings. Rural perpetrators tend to be older and are less likely to be male, less likely to kill same-sex victims, and more likely to kill family members and other intimates than urban perpetrators. Homicide events in rural areas also are less likely to be committed in conjunction with other crimes, gang activities are less implicated in homicide events, and indicators of income inequality are less predictive (e.g., Howell & Egley, 2005; Wesheit & Well, 2005). Due to the concentration of youth and youth homicide events in cities, this study focuses on large U.S. cities as the units of analyses.

Changes in trends at the national level also may not be experienced at the city level. Although the increase in overall and youth-perpetrated homicides from the mid-1980s to the mid-1990s was termed a national "epidemic," many U.S. cities did *not* experience an escalation in youth homicides during that period, and those that did demonstrated varying patterns in the epidemic's initiation, duration, and decline. For example, using UCR data, Messner et al. (2005) analyzed overall U.S. homicides rates at the city level for large cities for the years 1979-2001 and found that just over *half* of the cities in the sample conformed to the national trend over the period. Large cities were most likely to experience an epidemic-like cycle. Densely populated cities and cities with more extreme levels of socioeconomic deprivation tended to have earlier initiation into and exit from the homicide spike.

In their recent article (2009), McDowall and Loftin explored city-based trends from a different perspective, analyzing the extent to which trends in city crime rates *follow* national crime trends over time. For their analyses, McDowall and Loftin used panel data from 139 large cities with populations over 100,000 for at least 30 years of a 45-year period (1960-2005), based on UCR offenses and population rates interpolated from decennial Census figures (c.f., Mosher at al., 2002). Analyses assumed that a national pattern underlay part of the variation in local

crime rates and allowed conditions unique to each jurisdiction to account for the rest. Given the unusually long time period (45 years), national conditions must have exerted an effect at the city level during periods of increase, stability, and decline in nationally aggregated homicide rates.

Results of these analyses indicated that, in an average year, nearly two-thirds of cities and their residents were subject to the national crime trend for that period. Larger cities were more likely to follow national patterns, although smaller jurisdictions were also influenced by nation-wide conditions. However, much of the variation in city crime rates depended on local conditions within the cities. National trends accounted for about only about *one-fifth* of the variation in local rates when between-city differences were removed.

Such variations makes it critical to disaggregate national homicide data at the city level in order to better understand socio-demographic, economic, and social resource and disadvantage factors associated with youth homicide trends and city-specific characteristics (see also McDowall, 2002 and Williams & Flewelling, 1988).

Identifying City-Based Homicide Covariates

General knowledge of potential precursors for homicide perpetration also is not sufficient. Past research documents that predictors of homicide are not the same across homicide categories (e.g., Flewelling & Williams, 1999; Pampel & Williams, 2000; Williams & Flewelling, 1988), but differ across age, gender, race, circumstance, and relationship type (Blumstein, 1995; Messner, et al., 2001; Parker, 1995; Parker & Rebhun, 1995). Overall homicide rates may completely mask counter trends and the significance of factors driving homicide trends for different groups (Browne & Williams, 1989, 1993; Browne, et al., 1999). Changes in structural conditions also affect homicide rates and must be taken into account to avoid spurious conclusions (e.g., see Land et al., 1999 and McCall et al., 2009). Again, national rates tell us little about conditions within cities contributing to crime trends and variation between cities (McDowall & Loftin, 2009.) Differential effects can be properly estimated only if disaggregated rates are employed.

A variety of macro-level attributes have been associated with homicide rates at the city level. In their classic study of between-city differences, Land et al. (1990) identified a set of key covariates, including resource deprivation and/or affluence (e.g., families living below the poverty line, median family income, the Gini inequality index, and percent unemployed), family structure (including percent divorced males and percent of children not living with both parents),

population structure (including size, density, and percent Black), percent of the youth population, and geographical region in the U.S. Other variables appearing in the literature after the youth homicide epidemic include increase illicit drug activity and drug markets—particularly the illicit trafficking of crack cocaine, the rise in incarceration rates post-1980, and changes in law enforcement policies and practices (e.g., LaFree, 1999; Parker, 2004; Ousey & Lee, 2002; Eck & Maguire, 2006; MacDonald, 2002; Zimring, 2006; cf. Liedka, Piehl, & Useem, 2006).

McCall and her colleagues (2008) extended this work by drawing on Land et al.'s finding, but focusing their analyses within cities and adding economic shifts in the economy from 1970-2000 and changes in incarceration rates over the period. In studying the extent to which *within-city* changes in structural covariates were associated with changes in the homicides rate for 83 of the largest U.S. cities (populations over 100,000) from 1970-2000, McCall et al. (2008) used a pooled cross sectional time series model to examine the influence of intra-city changes in covariates on changes in homicide rates over time and found that (a) changes in resource deprivation, (b) the relative size of the youth population, and (c) increases in drug sales arrest rate were significantly related to changes in homicide rates over four decennial time points: 1970, 1980, 1990, and 2000. (Data sources included the UCR [1970-1975], the SHR, the US Bureau of the Census [1983, 1994, 003], and the City County Data Book.)

Baumer (2008) attempted to extend prior work on covariates by developing a more definitive portrait of the determinants of recent crime trends and identifying factors or sets of factors that made the most contributions to observed changes in crime rates for the years of 1980-2004. His analyses incorporated not only traditional factors, but also added factors neglected in empirical research including immigration, wages, alcohol consumption, and youthful cohort "quality" (see description of variables, pgs. 148-149) for a sample of 114 U.S. cities with populations of 100,000 or more in 1980.

Based on econometric panel modeling techniques, Baumer reported that unemployment rates were positively associated with gun homicide rates overall, whereas wages were negatively associated with nongun homicides (pg. 159). Firearm prevalence (as measured by the fraction of suicides committed with a firearm) was *not* significantly associated with crime trends in Bauer's analyses; drug market measures (the overall arrest rate for cocaine/heroin and the percentage of persons arrested for possession or sale of cocaine/heroin who were under 18) yielded the most consistently significant positive effects. These effects were strongest for youth homicide arrests

(p. 160). The age structure variable (percent of ages 15 to 24; percent of ages 45+) also was significant for homicide arrests. Based on further analyses, Baumer estimated that between 20 and 40 percent of observed increases in the rates of overall homicide, gun homicide, and youth homicide from 1984-2004 were attributable to drug market activity and drug involvement. A drop in unemployment during the 1990s, coupled with a rise in real wages during that period, explained as much as 30% of the observed decline in youth homicides and non-gun homicides (p. 165).

These empirical investigations set the context for the present study. A more detailed summary of research bearing on specific issues and covariates of homicide rate variation follows.

Age and Violence Perpetration. Disaggregation by age was the central focus of the present study. Age is strongly correlated with the perpetration of lethal and nonlethal violence across national as well as city-based studies in the U.S. (In contrast, cross-national studies indicate that younger age is *not* consistently correlated with higher homicide rates outside the U.S., and that having highly developed national institutions for social protection mitigates the expected positive association when youth comprise a significant proportion of the population; e.g., see Gartner & Parker, 1990; Pampel & Gartner, 1995; Zimring & Hawkins, 1997.) Analyzing data from the FBI's Uniform Crime Reports (UCR), Butts and Snyder (2006) found that arrest rates for youth ages 15 to 24 were higher than rates for any other age group from 1975 to 2005, particularly for murder, robbery, and weapons offenses by 15 to 20 year olds. From 1970 to 1980, the percent of the U.S. population ages 15 to 20 increased from 25% to 30%, then declined again to just under 25% by the year 2000. This growth in the population of youth—many of them in urban centers—has been associated with an increase in homicide during that period. In contrast, a decrease in the percent of youth in the population has been associated with the decrease in rates of homicide during the latter half of the 1990s (Pepper, 2008.) In their recent study of 83 large U.S. cities from 1970-2000, McCall and her colleagues (2008) also found that a decline in the percent of the population ages 15 to 29 within cities was associated with a decline in city rates of homicide during the time period.

As with all covariates, the relationship between age and homicide perpetration must be interpreted in context. In her county-based analyses of temporal associations between the size of the population ages 15 to 24 and overall homicide rates, Phillips (2005) confirmed a positive

association between young age and homicide, while finding that criminogenic forces such as poor social conditions can alter that association.

With some exceptions (e.g., Ousey & Lee, 2002; Phillips, 2005), homicide rates have usually been calculated for those under or over age 17 or 18. However, Butts & Snyder (2006) argue that it is "not accurate to describe violent youth crime as juvenile crime" and encouraged the inclusion of youth ages 18 to 24 in research on youth homicide trends. Of all violent crime arrests in 2005, 29% were of youths between the ages of 18 and 24; only 16% were of juveniles younger than age 18 (Butts & Snyder, 2006). Perpetrators under the age of 15 are less represented in homicide and severe violence counts. In an analysis of UCR arrest data for pre-adolescents, Butts and Snyder (2008) note that the majority of youth arrested from 1980 through 2006 were 15 years of age or older. Nearly three-quarters (71%) of all juveniles arrested for murder, aggravated assault, robbery, and forcible rape were over the age of 14, and 92% of all juvenile arrests for homicide were in this age group. Based on these and similar findings, in this study we examined homicide and severe violence among two age groupings (although we do include all teenagers): juveniles ages 13 to 17 and young adults ages 18 to 24.

Structural Disadvantage. The importance of social context and economic and social disadvantage is strongly documented across empirical studies of youth and adult homicide (Blumstein & Wallman, 2006; Ousey, 1999; Ousey & Augustine, 2001; Parker & McCall, 1999; McCall et al, 2008; Messner, et al., 2001; Williams, 1984; Williams & Flewelling, 1988). Pridemore has contended that the "relationship between poverty and homicide rates is the most consistent finding in the literature" across time periods, levels of analysis, measures of poverty, and model and relationship specifications (2002, p. 144). Rates of poverty and unemployment rose between 1970 and 1990 (McCall et al., 2008), with the impact falling most heavily on families and individuals already lacking monetary and structural resources. Scholars theorize that structural disadvantage is a key precursor of community disorganization (Krivo & Peterson, 2000; Sampson & Wilson, 1995), decreasing informal mechanisms of positive social control and increasing vulnerability to disorder (Ousey & Lee, 2002). Wilson (1987) and others contend that declines in median family incomes and increases in families and households living in poverty, rates of unemployment, and percentages of female-headed households in cities play a pivotal role in the social production of violence (see also Massey & Eggers, 1990). Communities with higher levels of concentrated disadvantage have fewer resources for protecting youth from involvement

in illegal and dangerous activities, preventing the proliferation of gangs, and slowing the expansion of illegal drug markets.

Underscoring the importance of structural disadvantage for the perpetration of lethal violence, studies have found that resource deprivation has a more pervasive impact on various forms of criminal homicide than other structural or cultural determinants (e.g., Ousey & Lee, 2002; Phillips, 2005; Strom & MacDonald, 2007 Wesheit & Well, 2005; Williams & Flewelling, 1988). For example, in their study of 83 large U.S. cities for the years of 1970-2000, McCall et al. (2008) found that an index of resource deprivation provided some of the strongest associations with within-city increases in homicide rates. Cities with *decreases* in percent of families living in poverty, income inequality, and percent of children not living with both parents coupled with *increases* in median family income experienced decreases in overall homicide rates. Moreover, each of these components was significantly and independently associated ($p < .05$, one tailed) with variation in the homicide rate. (McCall et al. found no significant relationship between unemployment and the homicide rate, however.) Similarly, in MacDonald and Gover's (2005) study of the effects of concentrated disadvantage on *youth-on-youth homicide* among adolescents age 17 or younger—based on SHR data for U.S. cities with populations over 100,000—an increase in structural indicators of disadvantage was also associated with increases over time in youth-on-youth homicide rates for juveniles.

Race/Ethnicity and Structural Disadvantage. In urban areas, structural disadvantage may be particularly severe in communities of color. Theorists contend that urban communities with larger concentrations of Black residents have become increasingly structurally disadvantaged over time (Massey & Denton, 1993), differentially exposing youth in these communities to high risk factors for perpetration of severe and lethal violence (e.g., Sampson & Wilson, 1995). The percent of African Americans in large cities increased substantially between 1970 and 2000 (McCall et al, 1980); this shift has been linked to the historic increase in youth homicides in the late 1980s and early 1990s. The homicide epidemic during this period disproportionately involved youth from minority groups, particularly Black and Hispanic youth (Fox & Zawitz, 2002; Messner, et al., 2001, 2005).

Increases from 2004 to 2005 in arrest rates for violent crime also were greater for Black than White youth, with murder, robbery, and weapon offense arrests combined increasing less than 5% for White youth but more than 20% for Black youth up to age 24 (Butts & Snyder, 2006). In

2008, the latest year for which data is available, young black youth were involved in 52% of arrests for Violent Crime Index offenses, although they accounted for just 16% of the juvenile population (Puzzanchera, 2009). This was approximately 5 times the rate for white juveniles, up from a ratio of 4 to 1 for 1999-2004. Based on these findings, we incorporated the relative size of the African-American urban population in our measure of disadvantage.

The relationship of effects of race/ethnicity and structural disadvantage has also been explored. In analyses of *nonlethal* forms of youth violence among 8 to 25 year olds from the Project on Human Development in Chicago Neighborhoods, Sampson et al. (2005) found that the odds of perpetrating violence were 85% higher for Black youth than for White youth, with Latinos 10% lower. However, the total Latino-White gap and over 60% of the Black-White gap was explained by marital status of parents, immigration generation, and neighborhood social context. In their study of how city-level changes in social and economic disadvantage contribute to increases in *race-specific youth homicide victimization* for 15 to 19 and 20 to 24 year olds for the years of 1990-2000, Strom and MacDonald (2007) found that increases in social and economic disadvantage were positively associated with increases in Black teenage, Black young adult, and White teenage homicide rates, independent of other factors (cf. Parker & McCall, 1999). In general, cities with increasing economic disadvantage and family instability showed increases in youth homicide for both Blacks and Whites, *independent* of drug arrest rates, ethnic heterogeneity, region, and population density.

Drug Markets and Structural Disadvantage. Similar effects have been found in studies of the influence of drug markets on youth homicide. In their analysis of the role of illegal drug markets in the 1980s-1990s homicide epidemic, Ousey and Lee (2002) used longitudinal data to examine whether within-city variation in sale or manufacture of cocaine/opiates from 1984 to 1997 was associated with within-city variation in homicide perpetration rates during that period.

Using HLM, Ousey and Lee modeled the city-specific change in drug market activity and homicide perpetration rates for 15 to 29 year olds and the effect of between-city variation in levels of resource deprivation. Echoing previous findings, they found that levels of concentrated disadvantage within cities moderated the relationship of drug market activities and homicide. Cities with higher levels of resource deprivation had significantly stronger positive relationships between illegal drug market activities and homicide perpetration by 15 to 29 year olds. Conversely, in cities with the lowest levels of resource deprivation, the relationship became

negative. They concluded that, "the lethality of [drug markets] depends on whether the city is characterized by high or low levels of resource deprivation" (p. 89). (Ousey and Lee's analysis focused solely on the relationship between within-city resource deprivation and homicide rates, with the time variable centered around 1990. Although they included young adults in their sample, they did not examine potential differences for juveniles and young adults.)

Given this literature, we not only included a measure of structural disadvantage within our analysis, but we fully anticipated that it would have the strongest and most robust estimated effects on trends of youth homicide.

Family Factors and Structural Disadvantage. Other forms of structural disadvantage relating to families, and particularly to female-headed families, have been consistently associated with risk for delinquency and violence perpetration by youth (LaFree, 1998; Parker & McCall, 1999; Sampson & Laub, 1993). Children in female-headed families may be especially likely to suffer economic deprivation (O'Brien, et al., 1999; Savolainen, 2000) and to lack adult monitoring and supervision if the head of household is working and there is no other adult available. Sampson & Groves (1989) argued that single parents experience greater strains in terms of time, financial resources, and structural supports. Throughout the first half of the 20th Century, the vast majority of both White and Black families were two-parent households composed of a male breadwinner and a female housewife (Ruggles, 1994). Since the 1960s, the structure of American families has changed dramatically, particularly among Black families in the inner city (U.S. Census Bureau, 2000). The divorce rate has also increased rapidly. The percent of children in single-parent households nearly doubled between 1970 and 1990, before declining again in 2000 (McCall et al, 1980). Thus we incorporated the percent of female-headed households in our measure of structural disadvantage.

Drug Markets and Illicit Drug Activity. The most popular explanation offered for the suddenness and extremity of the homicide epidemic has been the explosion of volatile illegal drug markets linked to the introduction of crack cocaine in the 1980s (Baumer, et al., 1998; Blumstein & Cork, 1999; Blumstein & Wallman, 2006; Johnson, Golub, & Dunlap, 2006; Levitt, 2004). This model has been used by some to explain the precipitous decline in the epidemic as well (Blumstein & Rosenfeld, 1998; Steffensmeier & Harer, 1999). Crack cocaine markets spread throughout the U.S. during the 1980s, as did the systematic violence that often accompanied the marketing and sale of the drug (Goldstein, 1985). Violence was additionally

fueled by the increase in demand and use of high-powered firearms by urban youth and other community residents for protection (Shelley & Wright, 1995). Some research indicates that, in many large cities, the introduction of crack cocaine occurred around the same time as the surge in juvenile homicide (Cork, 1999; Grogger & Willis, 2000). A growth in juvenile drug-related arrests during this period was associated with higher homicide arrest rates, however this effect held true only for White juveniles (Ousey & Augustine, 2001).

Importantly, although studies document the importance of illegal drug markets to the 1980s-1990s homicide epidemic, studies by Ousey and Lee (2002) and others demonstrate that effects are highly influenced by causes such as social context (White & Gorman, 2000; see also Zimring & Hawkins, 1997). In their study of changes in overall homicide rates from 1970-2000 in 83 large U.S. cities, for example, McCall et al. (2008) also found that the "drugs and violence" link often associated with the spike in juvenile and young adult homicides during the mid-1980s and early 1990s did not explain the sharp decline in those rates during the last half of the 1990s. Similarly, Baumer's (2008) analyses revealed that crack cocaine was not a strong predictor of the crime decline in the 1990s. We explored the drug and violence link in our analyses as well to determine whether it played a significant role in accounting for between city variations in youth homicide trends from 1984-2006.

Firearm Availability. The presence of weapons—particularly firearms—also has been associated with shifts in homicide trends, particularly in relationship to illicit drug market activity and gang activity. Youth homicides during the 1980s and early 1990s primarily involved firearms (Cook, 1998). Blumstein has speculated that, as adult sellers dominating drug markets were imprisoned, crack markets were increasingly staffed by young inexperienced street sellers who, lacking maturity and other skills, resolved conflicts with overwhelming force, often through the use of firearms (Blumstein, 1995, pp. 29-31). In Baumer's recent (2008) analysis of data from 114 large U.S. cities for the years of 1980-2004, however, his measure of firearm prevalence was not significantly associated with either youth or adult homicide, suggesting a need for further research. Additionally, in Kleck's (1991) analysis of data from 170 large U.S. cities, gun ownership was found to have a negative effect on homicide and no significant effect on other violent crimes.

Gang Presence-Activity. A related issue facing U.S. cities over the past two decades has been the ongoing proliferation of gang violence (Egley & O'Donnell, 2009). More than one-third

of jurisdictions in the National Youth Gang Survey (NGYS) reported gang problems in 2007, the highest annual estimate since before 2000. Reports of gang-related homicides tend to be concentrated in America's most populous cities, many of which suffer from long-standing and persistent gang problems (Egley, et al., 2006; Howell, 2006). In 2007, *86% of agencies serving larger cities* reported gang problems (n=624 agencies serving cities of 50,000 residents or more), in contrast to 50% of agencies serving suburban areas and 35% of agencies serving smaller cities (Egley & O'Donnell, 2009). One in five large cities in the survey reported an *increase* in gang homicides in 2007 compared with the previous year. Approximately two in five reported increases in other violent offenses by gang members. Based on the 2007 survey, Egley and O'Donnell estimate that there were more than 27,000 active gangs and 788,000 gang members in the United States, with 80% of gang members residing in large cities and suburban counties.

Longitudinal studies document that youth are more prone to serious and violent offenses when actively involved with a gang than before or after that affiliation (e.g., Thornberry, 1998). Adolescent gang members in large cities account for a disproportionate share of serious violent offenses committed by juveniles, including homicide. Although there are aggregate data that support gang members' disproportionate contribution to homicide in large cities, to date there has been little documentation of *city-specific* contributions of gangs to *changes* in serious and lethal youth violence during the escalation period of the mid-1980s and early 1990s, or during more recent trend changes from 2000 to 2006. Given prior findings on gangs and firearms, gang presence-activity was incorporated in our analyses of intercity variation in youth homicide trends as well.

In sum, the research described here incorporated multiple factors identified in empirical literature as highly associated with violent crime and homicide trends for youth at the city level. We constructed a structural disadvantage measure that included various components identified as critical in previous studies and added measures bearing on drug activity, gang presence-activity, and firearm availability. These measures were used to account for intercity variation in the trends of homicide involving juveniles 13 to 17 years of age and young adults 18 to 24 years of age for 91 of the 100 largest cities in the United States (based on the 1980 Census) from 1984-2006.

RESEARCH DESIGN AND METHODS

The following section describes the primary data sources used for calculating rates of lethal and nonlethal violence by youth ages 13 to 24, disaggregated by age and characteristics of the nation's largest cities, including indicators of structural disadvantage, presence and activity of youth gangs, firearm availability, and drug market activity. It also describes issues addressed in the use of these data sources and the analytical techniques used in estimating specified models.

Data on Youth Homicide Perpetration from the SHR

Youth homicide data were acquired from the *Supplementary Homicide Report* (SHR; see Riedel, 1999 for a detailed description), a component of the *FBI's Uniform Crime Reporting Program*. The SHR consists of detailed information reported by U.S. law enforcement agencies about known incidents classified as murder and non-negligent manslaughter, negligent manslaughter, or justifiable homicide. Information is provided about the circumstances of these incidents (e.g., arguments, felony homicide, rape, robbery, arson, alcohol involvement, narcotics law violations) and the weapons used to kill (e.g., handguns, other guns, knives, blunt instruments). The SHR also includes information on characteristics of victims and suspected perpetrators (e.g., age, race, and gender), along with the relationship (if known) between perpetrators and victims.

For the current study, detailed information in the SHR permitted the categorization of homicide incidents into those involving age groupings corresponding to our focus on adolescence and young adulthood, specifically juvenile offenders ages 13 to 17 and young adult offenders ages 18 to 24. The focus here was on perpetration of *murder* and *non-negligent manslaughter* in the largest cities in the United States for the years of 1984-2006 by this age group. The earliest period in this time frame (1984-1994) represents the well-documented national epidemic of youth homicide, followed by years of rapid decline from 1995-1999. The new millennium ushered in the possibility of a resurgence of youth homicide, with increases reported in at least some parts of the country (Snyder & Sickmund, 2006), and represented a subsequent "test" period for the model developed to account for between-city variation in trends of youth homicide during the earlier "epidemic" years.

As noted, the analyses reported here were restricted to murder and non-negligent manslaughter and did not include homicide by negligence or justifiable homicides. The latter are not included in most definitions of criminal homicide. Analyses of incident-level data were

further delimited by including only incidents involving a single victim and a single offender. Such incidents represent the overwhelming majority of homicide events included the SHR. Specifically, the range of variation in the percentage of incidents having a single victim across years in the time frame is about 92% to 98%. The percentage of incidents having a single offender ranges from about 83% to 90%. The initial sample consisted of the 100 largest cities in the United States in 1980; however, several cities were dropped due to missing data problems (described below), resulting in a sample of 91 cities for the homicide analyses and 90 cities for nonlethal violence analyses. Exhibit 2 lists the cities in the final sample and indicates whether they were included in the homicide and/or the non-lethal violence analyses.

Exhibit 2. Cities Included in Sample and Analyses

Cities	Homicide	Non-lethal
Akron	x	x
Albuquerque	x	x
Amarillo	x	x
Anaheim	x	x
Anchorage	x	x
Atlanta	x	x
Austin	x	x
Baltimore	x	x
Baton Rouge	x	x
Birmingham	x	x
Boston	x	x
Buffalo	x	x
Charlotte	x	x
Chattanooga	x	x
Chicago	x	x
Cincinnati	x	x
Cleveland	x	x
Colorado Springs	x	x
Columbus	x	x
Columbus	x	x
Corpus Christi	x	x
Dallas	x	x
Dayton	x	x
Denver	x	x
Des Moines	x	x
Detroit	x	x
District Of Columbia		
El Paso	x	x
Flint	x	x
Fort Lauderdale		
Fort Wayne	x	x

Fort Worth	x	x
Fresno	x	x
Gary	x	x
Grand Rapids	x	x
Greensboro	x	x
Honolulu	x	x
Houston	x	x
Indianapolis	x	x
Jackson	x	x
Jacksonville		
Jersey City	x	x
Kansas City	x	x
Knoxville	x	x
Las Vegas	x	x
Lexington-Fayette	x	x
Lincoln	x	x
Little Rock	x	x
Long Beach	x	x
Los Angeles	x	x
Louisville	x	x
Lubbock	x	x
Madison	x	x
Memphis	x	x
Miami		
Milwaukee	x	x
Minneapolis	x	x
Mobile	x	x
Montgomery	x	x
Nashville-Davidson	x	x
New Orleans	x	
New York City	x	x
Newark	x	x
Norfolk	x	x
Oakland	x	x
Oklahoma City	x	x
Omaha		x
Philadelphia	x	x
Phoenix	x	x
Pittsburgh	x	x
Portland	x	x
Providence	x	x
Raleigh	x	x
Richmond	x	x
Riverside	x	x
Rochester	x	x
Sacramento	x	x
Salt Lake City	x	x
San Antonio	x	x
San Diego	x	x
San Francisco	x	x

San Jose	x	x
Santa Ana	x	x
Seattle	x	
Shreveport	x	x
Spokane	x	x
Springfield	x	x
St Petersburg		
St. Louis	x	x
St. Paul	x	x
Stockton	x	x
Syracuse	x	x
Tacoma	x	x
Tampa		
Toledo	x	x
Tucson		
Tulsa	x	x
Virginia Beach	x	x
Wichita		x
Worcester	x	x

Addressing Missing Data in the SHR. Although the SHR provided the necessary data for the study, several important limitations have to be addressed. One limitation is that police agencies are not legally mandated to participate in the Uniform Crime Reporting Program; all participation is voluntary. Consequently, some police agencies did not report or only filed partial reports on homicide to the FBI. A second limitation is that not all information, particularly on offender characteristics, was always completely reported on the SHR report form. Obviously, missing data can result in biased estimations of homicide rates, as well as biased estimations of the parameters of theoretical models. Thus this study systematically addressed missing data problems in the SHR.

Previous studies using SHR data developed methods of compensating for non-reporting and missing information on reported incidents (e.g., Flewelling, 2004; Messner, et al., 2002; Pampel & Williams, 2000; Regoeczi & Riedel, 2003; Riedel, 1998; Williams & Flewelling, 1987). Other investigators have recommended the use of multiple imputation (MI) to address this problem (e.g., Wadsworth & Roberts, 2008: 866; see also Ousey & Lee, 2002: 81). (See Allison, 2002; McKnight, McKnight, Sidani, & Figueredo, 2007: 196-212 for general discussions of multiple imputation.) This study employed the MI procedure to compensate for missing data.

For this study, the primary problem with missing data in the SHR was missing information on offenders involved in reported incidents. For example, the SHR includes a “situation”

variable that indicates whether incidents involved a single victim and single offender or multiple victims and multiple offenders. That variable also indicates whether offenders were "unknown." The distribution of unknown offenders across the 23 years of SHR incident-level data for the original sample of 100 cities combined varied from a low of about 7% to a high of 28%, with the mean being approximately 18%.

The focus of our analysis was on the age of offenders, specifically, adolescents 13 to 17 and young adults 18 to 24. To compensate for missing data on the age of offenders, MI was conducted at the incident level for each year in the 23-year time frame, using the total number of incidents within the original sample of 100 cities combined. This was done on the assumption that the data were missing at random; that is, the likelihood of missing data on age of offender is unrelated to age, and the factors producing the missing data are unrelated to the parameters of estimated models (see e.g., Allison, 2002: 3-5).

Given this assumption, MI was executed in Stata/SE 10.1 using the iterative chain equation procedure (see Carlin, Galati, and Royston 2008; and Royston 2004 for descriptions). The "ice" command included the age, race (Black compared to non-Latino white), ethnicity (non-Latino compared to Latino), and gender of victims; circumstances of homicide incidents (gang-related, narcotics-related, firearm-related, conflict-related, alcohol-related, homicides involving arguments over money or property, and felony homicides); and city size (large compared to smaller cities in the total population). The imputation process involves filling in missing values by drawing from a conditional distribution of missing values, given complete data on other variables. This is done multiple times (five times in the present analysis), generating multiple data sets with slightly different imputed values for missing data. Typically, each data set is analyzed, and the results are pooled across data sets for the final results. This procedure allows for an (upward) adjustment of standard errors, which are typically underestimated with most other methods of compensating for missing data, thus increasing the chances of Type I error in tests of statistical significance (Allison, 2002: 5-12).

The method used here departed from the standard MI process in that, once the five imputed data sets were created, values were aggregated across these files, yielding a single data set with no missing values. The incident-level data were then aggregated to the city level to create a file with "raw" (ignoring missing data) and multiply imputed frequencies of youth homicide for each city and for each year. Once this procedure was completed for all 23 years, the files were merged

to create a time series data set for all 100 cities in the original sample. Since all substantive analyses were conducted at the city level, aggregating across the five multiply imputed data files at the incident level and then aggregating to the city level should not adversely influence standard errors and thus tests of statistical significance.

Calculations of Raw and Multiply Imputed Data. With these data at the city level, annual homicide rates were calculated through a conventional procedure: annual incidents in a specific city, divided by the age-specific population of that city, multiplied by 100,000. The result is the annual rate of age-specific homicide for a given city per 100,000 age-specific population (i.e., annual rates for adolescents 13 to 17 years of age per 100,000 youth in that age grouping and annual rates for young adults 18 to 24 years of age per 100,000 youth in that age grouping). Youth population data for the denominators of the rate calculations were obtained from the census years of 1980, 1990, and 2000. Inter-census years were estimated through linear interpolation to allow the calculation of annual rates in the 23-year time series. Annual rates were calculated using the raw data and the multiply imputed data.

Partial reporting during the 23-year time frame was limited to 34 cities having missing data for one or more years in the SHR. Seven were missing for 10 years (DC only) to 14 years (Ft. Lauderdale, Jacksonville, Miami, St. Petersburg, Tampa, and Omaha). These cities were dropped from the sample, due to the excessive amount of missing data. Wichita and Chattanooga each had seven years of missing data but, as described below, a significant time trend could be estimated for Chattanooga but not Wichita. Hence, Wichita was dropped from the sample but Chattanooga was retained. Tucson was also dropped because the race-specific population data used for the denominators of the rate calculations were unreliable (i.e., there were inconsistent estimates in the interpolation of inter-census years). Of the remaining 91 cities, approximately 99.5% of the 2,093 city-years (91 cities multiplied by 23 years) had reported data. Moreover, the slight variations across cities and over time in the months having reported data were not significantly related to temporal variation in the adolescent (13 to 17) or young adulthood (18 to 24) homicide rates.

Data on Nonlethal Youth Violence from the UCR

Measures of youth arrests for the nonlethal violent crimes of robbery and assault were derived from UCR city arrest data (*Arrests by Age, Sex, and Race for Police Agencies in Metropolitan Statistical Areas*) for 1984 through 1997. For the years of 1998-2006, we used the

annual files available at ICPSR (e.g., *Uniform Crime Reporting Program Data [United States]: Arrests by Age, Sex, and Race, 1998-2004*). Similar to annual youth homicide rates, robberies and assaults per 100,000 age-specific population were calculated by year.

As in the SHR, agencies varied in the number of months in a year they reported arrest data to the UCR, so rates were adjusted to reflect this variation. In any given year, if a city reported in fewer than 6 months, their arrest counts were set to missing. The number of months reported by an individual agency was then used to recalculate the number of annual arrests for agencies reporting between 6 and 11 months of data. For example, if an agency reported 10 homicides over 6 months and did not report in the other 6 months, the number was adjusted to 20 homicides to account for missing reporting months. Robberies and assaults per 100,000 of the total and age specific population were then calculated for each year using these adjusted counts.

Partial reporting during the 23-year time frame was limited to 43 cities having missing data for one or more years in the UCR. Nine cities were missing for 10 years or more (Seattle, Lexington, Ft. Lauderdale, Jacksonville, Miami, St. Petersburg, Tampa, New Orleans, and Washington, D.C.). These cities were dropped from the analysis. Tucson was also dropped for the reasons cited above. Of the remaining cities, approximately 94% of the 2,070 city-years (i.e., 90 cities multiplied by 23 years) had reported data.

Data on City Characteristics

Structural Disadvantage. Research reviewed above identified several types of city characteristics that should have major impacts on trends of youth homicide. One broad class of measures can be classified under the construct of structural disadvantage. We constructed a weighted disadvantage scale by conducting principal components factor analysis of five different indicators of disadvantage conventionally used in previous research (factor loading for the years 1980, 1990, and 2000, respectively are in parentheses by each indicator: percent in poverty (.92, .95, .94), percent unemployed (.80, .90, .77), percent on public assistance (.91, .87, .78), percent female headed households with children (.96, .95, .92), and percent African American (.83, .82, .73). Eigenvalues were 3.91, 4.05, and 3.47 for the three census years from 1980 to 2000. Factor scores were calculated and used in the analyses reported below.

Drug Market Activity. Youthful offenders and gang members in urban areas often become associated with or involved in drug sales/distribution. It is reasonable to assume that variation in such activity may explain between-city *v*ariations in city-level trends of youth homicide noted in

the literature (e.g., Blumstein, 1995; Blumstein & Rosenfeld, 1998; Cork, 1999; Grogger & Willis, 2000; Messner et al., 2005; Ousey & Lee, 2002). Drug arrests are especially related to police resources and enforcement priorities (Biderman & Lynch, 1991). A critical question is whether drug arrest statistics reflect changes in local law enforcement *policy* rather than drug market *activity* (Cork, 1999; see Ousey & Lee, 2002, pg 81 for a discussion). For example, drug arrests may ascend or descend because of shifts in drug enforcement policy and resources, which in turn may be driven by social and political factors not necessarily related to actual changes in local drug activity.

Comparisons to other drug data sources have shown UCR drug *arrest* data to be a proximate measure for local drug market activity (e.g., Baumer et al., 1998; Rosenfeld & Decker, 1999). However, empirical results of analyses across studies using these data have been decidedly mixed, with some investigators finding a positive estimated relationship between drug arrests and youth homicide (e.g., Cork, 1999; Baumer 2008), some finding a negative estimated relationship (e.g., McCall et al, 2008), and others finding that the estimated relationship is significantly moderated by social context (e.g., Ousey and Augustine, 2001; Ousey and Lee, 2002). These mixed results could be due to several factors including: (a) changing dynamics over time and across cities between law enforcement policy and drug market activity, (b) the particular drug arrest measures used (e.g., sales/manufacture versus possession or the type of drug for which arrests were made, such as cocaine/heroin versus marijuana), and (c) the finding that the estimated relationship is moderated by social context. For example, Ousey and Lee (2002) found that cities having a *higher* level of resource deprivation had a stronger *positive* estimated effect on homicide rate variation. Conversely, cities having a *lower* level of such disadvantage had a *negative* estimated effect.

Given the limitations of drug arrest data, combined with the mixed empirical findings to date, we explored the use of an alternative proxy measure of drug market activity drawn from the SHR. Specifically, the SHR provides data on the number of "narcotics-related" homicides, and we calculated the percent of homicides at the city level that were narcotics related as a proxy for drug market activity. Although local police classify incidents as narcotics-related (or not), this measure should not be as contaminated by *enforcement policies* as an arrest proxy and should be more reflective of actual behavior—particularly the relative proportion of lethal violence within cities related to local drug market activity.

A key focus for the current study is the extent to which drug market activity became infused with serious and/or lethal violence. It is true that data for the measurement of temporal trends in youth homicide and predictors of those trends (see also the proxy for gang presence and activity below) were drawn from the same data source: the SHR. However, the relative proportion of *all* lethal violence—not just youth violence—was used, and the objective was to determine how well this proxy measure predicted *intercity variation* in trends of youth homicide *over time*, not levels of such homicide at a particular point in time. (Doing the latter could result in definitional dependency between the predictor and the outcome variable, in that counts in the numerator of the proportion of all homicides that are narcotics-related could also be counts in the numerator of a youth homicide rate. Steps should be taken to minimize this type of definitional dependency when variation in temporal tends across cities is the outcome measure.)

Firearm Availability. Another important measure given our focus on homicide is firearm availability. The construct validity of this measure has been demonstrated by its applications in a variety of other research studies. Azrael, Cook, and Miller (2004) reviewed leading studies and compared different proxy measures for the prevalence of firearm ownership with survey estimates. "Percent of suicides with a firearm" consistently performed better than other proxy measures in cross-sectional comparisons. (See also the National Bureau of Economic Research Working Paper #8570.) For this study, the Division of Vital Statistics at the National Center for Health Statistics provided their *Multiple Cause of Death* file for the years of 1989-2005. These data were used to construct a proxy for firearm availability in 1990 and 2000—the ratio of firearm suicides to total suicides. Cause of death information was reported at the individual level, and included indicators for the city of residence of the decedent and the county of the occurrence of the suicide. City of residence was used to construct the ratio of firearms to total suicides.

Youth Gang Presence-Activity. Finally, the study's focus on youth homicide suggests an additional category of measures should be included. A major issue in research and policy discussions about youth-perpetrated violence is the impact of youth *gangs* on youth homicide and serious nonlethal violent crime (e.g., Egley & Ritz, 2006; Howell, 2006.) Although no single reliable indicator of gang presence and activity in the U.S. is available for this time frame, two sources of data on youth gangs were analyzed to establish the reliability of our measure of gang presence and activity.

1. One proxy for gang presence and activity was derived from the SHR homicide data discussed above—the proportion of all homicides in a given city classified as gang-related. Classification criteria are likely to vary across police agencies reporting homicide data to the FBI, but reliability of classification is a problem with any data that might be used in the study of youth gangs (e.g., see Snyder & Sickmund, 2006). Given the availability of the SHR data, they were used to determine whether the percentage of homicides classified as "gang-related" was associated with variation in youth homicide trends across cities.

2. A second set of indicators was available beginning in 1996 from the annual *National Youth Gangs Survey (NYGS)* conducted by the National Youth Gang Center (e.g., Egley, et al., 2006). This nation-wide annual survey of law enforcement agencies includes reports on gang homicides, as well as measures of gang numbers and gang membership. The SHR gang-related homicide data and indicators drawn from the NYGS were analyzed to determine the nature of their relationships.

Specifically, we calculated the average gang membership for the period 1996-1999 and 2000-2004 reported in the NYGS for each city in the sample and estimated the association between these averages and the average number of homicides classified as gang- related in the SHR for the same two periods. The associations were very strong: r = .954 for the 1996-1999 period and r = .887 for the 2000-2004 period. We also calculated the association between the annual gang-related homicides in the SHR with those reported in the NYGS. Again the associations were very strong, ranging from a low of r = .682 in 1999 to a high of r = .960 in 2001. Based on these associations, we moved forward with using the proportion of homicides classified as gang-related in the SHR as our proxy for gang presence and activity. *Like the proportion of all homicides that were narcotics-related, this proxy measure was used to account for intercity variation in youth homicide trends over time, not levels of such homicide at a given point in time (i.e., intercity variation in youth homicide rates).*

Analytic Approaches

Hierarchical Linear Modeling (HLM). The basic design for the analysis utilized the Hierarchical Linear Modeling (HLM) framework developed by Raudenbush and Bryk (2002) and effectively used in city-level homicide research by Ousey and Lee (2002) among others. In this approach, a set of models for nested data was estimated simultaneously, such that the influence of the independent predictors of the dependent variable is estimated and,

simultaneously, the factors that measure differences among the clusters of cases at level 2 are assessed as to their influence on the effects of the independent variables at the lower level (level 1). This structure is the reason such models are characterized as "multi-level models" in the literature. In this case, HLM models were specified with level 1 establishing the *within-city annual time trends* in youth homicide for each city, and level 2 involving the *city characteristics*, proxies for gang presence-activity, and proxies for drug market activity discussed previously that were expected to account for variation in the time trends across the sample of 91 large cities.

The first part of the analysis involved estimating the temporal trends in youth violence rates variation across 91 cities of the 100 largest cities in the U.S. for the years of 1984-2006. For the most part, similar approaches were used for the analysis of lethal (murder and non-negligent manslaughter) and nonlethal (robbery and aggravated assault) youth violence; differences are noted below. The second part of the analysis involved estimating the impact of city-level characteristics (level 2) on the parameters of the temporal trend estimated at level 1. Empirical questions addressed were:

- What is the temporal trend for this time period for homicide rates involving perpetrators 13 to 17 and 18 to 24 years of age?
- Are temporal trends in nonlethal violence perpetrated by youth similar to youth homicide trends?
- Do similar city characteristics account for variation in nonlethal violence and youth homicide trends?
- Do the city characteristics that account for variation in the temporal trends between cities in the early years in the period also account for the upturn in the trend in later years?

Analytical procedure used to address these empirical questions involved conducting three steps of multilevel modeling. Rates were calculated using both raw and the multiply imputed data to assess if the temporal trends using raw data differed from the estimated trends using multiply imputed data. First, fully unconditional models were estimated to determine the percent of the total variation in age-specific and measurement specific homicide rates between and within the sample of cities. Such models also provided the basis for deriving the R^2 for the equations in which the temporal trend is estimated. This derivation involved comparing the reduction of the within city variation of the conditional models (temporal trend specified and

estimated) to the within city variation of the unconditional models (no temporal trend specified and estimated).

Second, the temporal trend was estimated at level 1 (within city) using third-order polynomial regression. The level one equation estimated is as follows:

$$Y = B0 + B1(\text{Time}) + B2(\text{Time Squared}) + B3(\text{Time Cubed}) + e$$

Time was measured in single years ranging from zero (1984) to 22 (2006). Hence, the intercept represents the initial status of cities (their age-specific homicide rates) as of 1984. A third-order temporal model was specified because the national trend between 1984 and 2006 has three bends in the temporal curve—an increase from 1984 to circa 1991-1993, a decline from that high point to 2000, and another upturn thereafter. Ousey and Lee (2002) used a second-order temporal specification at level 1 in their HLM analysis, however their time period ended in 1997, prior to the third upturn in the national trend. The objective here was to determine if the third order polynomial specification fit the data for the two age-specific homicide rates, robbery rates, and assault rates, and to determine whether this pattern varied depending on what data were analyzed (raw rates or imputed rates).

Third, city level characteristics were added to the model to determine whether structural disadvantage and our proxies for drug market activity, firearm availability, and gang activity accounted for variation in the early and later years of the temporal trends across cities.

Pooled Cross Section Time Series Analysis. A second multilevel analytical approach was used to determine if the results generated from HLM and UCR data could be replicated using a different technique. Pooled Cross Section Time Series Analysis was conducted for this purpose. Pooled models offer a number of advantages over conventional time series and/or cross sectional approaches (e.g., Podesta, 2006). Of particular importance for this study are two advantages: (1) the estimation of models that account simultaneously for *both* cross sectional variation and dynamic processes (and the implications that both sets of processes have for the error in equation structures), and (2) the question of statistical power, or the ability to detect effects that do in fact exist, but that may be hard to discern because of limits on the number of observations in space or time.

Although HLM models provide a powerful analytic approach for the purposes of this project, with its goal of yielding a better account of the dramatic changes over the past 23 years in youth homicide in the U.S., the model's characteristics are such that, in each of the variants of the analysis conducted, either time or city variation is held constant while the influence of the other is estimated. Moreover, the time variation is subdivided into the early "epidemic" and the more recent upturn in youth homicide rate variation. In contrast, the pooled approach involves creating a data set that treats the city-by-year data points as the unit of observation for each variable, dependent and independent. Explaining variation in the direct combination of these two sources of variation in youth violence is a complementary goal of this project, in addition to testing models for the epidemic and later years in the temporal trends for cities. By analyzing the city-by-year units as *cases* in the analysis, we can uniquely and directly assess youth homicide and serious nonlethal youth violence trends as they occurred in U.S. cities from 1984 through 2006.

Data structures of this type impose a number of violations of standard statistical models, but considerable research on these issues and their solutions over the past 50 years in economics, sociology, and political science—and standard software packages such as Stata/SE 10.1 — provide a wide variety of alternative models and specifications to deal with these problems. All results of the pooled cross section time series analyses presented in this report were produced with this statistical software.

The second issue, that of statistical power, is not only generally important for drawing inference in criminology and related fields, but is relevant in our interpretation of any differences we may find between the HLM results of our analyses and results of the pooled model. The challenge is easily seen in the nature of our data. We selected the 100 largest U.S. cities in 1980 for this analysis. At best, we could analyze these cities in a cross sectional design, as many scholars have done with similar data sets in this field. However, one of the most important aspects of the reality of youth homicide over the past 30 years is its temporally dynamic nature.

To approach this as a time series analysis, we are left with 91, 23-year series, and 23 years is viewed as too few over time observations to identify statistically stable differences by many experts (e.g., McCleary et al., 1980). Thus the analyst may find her/himself without sufficient power to detect moderate or small, but theoretically important, effects in multivariate models. The pooled approach solves this problem, as the available degrees of freedom for the analysis is

the number of cross sections times the number of time points, or, in our case, with the attrition of some cities, 91 times 23 or 2093. This provides ample power for the detection of effects in these multivariate models.

EMPIRICAL FINDINGS

Empirical findings from these analyses are presented in three sections below. The first section summarizes the results of the HLM analyses involving the age-specific youth homicide rates. The second section describes the findings from the HLM analyses of the nonlethal youth violence rates. Finally, we present results of a pooled cross section time series analysis of the youth homicide and nonlethal youth violence data.

I. HLM Analyses (Tables 1-9)

Age-Specific Youth Homicide Rates

The results of estimating the fully unconditional models for homicide involving the two age groups are presented in Table 1. This table shows the partitioning of the total variance in the age-specific homicide rates over the 23-year time period within and between the 91 cities. Two findings are notable. First, variance in the initial status of the temporal trends (rates as of 1984) between cities was greater for homicides involving perpetrators 18 to 24 years of age than those involving 13 to 17 years of age. That difference is revealed by comparing the intra-class correlation coefficients (ICC), indicating the portion of the total variance that is between cities. Specifically, the ICCs for 18 to 24 year olds were more than *double* the ICCs for 13 to 17 year olds. Second, the results were remarkably similar regardless of whether the raw or multiply imputed data were used in the estimation of the fully unconditional models, although the within and between variance was greater for the multiply imputed data, compared to the raw data involving homicide rates with 18 to 24 year old perpetrators. ***These results provided preliminary evidence that the MI procedure to compensate for missing data made full use of information about homicide in the SHR files, but was not likely to yield findings that were significantly different from those involving the raw data***.

Table 1

Variance Components of Youth Homicide Rates Across 23 Years and Between 91 Cities

	13 to 17 Homicide Rates		18 to 24 Homicide Rates	
Variance Components	Raw Data	Imputed Data	Raw Data	Imputed Data
Between Cities	206.97	221.47	309.18	765.44
Within Cities	589.97	643.60	287.74	595.66
Intra-Class Correlations (ICC)	.26	.26	.52	.56

Further evidence was found by examining the correlation across the 2,093 city years (91 cities times 23 years) between the age-specific homicide rates based on the raw and multiply imputed data. The correlation for homicide rates involving perpetrators 13 to 17 years of age was r = .99; rates involving 18 to 24 year old perpetrators was r = .84. Three cities had substantially higher multiply imputed rates for some of the years in the 23-year time series compared to the rates based on the raw data: Gary, Indiana for nine years, with New Orleans, Louisiana and Santa Ana, California having "outliers" for five years. The correlation increased to r = .91 with the elimination of these cities. However, they were kept in the analysis reported below because the remainders of the imputed rates in the time series for those cities were consistent with the temporal trends (i.e., there were no outliers).

The second stage of the HLM analysis was to estimate the third-order polynomial specification at level 1 in the HLM analysis. The objective here was not to determine the variance of the time parameters between cities (time, time squared, and time cubed). That objective was addressed in the third stage of the analysis when city-level characteristics were specified to account for such variance at level 2. Rather, the objective of the second stage was to determine if the third-order polynomial significantly modeled the temporal variation of the age-specific homicide rates over time. Hence, the time parameters were fixed at level 2, but the initial status of the trend (the intercept) was allowed to vary. The results of the HLM estimation are presented in Table 2.

The empirical results of the HLM estimation can be summarized succinctly. All of the parameter estimates of the third-order polynomial model were statistically significant ($p \geq .00$) and in the direction expected. This assertion applies to both the homicide rates involving juvenile perpetrators 13 to 17 and those involving young adult perpetrators 18 to 24 years of age. The

positive time coefficient corresponded to the escalating youth homicide rates during the early "epidemic" years of the 23-year series (e.g., the mid-1980s to the early 1990s). The negative time squared coefficient reflected the downturn in the time series after the early 1990s, while the positive time cubed coefficient captured the upturn of homicide rates during the more recent years of the period. The fit of the model appeared to be stronger for the homicide rates involving perpetrators ages 13 to 17. However, when the three cities having the outliers for some of the years in the time series for multiply imputed rates involving 18 to 24 year old perpetrators were dropped, the "explained variance" more than tripled ($R^2 = .28$). Once again, the results for the age-specific rates were similar regardless of whether the raw or multiply imputed data were analyzed. Given these findings, the third stage of the HLM analysis was limited to the multiply imputed data, while checking for the influence of the three cities having "outliers."

Table 2

HLM Estimates of the Third-Order Polynomial Model of Age-Specific Homicide Rate Variation Over 23 Years and 91 Cities[1]

Third-Order Polynomial	13 to 17 Raw	13 to 17 Imputed	18 to 24 Raw	18 to 24 Imputed
Model Parameters	Coefficient (Robust Standard Error)	Coefficient (Robust Standard Error)	Coefficient (Robust Standard Error)	Coefficient (Robust Standard Error)
Time	11.47 (1.04)	11.98 (1.08)	6.54 (.81)	8.35 (1.00)
Time Squared	-1.08 (.10)	-1.12 (.11)	-.64 (.08)	-.73 (.11)
Time Cubed	.03 (.003)	.03 (.003)	.02 (.002)	.02 (.003)
Intercept	4.25 (1.28	3.68 (1.33)	18.05 (1.52)	22.17 (2.02)
R^2	.21	.22	.11	.09
Variance Components				
Between Cities	211.55	226.48	308.57	764.76
Within Cities	463.29	503.23	255.46	543.45

[1]*All coefficients are statistically significant beyond* $p \geq .00$

The third stage of this analysis began by determining the extent to which the parameter estimates of the third-order polynomial model varied across the 91 cities. Recall that the primary objective was to establish the city-level characteristics associated with the escalation of youth homicide rates during the "epidemic" years and then to establish whether these same characteristics were linked to the upturn in these rates during recent years. Given that objective, the "time" and "time cubed" parameter estimates were allowed to vary in the HLM models, with the intercept and "time squared" estimates remaining fixed. Table 3 shows the variance components of the third-order polynomial models estimated using HLM, with time and time cubed allowed to vary but the intercept and time squared remaining fixed. The level 1 parameter estimates of the third-order polynomial model are not shown because they are virtually identical to those reported in Table 2.

Table 3

Variance Components of the Third-Order Polynomial Model Allowing Time and Time Squared to Vary Across Cities[1]

Variance Components	13 to 17 Imputed Homicide Rates	Chi Square	18 to 24 Imputed Homicide Rates	Chi Square
Between Cities:				
Time	8.613	1054.57	17.00	1779.64
Time Cubed	.00005	647.57	.00006	790.78
Within Cities	468.66		534.79	
Intra-Class Correlations (ICC)[2]	.02		.03	

[1]*The between city variance for both the time and time cubed parameter estimates have statistically significant Chi Squares with 89 degrees of freedom beyond* $p \leq .00$
[2]*The ICC coefficients are based on the combined variance of time and time cubed because the variance for time cubed is so small.*

Table 3 revealed a striking feature of the between city variance in the time and time cubed parameter estimates. It was remarkably limited. The ICC coefficients indicated that only two percent of the total variance was attributable to between city differences in the time and time cubed parameter estimates for homicide rates involving 13 to 17 year old perpetrators. For homicide rates involving perpetrators 18 to 24 years of age, the between city variance was only

three percent of the total. Considering the results reported in Table 1 with those in Table 2, the following summary statement can be made: The vast majority of the between city variance was due to differences in the initial status of the time series (i.e., the intercept), not differences in the parameter estimates capturing the temporal trends over the 23-year period. Although not shown, that statement applied to the time squared parameter estimates as well; the ICC coefficients for the between city variance of those estimates for the 13 to 17 and 18 to 24 homicide rates, respectively, were five percent and seven percent. In short, the third-order polynomial temporal trend appeared to be quite robust across the 91 cities, with the greatest portion of the between city variance owing to where cities start in the time series (i.e., their youth homicide rates as of 1984—the intercept of the third-order polynomial model).

Despite the limited variance in these parameter estimates, we specified and estimated multivariate HLM models in which city-level characteristics were included at level 2. Those incorporated in the models estimated were: (a) the structural disadvantage scale, (b) the proportion of total homicides that were drug-market-related, (c) the ratio of firearm-related suicides to total suicides, and (d) the proportion of total homicides that were gang related. Each of these predictors were time-specific, meaning data from the 1980s were used to estimate between city variation in the time parameter estimate, and 2000 and post 2000 data were used to estimate between city variation in the time cubed parameter estimate. The time and time cubed parameter estimates were allowed to vary, with the intercept and time squared fixed. However, the level 2 models were estimated separately (i.e., one for time and then another for time cubed). The results of the HLM analysis are reported in Table 4.

As shown in that table, a clear pattern emerged from the analysis. For homicide rates involving both juvenile perpetrators ages 13 to 17 and young adult perpetrators ages 18 to 24, the structural disadvantage scale and the proxy for gang presence and activity had statistically significant estimated effects on intercity variation in the time parameter estimate. Moreover, those estimated effects were in the direction expected. The greater the structural disadvantage and the greater the gang presence and activity, the greater was the escalation in the age-specific youth homicide rates during the early years of the time series. Although the strength of the estimated effects waned, that same pattern held for intercity variation in the upturn in youth homicide rates in the later years of the period. That is, gang presence and activity as well as structural disadvantage was significantly associated with intercity variation in the time cubed

parameter estimate. No statistically significant estimated effects were found for the firearm availability proxy (the suicide ratio) or the percent of total homicides that were narcotics related—the proxy for drug market presence-activity—in the HLM analyses.

Table 4

Empirical Results of the HLM estimation of Level 1 and Level 2 Multivariate Models

	13 to 17 Homicide Rates		18 to 24 Homicide Rates	
Model Parameters	Time	Time Cubed	Time	Time Cubed
Level 1	Coefficient (Robust Standard Errors)	Coefficient (Robust Standard Errors)	Coefficient (Robust Standard Errors)	Coefficient (Robust Standard Errors)
Time	12.09* (1.10)	12.10* (1.09)	8.22* (1.12)	8.53* (1.01)
Time Squared	-1.13* (.11)	-1.13* (.11)	-.75* (.11)	-.75* (.11)
Time Cubed	.03* (.002)	.03* (.003)	.02* (.003)	.02* (.003)
Intercept	3.47* (1.35)	3.47* (1.35)	22.16* (2.01)	22.17* (2.01)
Level 2				
Gangs	3.34* (1.28)	.003* (.001)	17.74* (2.46)	.01* (.002)
Narcotics	.78 (1.05)	.003 (.003)	2.95 (4.06)	.01 (.01)
Gun Availability	-.14 (.33)	-.001 (.001)	-.07 (1.00)	-.00 (.00)
Disadvantage	.17* (.04)	.0003* (.0001)	.484* (.12)	.0005* (.0002)
Variance Components				
Between Cities: Time	8.16	8.64	13.99	17.01
Time Cubed	.00005	.00005	.00006	.00007
Within Cities	468.23	467.23	534.90	534

*$p \leq .05$

Age-Specific Rates of Nonlethal Violence (Robbery and Assault)

The results of estimating the fully unconditional models for robbery and assault involving the two age groups are presented in Table 5. This table shows the partitioning of the total variance in the age-specific robbery and assault rates over the 23-year time period within and between the 90 cities. Notably, the variance in the initial status of the temporal trends (rates as of 1984) between cities was *similar* across offense types and age groups, with ICCs indicating that the majority of variance is between cities.

Table 5

Variance Components of Youth Robbery and Assault Rates Across 23 Years and Between 90 Cities

	Robbery Rates		Assault Rates	
Variance Components	13 to 17	18 to 24	13 to 17	18 to 24
Between Cities	408.98	479.57	478.25	1847.89
Within Cities	199.93	203.75	333.03	1019.23
Intra-Class Correlations (ICC)	0.67	0.70	0.59	0.64

Similar to the analysis of homicide, the objective of the next stage of analyses was to determine if the third-order polynomial significantly modeled the temporal variation of the age-specific robbery and assault rates over time. Hence, the time parameters were fixed at level 2, but the initial status of the trend (i.e., the intercept) was allowed to vary. The results of the HLM estimation are presented in Table 6.

The empirical results of the HLM estimation also can be summarized succinctly. All of the parameter estimates of the third-order polynomial model were statistically significant ($p \geq .001$) and in the direction expected. This assertion applies to the robbery and assault rates involving perpetrators 13 to 17 and those involving perpetrators 18 to 24 years of age. The positive time coefficient corresponded to the escalating youth nonlethal violence rates during the early "epidemic" years of the 23-year series (e.g., the mid-1980's to the early 1990's). The negative time squared coefficient reflected the downturn in the time series after the early 1990's, and the positive time cubed coefficient captured the upturn of youth nonlethal violence rates during the more recent years of the time period. For robbery, the fit of the model appeared to be stronger for

rates involving young adult perpetrators 18 to 24 years old. However, the converse was true for assault rates.

Table 6

HLM Estimates of the Third-Order Polynomial Model of Age-Specific Robbery and Assault Rate Variation Over 23 Years and 90 Cities[1]

Third-Order Polynomial	13 to 17 Robbery	18 to 24 Robbery	13 to 17 Assault	18 to 24 Assault
Model Parameters	Coefficient (Robust Standard Error)	Coefficient (Robust Standard Error)	Coefficient (Robust Standard Error)	Coefficient (Robust Standard Error)
Time	2.96 (0.61)	3.25 (0.49)	6.37 (0.77)	9.49 (1.48)
Time Squared	-0.26 (0.05)	-0.40 (0.06)	-0.49 (0.08)	-0.76 (0.15)
Time Cubed	0.006 (0.001)	0.01 (0.002)	0.01 (0.002)	0.02 (0.004)
Intercept	22.09 (3.71)	37.32 (2.87)	20.60 (2.13)	48.63 (5.07)
R^2	.08	0.17	0.16	0.10
Variance Components				
Between Cities	406.48	479.20	477.98	1844.18
Within Cities	183.30	169.23	278.88	913.48

[1]*All coefficients are statistically significant beyond* $p \geq .001$

The third stage of this analysis began by determining the extent to which the parameter estimates of the third-order polynomial model varied across the 90 cities. Recall that the primary objective was to establish the city-level characteristics associated with the escalation of youth violence rates during the "epidemic" years and then to establish whether these same characteristics were linked to the upturn in these rates during recent years. Given that objective, the "time" and "time cubed" parameter estimates were allowed to vary in the HLM models, with the intercept and "time squared" estimates remaining fixed. Table 7 shows the variance components of the third-order polynomial models estimated using HLM, with time and time cubed allowed to vary but the intercept and time squared remaining fixed. The level 1 parameter

estimates of the third-order polynomial model are not shown because they are virtually identical to those reported in Table 6.

Table 7

Variance Components of the Third-Order Polynomial Model Allowing Time and Time Squared to Vary Across Cities[1]

Variance Components	13 to 17 Robbery	Chi-Square	18 to 24 Robbery	Chi-Square	13 to 17 Assault	Chi-Square	18 to 24 Assault	Chi-Square
Between Cities Time: Time cubed:	7.47 0.00003	1355.69 585.65	10.39 0.00005	2151.62 1011.73	12.14 0.00005	2288.16 1099.98	43.58 0.000019	2210.64 1042.32
Within Cities	292.44		255.95		275.81		1023.79	
Intra-Class Correlation (ICC)	0.02		0.04		0.04		0.04	

[1]*The between city variance for both the time and time cubed parameter estimates have statistically significant Chi Squares with 89 degrees of freedom beyond p ≥ .001*
[2]*The ICC coefficients are based on the combined variance of time and time cubed because the variance for time cubed is so small.*

Similar to the findings for homicide, the between city variance in the time and time cubed parameter estimates was remarkably limited. Between 2% and 4% of the total variance was attributable to between city differences in the time and time cubed parameter estimates for robbery and assault rates among both age groups. Again, the vast majority of the between city variance was due to differences in the initial status of the time series (i.e., the intercept), not differences in the parameter estimates capturing the temporal trends over the 23-year period. In short, the third-order polynomial temporal trend appeared to be quite robust across the 90 cities in the nonlethal violence sample, with the greatest portion of the between city variance owing to where cities start in the time series (i.e., their youth robbery and assault rates as of 1984: the intercept of the third-order polynomial model).

Despite the limited variance in these parameter estimates, we again specified and estimated multivariate HLM models in which city-level characteristics were included at level 2. The models included the same set of variables included in the multivariate homicide models: the

structural disadvantage scale, the proportion of total homicides that were narcotics-related, firearm availability (the ratio of firearm-related suicides to total suicides), and the proportion of total homicides that were gang-related. Again, each of these predictors were time-specific, meaning data from the 1980s were used to estimate between city variation in the time parameter estimate, and 2000 and post 2000 data were used to estimate between city variation in the time cubed parameter estimate. The time and time cubed parameter estimates were allowed to vary, with the intercept and time squared fixed. However, the level 2 models were estimated separately (i.e., one for time and another for time cubed). Due to missing data in the SHR on the measures of narcotics- and gang-related homicides, two cities (Wichita and Omaha) were not included in the multivariate analysis. The results of the HLM analysis for robbery and assault are reported in Table 8 and Table 9, respectively.

As shown in Table 8, the pattern in findings for robbery is not as clear as that in the homicide analysis. For robbery rates involving juveniles age 13 to 17 and young adults age 18 to 24, the structural disadvantage scale had statistically significant estimated effects on intercity variation in the time parameter estimate such that the greater the structural disadvantage, the greater the escalation in the age-specific youth robbery rates during the early years of the time series. Although the strength of the estimated effects waned, this relationship was also significant in the time cubed parameter estimate for 13 to 17 year olds and was marginally significant ($p=0.079$) in the time cubed parameter estimate for 18 to 24 year olds.

Other significant findings were less consistent across time periods and age groups. For robbery rates involving 18 to 24 year olds, the proxy for gang presence-activity had a statistically significant effect on intercity variation in the time cubed parameter; however, no other statistically significant estimated effects were found for the gang proxy. Given its lack of significance in other robbery models, this could be a spurious finding. For robbery rates involving 13 to 17 year olds, the firearm availability measure had a negative and statistically significant estimated effect on intercity variation in the time parameter estimate, suggesting that the lesser the availability of firearms, the greater the escalation in robbery rates involving juvenile perpetrators. No other statistically significant estimated effects were found for the measure of firearm availability. Additionally, no statistically significant estimated effects were found for the proxy for drug market activity.

For assault rates involving either 13 to 17 or 18 to 24 year olds, no statistically significant estimated effects were found for any of the city-level characteristics. However, there were a few marginally significant effects worth mentioning. Similar to robbery, firearm availability had a negative estimated effect on intercity variation in the time and time cubed parameter estimates for assault involving juveniles. Again, this suggests that the lesser the availability of firearms, the greater the escalation in assault rates among this population. Additionally, for assault rates involving 18 to 24 olds, the proxy for gang presence-activity had a marginally significant estimated effect on the intercity variation in the time parameter estimate.

Table 8

Empirical Results of the HLM estimation of Level 1 and Level 2 Multivariate Models

	13 to 17 Robbery Rates		18 to 24 Robbery Rates	
Model Parameters	Time	Time Cubed	Time	Time Cubed
Level 1	Coefficient (Robust Standard Errors)	Coefficient (Robust Standard Errors	Coefficient (Robust Standard Errors)	Coefficient (Robust Standard Errors)
Time	3.47* (0.66)	2.81* (0.61)	2.72* (0.53)	3.06* (0.46)
Time Squared	-0.25* (0.05)	-0.25* (0.05)	-0.38* (0.05)	-0.38* (0.05)
Time Cubed	0.005* (0.001)	0.006* (0.002)	0.01* (0.002)	0.009* (0.002)
Intercept	22.75* (3.82)	22.75* (3.82)	38.08* (2.97)	38.07* (2.97)
Level 2				
Gangs	0.71 (1.36)	0.0008 (0.001)	-1.25 (0.84)	-0.002* (0.001)
Narcotics	1.21 (1.48)	0.004 (0.003)	-0.36 (1.15)	0.004 (0.003)
Gun Availability	-1.31* (0.51)	-0.002 (0.001)	0.65 (0.60)	0.002 (0.001)
Disadvantage	0.26* (0.08)	0.0004* (0.0002)	0.41* (0.08)	0.0003^ (0.0002)
Variance Components				
Between Cities: Time Time Cubed	6.41 0.00003	7.57 0.00003	8.93 0.00005	10.48 0.00005

Within Cities	295.90	296.02	256.74	257.45

*$p \leq .05$

Table 9

Empirical Results of the HLM estimation of Level 1 and Level 2 Multivariate Models

	13 to 17 Assault Rates		18 to 24 Assault Rates	
Model Parameters	Time	Time Cubed	Time	Time Cubed
Level 1	Coefficient (Robust Standard Errors)	Coefficient (Robust Standard Errors)	Coefficient (Robust Standard Errors)	Coefficient (Robust Standard Errors)
Time	7.17* (0.87)	6.44* (0.80)	10.20* (1.62)	9.45* (1.46)
Time Squared	-0.50* (0.08)	-0.50* (0.08)	-0.75* (0.14)	-0.75* (0.14)
Time Cubed	0.01* (0.002)	0.01* (0.002)	0.02* (0.004)	0.02* (0.004)
Intercept	20.94* (2.15)	20.94* (2.15)	49.38* (5.17)	49.39* (5.17)
Level 2				
Gangs	2.67 (2.07)	0.003 (0.002)	6.93^ (3.91)	0.005 (0.003)
Narcotics	0.38 (2.24)	0.0004 (0.002)	-0.29 (3.30)	0.0001 (0.005)
Gun Availability	-1.38^ (0.75)	-0.003^ (0.002)	-1.45 (1.47)	-0.004 (0.003)
Disadvantage	0.12 (0.10)	0.0001 (0.0002)	0.28 (0.18)	0.0003 (0.004)
Variance Components				
Between Cities: Time Time Cubed	11.51 0.00005	12.004 0.00005	41.33 0.00019	43.18 0.00019
Within Cities	279.02	279.08	1034.44	1034.90

*$p \leq .05$

II. Pooled Cross Section Time Series Analysis (Tables 10-12)

Age-Specific Youth Homicide Rates

We next present the results of the pooled cross section time series analysis of the youth homicide and nonlethal violence data discussed above. The goal of this type of analysis is somewhat different than the analyses previously presented. The advantages of this analytic approach offer the possibility of additional insight into the causes of the rise, fall, and rise of urban youth homicide and violence demonstrated in the results discussed thus far. Table 10 below is parallel to Table 4 presented previously shown for youth *homicide* rates among juveniles (13 to 17 years old) and young adults (18 to 24 years old).

Table 10

Pooled Cross section Time Series Analysis Results for Youth Homicide, 91 Cities

	13 to 17 Homicide Rates		18 to 24 Homicide Rates	
Model Parameters (Random Effects)	Coefficient	Standard Error	Coefficient	Standard Error
Gangs	0.73*	0.09	1.11*	0.09
Narcotics	0.42*	0.07	0.76*	0.07
Gun Availability	7.54	6.99	33.34*	8.08
Disadvantage	8.73*	1.24	17.63*	1.58
R-Square				
Between Cities:	.31		.52	
Within Cities	.26	Overall R-Square: .27	.20	Overall R-Square: .39

**p ≤ .05; N=2093; non significant constant included in both models. (Time variables had the same pattern as in Table 4, included in the model but not shown here.*)

Results here are consistent with the strengths of pooled analysis discussed previously. First, they are very similar to the HLM findings presented above, in that both ***structural disadvantage*** and ***gang presence-activity*** as measured here have consistent and positive effects on the entire pattern of cross sectional and time dynamic variation in youth homicide for both age groups.

Second, in the case of 13 to 17 year olds, we also detect an impact of ***drug market activity*** in the cities and over time that also has a positive and significant impact. With HLM analyses (shown in Table 4), this effect was positive but never reached conventional significance levels. In the pooled model, with its greater statistical power, we are able to see evidence that drug-related activities in a city and over time influenced the course of youth homicide during both increases and decreases in the time period.

Concerning the impact of ***firearm availability***, in Table 4, the effects reported were insignificant and inconsistent. In Table 10, we also see inconsistency, in that the impact is not significant for juveniles ages 13 to 17. However, with the greater power, the impact of firearm availability is significant and positive for young adults ages 18 to 24. This result is theoretically consistent with the notion that access to firearms is likely to increase for older youth and young adults and is legal in many jurisdictions, but is consistently illegal and potentially less frequent for underage youth in the 13 to 17 year old age group.

Although we report only the GLS random effects model in Table 10, we considered a number of alternatives models for these analyses, including a fixed effects model with city based unit variables and a variety of GLS estimated models with error structures correcting for the effects of heteroskedasticity and serial autocorrelation, with overall structures, panel specific structures, and correlated structures. The findings reported in Table 10 are completely robust under all of these conditions.

Table 11

Pooled Cross Section Time Series Analysis Results for Youth Robbery, 90* Cities, 1984-2006

	13 to 17 Robbery Rates		18 to 24 Robbery Rates	
Model Parameters (Random Effects)	Coefficient	Standard Error	Coefficient	Standard Error
Gangs	0.13*	0.06	-0.13*	0.06
Narcotics	-0.04	0.04	0.08*	0.04
Gun Availability	-11.57*	5.33	-23.34*	5.23
	10.71*	1.10	12.90*	1.10

Disadvantage				
R-Square				
Between Cities:	.32		.51	
Within Cities	.10	Overall R-Square: .25	.19	Overall R-Square: .41

*p ≤ *.05; N=2070 (Seattle was dropped from these Robbery and Assault analyses due to missing data; non significant constant included in both models; time variables had same pattern as in Table 4, included in the model but not shown here.)*

Age-Specific Rates of Nonlethal Violence (Robbery and Assault)

The results in Table 11 are comparable to those in Table 8 for ***robbery rates*** among the two age groups of offenders we studied. Results for robbery committed by juveniles ages 13 to 17 are similar to those reported in Table 8 for the HLM analysis of juvenile robbery. The ***structural disadvantag***e index has a positive and significant effect here, as it did for homicide in this age group as well as in the HLM analysis for juvenile robbery. However, unlike the homicide results given in Table 10, juvenile robbery was negatively associated with ***firearm availability***. This same finding is reported in Table 8 for the HLM results for juvenile robbery in the level 2 findings. Thus the *higher* the proxy for firearm availability, the *lower* the rate of robbery in this younger age group. This was not the case for homicides among this age group, however, in which firearm availability was nonsignificant.

For the ***drug activity*** proxy, the results in both Table 8 for the HLM analyses and Table 11 for the pooled model show no evidence of a significant impact on juvenile robbery. Again, for homicide in this age group, narcotics related violence had a significant and positive impact. For ***drug market activity***, there is a difference between the results for the pooled model in Table 11 and those in Table 8 for the HLM analysis. Although ***gang presence-activity*** was not significant for robbery among 13 to 17 year olds in the HLM level 2 effects, it was positive and significant in the pooled model. This finding is similar to that for juvenile homicide offenders aged 13 to 17 reported in Table 10.

Results for robbery committed by 18 to 24 year old young adults also were different from the HLM results for young adult robbery and from the homicide results in Table 10. In the pooled section model, with its greater power, *all four predictors* were significant and positive in their impact on homicides committed by young adults. For the HLM level 2 effects, only disadvantage was consistent in its positive and significant impact. ***Gang presence-activity*** had

the same sign in both the HLM and pooled analysis for young adult robbery—negative, but this effect was significant in pooled model and non significant in the HLM model. ***Drug market activity***, which was significant and positive for both pooled homicide and robbery models, demonstrated no significant effect on young adult robbery in the HLM model, similar to the non significant effect found for firearm availability proxy in the HLM model for young adult robbery. However, as with the HLM model for juvenile robbery, ***firearm availability*** was significant and negative in the equation for robbery for 18 to 24 year olds.

Table 12

Pooled Cross section Time Series Analysis Results for Youth Assault, 90 Cities, 1984-2006

	13 to 17 Assaults Rates		18 to 24 Assault Rates	
Model Parameters (Random Effects)	Coefficient	Standard Error	Coefficient	Standard Error
Gangs	0.13	0.08	0.38*	0.15
Narcotics	0.002	0.05	0.07	0.10
Gun Availability	-27.33*	6.82	-64.67*	12.62
Disadvantage	6.33*	1.44	12.14*	2.72
R-Square				
Between Cities:	.19		.14	
Within Cities	.15	Overall R-Square: .17	.13	Overall R-Square: .14

*p $\leq$ *.05; N=2070(Seattle was dropped from the Robbery and Assault analyses due to missing data; nonsignificant constant included in both models; time variables had the same pattern as in Table 4, included in the model but not shown here.)*

Table 12 gives the pooled results for assaults committed by juveniles ages 13 to 17 and young adults ages 18 to 24 respectively, and is comparable to the HLM analysis reported in Table 9. Comparing the two statistical approaches, for juvenile assaults, neither g***ang presence-activity*** nor ***drug market activity*** had significant effects, similar to that reported in Table 9 for the HLM level 2 results. These results are divergent from the pooled homicide results in Table 10,

in which both proxies had significant and positive effects on juvenile homicide. The impact of ***firearm availability*** was similar in both the pooled and HLM assault analysis; both estimated effects were negative, although only in the pooled model did the effect reach statistical significance, probably a reflection of the greater statistical power of the pooled model. Results for ***structural disadvantage*** shown in Table 12 for juvenile assaults are similar to those for the pooled homicide results in Table 10, with positive and significant effects. The HLM results for juvenile assault did not show a significant impact of structural disadvantage in this case.

The pooled results for assault among those 18 to 24 also show some divergence from the HLM results and those for the pooled homicide model in the same age category. Although both the pooled assault model and the pooled homicide model show a *significant* and *positive* impact of ***gang presence-activity***, the HLM level 2 results do not reach the conventional significance level. The impact of ***drug market activity*** is not significant in either the pooled or HLM models for young adult assault, and again this predictor has a significant and positive impact in the pooled homicide model for this age group. ***Firearm availability*** is *negative* for young adult assault in both the pooled and HLM level 2 for these older young offenders, and—similar to findings on juvenile assault in the pooled model, rises to significance in the HLM model. Again, the impact of ***structural disadvantage*** on young adult assault replicates the significant and positive effect on homicide in this age category, but does not reach significance in the HLM level 2 results.

In sum, extending the nonfatal analysis to both the pooled and HLM models further underscores the main finding of the study regarding causes of lethal and nonlethal violence by juveniles and young adults during the period 1984-2006 in the nation's largest cities: namely that disadvantage has helped drive the increases in youth violence in 91 of the largest US cities during the past three decades. Disadvantage has the most consistent findings in all of the models across age groups and crime types, as well as across methodological variation. In the next section, we summarize key findings and suggest some policy options to prevent and reduce youth violence in the future, based on these empirical results.

CONCLUSIONS AND RECOMMENDATIONS

Summary of Findings

The perpetration of serious and lethal violence by youth in the United States is a matter of critical importance. Although there have been many studies of lethal and nonlethal youth violence, few (see McCall et al., 2008 for an exception) have examined *within-city* explanatory predictors for annual trends of youth homicide perpetration, even for the wildly anomalous period of the homicide epidemic. And no previous studies have tested such models against city-specific trends for serious but nonlethal violence by juveniles and young adults. This project sought to address both of these gaps in past research by compiling and analyzing 23 years of city-level data from a range of available data sources to empirically identify characteristics that most directly accelerate both lethal *and* nonlethal youth violence. Our ultimate goal was to initiate a process that will lead federal, state, and local criminal justice leaders to proactively develop and utilize a data-driven approach for monitoring and preparing solutions to impending serious crime problems involving youth.

In the years after 2000, reports from some U.S. cities indicated a resurgence of urban-based severe and lethal violence by juveniles and young adults. National statistics document a change in violence and use of firearms among that group as well. Although trends vary over time, it is vital to use the statistical tools and prior scientific findings at our disposal to deepen our understanding of trends variation and key precursors at the city level for the two most involved age groups of perpetrators and direct this expanded knowledge into evidence-based policies for reduction and prevention.

A potential approach to better understanding recent changes in youth violence—and thus to the development of more effective and evidence-based interventions—is to compare factors driving the historic acceleration in youth violence during the mid-1980s and early 1990s to emerging trends in lethal and nonlethal youth violence as they unfolded for cities in the early to mid-2000s. This study responded to this need by estimating temporal trend in youth homicide from 1984-2006 and modeling city-specific explanatory predictors influencing this trend for lethal and nonlethal violence by two age groups of youth.

One principal finding from the study is that the perpetration of *lethal* violence (murder and non-negligent manslaughter) and *serious nonlethal* violence (robbery and aggravated assault) for both juveniles and young adults followed the same general trend from 1984 through 2006. This

was demonstrated by an escalation in both lethal and nonlethal violence rates in the early years, with a significant downturn after the early 1990s, followed by a subsequent and significant upturn in the more recent years of the time period. City-level predictors significantly associated with these trends in youth violence varied by (a) time period (early vs. more recent upturn), (b) offense type (homicide, robbery, and aggravated assault), and (c) age of perpetrator (juvenile vs. young adult).

In focusing on predictors of *escalation* in youth violence, this study found that some factors were significantly associated with lethal and nonlethal violence by youth not only for the epidemic years, but also for the more recent increase. While some factors were consistently associated with youth violence across offense type, time period, and analytic technique, others were significant only in certain situations.

- ***Structural disadvantage*** and ***gang presence and activity*** had consistent and positive effects on *homicide* trends during the initial escalation of violence in the mid-1980s and early 90s and in the more recent years.
- ***Structural disadvantage*** was also significantly associated with trends in *robbery* during both periods of escalation for both age groups. In the pooled cross section time series analysis, with its greater power (but not the HLM analysis), structural disadvantage also demonstrated significant and positive effects on trends in *assault* perpetration for both juveniles and young adults.
- ***Drug market activity*** in cities and over time also demonstrated consistent and positive effects on trends in youth *homicide* for the 13 to 17 year old and 18 to 24 year old age groups in the pooled cross section time series analysis (but not the HLM analysis).
- ***Firearm availability*** in the pooled cross section time series analysis (but not the HLM analysis) demonstrated significant and positive effects on trends in *homicide* perpetration for young adults ages 18 to 24 years old over the time period. No statistically significant estimated effects were found for perpetrators ages 13 to 17.
- ***Gang presence-activity*** was not consistently associated with *robbery* trends, however. In the pooled cross section time series analysis, gang presence-activity demonstrated a positive effect on trends in robbery among juveniles ages 13 to 17, but a negative effect on robbery trends for young adults ages 18 to 24. (In the HLM analysis, gang presence also had a negative effect on robbery rates for the 18 to 24 year old age group in the more

recent upturn, but not during the initial escalation, and there were no significant effects on robbery rates for the 13 to 17 year old age group.)

- ***Drug market activity*** demonstrated a positive effect on *robbery* among 18 to 24 year olds **i**n the pooled cross section time series analysis, but had no effect for the younger 13 to 17 year old group. (In the HLM analysis, drug market activity was not associated with trends in robbery perpetration by either age group.)
- ***Firearm availability*** had a negative effect on trends in *robbery* perpetration among juveniles ages 13 to 17 in both the pooled cross section time series analyses and the HLM analyses, and among young adults ages 18 to 24 in the pooled cross section time series analyses.
- ***Drug market activity and gang presence-activity*** was positively associated with trends in *assaults* perpetrated by the 18 to 24 year old group, but not in younger 13 to 17 year old age group in the pooled cross section time series (but were not associated with assault trends during either time period in the HLM analysis).

Taken together, these findings suggest that measures related to drug market activity and gang presence-activity are more important for predicting lethal than nonlethal youth violence.

Implications & Recommendations

Although complex, the research reported here identified both the *need* for interventions and *areas* that should become the focus of those interventions. Particular attention should be paid to the following findings:

1. First, study results show that the ***recent upswing in youth violence*** was real and occurred for both juveniles and young adults. Study findings also demonstrate that, despite two uniquely distinct periods in time, there have been consistent predictors for escalations in youth violence. Although a downturn has been reported in some national rates from 2007-2008 for violent crimes by youth (excluding robbery; see e.g., Puzzanchera 2009), that downturn is less than the increases from 2000-2006, and it is too soon to tell if it represents a sustained shift in direction. National rates also *mask* variation among cities, many of which report ongoing increases in perpetration of violent crime and weapons offenses by this age group during the first two quarters of 2010.

2. Study findings suggest that city-level characteristics (e.g., structural disadvantage and gang presence-activity) associated with the early youth violence epidemic also help to explain

the more recent violence upturn. This is important from a preparedness and prevention standpoint. If these factors were associated with two periods of violence escalation, they may well help predict subsequent upturns. The study's strong and consistent findings on the association of ***structural disadvantage*** and violent crime across both age groups, periods of escalation, and types of offense of focus are of particular relevance here. "Lessons learned" from the epidemic of the mid-1980s to mid-1990s, as well as the recent upturn from 2000-2006, raise a serious warning flag in thinking about these next few years. Given the ubiquitous and severe recession affecting the nation that began in 2008 and its impact on urban areas, city officials, police departments, legislators, and community leaders will need to be particularly vigilant to offset a potential escalation in lethal and nonlethal violence by youth related to ongoing recession effects over time.

3. The ***presence and activity of gangs*** at the city level also proved to be a key component in cross sectional and time dynamic variation in youth homicide for both age groups and both periods of escalation. Residents in communities with concentrated levels of unemployment, a high proportion of single-parent households, and economic deprivation may be less able to challenge delinquent youth and to control illicit activities. According to Klein (1995), a logical explanation for "gang-city proliferation" is the manifestation of an urban population characterized by segregation, unemployment, and poverty. In this study, gang presence and activity appeared to impact youth *homicide* perpetration trends across age groups, but not trends in *nonlethal* violence perpetration by youth. This may be because gang homicides are more purposeful in terms of serving an overall mission for the gang—e.g., protecting turf or in retaliation for perceived offenses against the group or its members—in comparison to robbery, which is instrumental and has a specific purpose of taking money or other possessions from an individual.

The ongoing recession may also have relevance here. Although strong quantitative support for the relationship between community social controls and the development of gangs is limited, studies show that economic transitions and opportunities are related to the existence of local youth gangs (e.g., Jackson, 1991). Despite downturns in some youth violence indicators, more than one-third of jurisdictions in the National Youth Gang Survey reported gang problems in 2007—the highest annual estimate since before 2000 (Egley & O'Donnell, 2009). In addition, one in five large cities in the survey reported an *increase* in gang homicides in 2007, compared

with 2006. Approximately two in five reported increases in other violent offenses by gang members during the same time period. Results of the pooled time series analysis in this study showed significant and positive effects for gang presence-activity, drug-related activities, and (for 18 to 24 year olds) firearm availability across the time period, suggesting the interaction of these covariates. Again, the consistent association with gang presence-activity and youth perpetrated homicide across time periods and age groups suggests the urgency of effective and preventive measures to avoid the escalation of youth homicide seen in the previous two time periods.

4. Finally, there were marked *similarities* in city-level predictors associated with juvenile and young adult violence trends. Although Butts and Snyder encouraged the inclusion of 18 to 24 year olds in the study of youth homicide trends in 2006, to our knowledge, this is the first study that examines lethal and nonlethal youth violence trends and their city-level predictors separately for juveniles (ages 13 to 17) and young adults (ages 18 to 24). Structural disadvantage, drug-related activity, and gang presence-activity were associated with homicide rates across the time period for both age groups. There is considerable overlap in the interactions of teenagers and young adults in urban settings, including family and other social interactions as well as local street gang- and drug market activities, impacting the offending as well as the victimization patterns of both groups. Much of the gang literature describes age-integrated gangs composed of juveniles and young adults (Hagedorn, 1998; Klein, Maxson, & Cunningham, 1991; Thrasher, 1963), and homicide data has consistently documented a substantial crossover between juvenile and young adult victims and offenders (Cook & Laub, 1998, 2002). Based on these findings in discrete areas and results of this study across age groups, time periods, and types of offenses, ***it is crucial that any interventions or initiatives seeking to prevent or reduce youth violence not simply focus on juveniles under age 18. They must also address criminally involved young adults with whom juveniles come in contact if the younger youth are to be deterred and protected***.

The findings presented here should be interpreted with a number of limitations in mind. The models in the analysis employed macro-level measures and do not directly capture the behavioral constructs that operate at the neighborhood or individual level. In addition, the use of city-level data does not capture within-city–level variation in social structure. For instance, measures of city-level social disorganization do not tell us whether certain neighborhoods within the city had

high or low concentrations of social disorganization, or if these areas also suffered from heightened rates of youth violence. The following recommendations take into account some of these limitations, including the measurement issues associated with capturing factors such as drug market and gang presence-activity across cities.

Results from this study of lethal and nonlethal violence by youth ages 13 to 24 in 91 of the nation's 100 largest cities (based on the 1980 Census) provide information for police departments, local officials, legislators, and community leaders they can then use to inform strategic planning and prevention efforts related to urban-based juveniles and young adults. For example, these findings can be used as a first step by cities, states, and national practitioners/policy makers to:

1. **Inform Preparedness and Prevention Activities More Proactively**. Federal and local leaders should develop and utilize more data-driven approaches for enhancing crime preparedness and prevention activities. These activities could then be tied directly to the deployment and strengthening of policing and crime prevention resources in a more effective fashion, based on identified predictors of lethal and nonlethal youth violence during the escalation period of the 1980s and early 1990s and the relevance of those predictors for the more recent 2000-2006 time frame. *At the federal level*, this would include compiling the necessary data sources and identifying cities at risk of continued increases or more significant increases in upcoming years, based on past and current structural conditions and city-specific trends. *At the local level*, mayors, police chiefs, and other agencies tasked with the response or prevention of crime, should consistently review and analyze the data for their jurisdiction to identify emerging patterns.

   Police departments across the country have increasingly become engaged in more strategic forms of crime analysis. The type of data collection and analysis proposed here would not be different in that it would: (1) analyze multiple years of data to explore past and emerging trends; and (2) include data sources in addition to police crime data, including structural indicators (i.e., key economic and social indicators) as well as specific measures for the prevalence of gang and drug-related activity in the city. An additional and critical recommendation is to improve both the timeliness and quality of crime and structural indicator data so that these measures more accurately capture the phenomena of interest (see Recommendation #2).

2. **Enhance the Timeliness of Both Crime Data and Structural Indicator Data**. One clear recommendation from this study is that city leaders (including police chiefs, mayors, city councils, community leaders etc.) need more timely and more detailed data on crime and structural indicators that measure social disorganization, gang activity, drug markets, and other relevant conditions. As noted by Rosenfeld & Goldberger (2008, pg 2), "[C]ompared with such areas as health status, housing, and employment, the nation lacks timely information and comprehensive research on crime trends." Currently, the U.S. government funds two principal crime data programs: the FBI's *Uniform Crime Report* (UCR) and BJS's *National Crime Victimization Surve*y (NCVS). Although both provide valuable and important information, neither data source provides timely and detailed data in a manner that lends itself to the development of time-dependent responses by state and local agencies.
3. **Improve the Quality of Crime and City-level Indicator Data**. There is also a critical need to develop improved measures that capture the frequency of certain classifications of behavior—most importantly gang-related activity and drug-related activity—as well as improved measures for social disorganization and other economic and social constructs. The goal is to develop measures that are *standardized* across jurisdictions and as *independent* as possible of police activities and initiatives. One alternative is to develop measures through survey or school-based data collection processes that monitor levels of gang activity or drug activity in the community. However, the regular collection of information using these types of approaches may prove cost-prohibitive for many jurisdictions. Ultimately, from a national policy standpoint, we must decide if the benefits associated with increased resources for collecting independent drug activity and gang presence-activity measures more reflective of the behaviors of interest provide a significant benefit in terms of (a) understanding these phenomena within and across cities and (b) monitoring and intervening with changes over time. In the absence of improved measures, many of the problems associated with the unknown precision of current measures will continue.
4. **Develop Comprehensive and Multi-Disciplinary Approaches for Addressing Gangs**. Findings from this study have demonstrated the importance of gang presence and activity in influencing both fatal and nonfatal increases in youth violence. It is important that federal, state, and city police makers work with law enforcement and crime prevention experts to

assess gang activity proactively and incorporate that knowledge into not only police planning activities but also into citywide planning for upcoming years.

5. **Create Prevention Initiatives and Programs That Target Not Only At-risk Juveniles but Also Young Adults Ages 18 to 24**. Results of this study show that juvenile and young adult trends in violence are impacted by similar factors. As a result, interventions—whether in the form of policing initiatives or community-based prevention strategies—should not exclude young adults from their focus.
6. **Support At-risk Youth, Particularly Youth Living is Structurally Disadvantaged Neighborhoods**. Finally, it is critical that proactive resources and programs for at-risk youth be increased by using comprehensive and integrated community-level, school-level, family-level, and individual-level interventions designed to strengthen young people's "core competencies" as well as the social contexts in which they reside. Having such supports will help juveniles and young adults more effectively—without violence and other illegal activities—"beat the odds" (e.g., Guerra & Williams, 2005; Kim, Guerra, & Williams, 2008; Guerra & Bradshaw, 2008). Research has documented that, even in the face of stark disadvantage and threatening danger, most young people accomplish the developmental tasks necessary to navigate the risks and live productive, healthy, and responsible adult lives (e.g., Elliott et al., 2006; for a case study see Guerra et al., 2010).

In sum, the research reported here examined and compared predictors influencing trends in lethal and nonlethal serious violence by juveniles and young adults over the past 23 years for 91 of the largest 100 U.S. cities. By identifying and better understanding factors that drive *increases* in homicide, robbery, and serious assault, policy makers, researchers, and community leaders can develop more effective and targeted strategies for responding to youth violence *before* periods of acceleration. Since the early 1980s, responses to crime in the United States have centered on law enforcement, sentencing, and incarceration (Browne & Lichter, 2001). A growing body of criminal justice literature suggests that investments in policing and other official forms of social control will have disappointing results unless the preconditions of structural disadvantage are effectively addressed (MacDonald & Gover, 2005; McCall, Parker, & Macdonald, 2008; Ousey & Lee, 2002). As contended in a recent description of a general aggression model, "[I]f you want to create people…predisposed to aggression and violence, begin by depriving them of the resources necessary to meet basic needs—physical, emotional, psychological, and social."

(DeWall & Anderson, 2011, pg. 26). The cost-benefit of preventing criminal activities and their outcomes among youth far outweigh the investments required for proactive support.

References

Azrael, D, Cook, PJ, & Miller. (2004). "State and Local Prevalence of Firearms Ownership: Measurement, Structure and Trends." Journal of Quantitative Criminology. 20:43-62.

Baumer, E.P. (2008). "An Empirical Assessment of the Contemporary Crime Trends Puzzle: A Modest Step Toward a More Comprehensive Research Agenda." *Understanding Crime Trends: Workshop Report*, Washington, DC: Committee on Law and Justice. pp. 127-176.

Baumer, E.P., Lauritsen, J.L. Rosenfeld, R., and Wright, R. (1998). "The Influence of Crack Cocaine on Robbery, Burglary, and Homicide Rates: A Cross-City, Longitudinal Analysis." *Journal of Research in Crime and Delinquency* 35:316-340.

Blumstein, A. (1995). "Youth Violence, Guns, and the Illicit-Drug Industry." *Journal of Criminal Law and Criminology,* 86:10-36.

Blumstein, A., and Wallman, J. (Eds.) (2006). *The Crime Drop in America* (Revised Edition). New York, NY: Cambridge University Press.

Blumstein, A., Rivara, F.P., and Rosenfeld, R. (2000). "The Rise and Decline of Homicide – and Why." *Annual Review of Public Health*, 21:505-541.

Blumstein, A., and Rosenfeld, R. (1998). "Explaining Recent Trends in U.S. Homicide Rates." *Journal of Criminal Law and Criminology*, 88:1175-1216.

Blumstein, A., and Wallman, J. (2006). *The crime drop in America* (revised ed.). New York: Cambridge University Press.

Browne, A., and Lichter, E. (2001). "Imprisonment in the United States." *Encyclopedia of Women and Gender*, Volume A-K. London: Academic Press. pp. 611-623.

Browne, A., and Williams, K.R. (1989). "Exploring the Effect of Resource Availability and the Likelihood of Female-Perpetrated Homicides." *Law & Society Review*, 23:75-94.

Browne, A. and Williams, K.R. (1993). "Gender, Intimacy, and Lethal Violence: Trends from 1976 – 1987." *Gender and Society,* 7:78-98.

Browne, A., Williams, K.R. and Dutton, D.G. (1999). "Homicide Between Intimate Partners: A 20-Year Review." In D. Smith and M. Zahn (Eds.), *Homicide: A Sourcebook of Social Research.* Thousand Oaks: Sage Publications.

Bryk, A.S., and Raudenbush, S.W. (1992). *Hierarchical Linear Models*. Newbury Park, CA: Sage.

Bursik, R.J. (1988). "Social Disorganization and Theories of Crime and Delinquency: Problems and Prospects." *Criminology*, 26:519-550.

Butts, J.A., and Snyder, H.N. (2008). Arresting Children: Examining Recent Trends in Preteen Crime. Chicago: Chapin Hall Center for Children at the University of Chicago.

Butts, J.A., and Snyder, H.N. (2006). *Too Soon to Tell: Deciphering Recent Trends in Youth Violence*. Issue Brief #110. Chicago: Chapin Hall Center for Children., University of Chicago. Available www.chapinhall.org.

Coleman, J. (1988). "Social Capital and the Creation of Human Capital." *American Journal of Sociology*, 94(Suppl.):S95-S120.

Cook, P.J. (1998). "The epidemic of youth gun violence." Perspectives on Crime and Justice: 1997-1998 Lecture Series, CJ172851. national Institute of Justice, Washington, DC, pp. 107-116.

Cook, P.J., and Laub, J.H. (1998). "The Epidemic of Youth Violence." In M. Tonry and M.H. Moore (Eds.), *Youth Violence*. Chicago: University of Chicago Press. pp. 27-64.

Cook, P.J., and Laub, J.H. (2002). "The Unprecedented Epidemic of Youth Violence." In M. Tonry (Ed.), *Crime and Justice: A Review of Research*, Vol. 24. Chicago: University of Chicago Press. pp. 1-37.

Cork, D. (1999). "Examining Space-Time Interaction in City-Level Homicide Data: Crack Markets and the Diffusion of Guns Among Youth." *Journal of Quantitative Criminology*, 15:379-406.

Cubbin, C., Pickle, L.W., and Fingerhut, L. (2000). "Social Context and Geographic Patterns of Homicide among U.S. Black and White Males." *American Journal of Public Health*, 90:579-587.

DeWall, C. N. & Anderson, C. A. (2011). The general aggression model. In Shaver, P. R. & Mikulincer, M. (Eds.) *Human Aggression and Violence: Causes, Manifestations, and Consequences.* Washington D.C.: American Psychological Association.

Eck, J.E. and Maguire, E.R. (996). Have Changes in Policing Reduced Violent Crime? An Assessment of the Evidence. In Blumstein and J. Wallman, Eds., The Crime Drop in America (revised ed.),. New York: Cambridge University Press.

Egley, A., Howell, J.C., and Major, A.K. (2006). *National Youth Gang Survey: 1999-2001*. Washington, DC: Office of Juvenile Justice and Delinquency Prevention, Office of Justice Programs, United States Department of Justice.

Egley, A., and O'Donnell, C.E. (2009). *Highlights of the 2007 National Youth Gang Survey*. OJJDP Fact Sheet, April 2009. Washington, DC: Office of Juvenile Justice and Delinquency Prevention, National Center for Juvenile Justice, U.S. Dept. of Justice.

Egley, A., and Ritz, C.E. (2006). *Highlights of the 2004 National Youth Gang Survey*. OJJDP Fact Sheet, April 2006 #01. Washington, DC: Office of Juvenile Justice and Delinquency Prevention, National Center for Juvenile Justice, U.S. Dept. of Justice.

Elliott, D. S., Menard, S., Rankin, B., Elliott, A., Wilson, W. J., & Huizinga, D. (2006). *Good Kids from Bad Neighborhoods: Successful Development in Social Context.* New York: Cambridge University Press.

Federal Bureau of Investigation (2005). *Crime in the United States, Annual*. Washington, DC: FBI, U.S. Department of Justice.

Flewelling, R.L. (2004). "A Nonparametric Imputation Approach for Dealing with Missing Variables in SHR Data." *Homicide Studies*, 8(3):255-266.

Flewelling, R., and Williams, K.R. (1999). "Categorizing Homicides: The Use of Disaggregated Data in Homicide Research." In D. Smith and M. Zahn (Eds.), *Homicide: A Sourcebook of Social Research*. Thousand Oaks: Sage Publications.

Fox, J.A., and Levine, J. (2001). *The Will to Kill: Making Sense of Senseless Murder*. Needham Heights, MA: Allyn and Bacon.

Fox, J.A., and Zawitz, M.W. (2002). *Homicide Trends in the United States.* Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics.

Gartner, R. and Parker, R.N. (1990). "Cross-National Evidence on Homicide and the Age Structure of the Population." *Social Forces*, 69:351-371.

Goldstein, P.J. (1985). "The Drugs/Violence Nexus: A Tripartite Conceptual Framework." *Journal of Drug Issues*, 14:493-506.

Grogger, J., and Willis, M. (2000). "The Emergence of Crack Cocaine and the Rise in Urban Crime Rates." *The Review of Economics and Statistics*, 82:519-529.

Guerra, N. G., Williams, K. R., Meeks Gardner, J., & Walker, I. (2010). The Kingston Youth Development Program: An effective antiviolence intervention for inner-city youth in Jamaica. In Knox, L. & Hoffman, J. (Eds.) *Beyond Suppression: Global Perspectives on Youth Violence.* Santa Barbara, CA: Praeger Publishers.

Guerra, Nancy G. and Kirk R. Williams (2005) "Contextual influences in the learning of aggression and violence," In Nancy G. Guerra and Emily Phillips Smith (Eds.) *Preventing Youth Violence in a Multi-Cultural Society*, American Psychological Association.

Guerra, Nancy G. and Catherine P. Bradshaw (Eds.) (2008) Core Competencies to Prevent Problem Behaviors and Promote Positive Youth Development; Special Issue (122, Winter) of *New Directions for Child and Adolescent Development.*

Hagedorn, J. M. (1998). Gang violence. In M. Tonry & M. H. Moore (Eds.), *Youth violence* (pp. 365-419). Chicago: University of Chicago Press.

Hamilton, L.C. (1992). *Regression with Graphics: A Second Course in Applied Statistics*. Pacific Grove, CA: Brooks/Cole Publishing Company.

Hartigan, J.A. (1975). *Clustering Algorithms*. New York, NY: Wiley.

Howell, J.C. (2006). *The Impact of Gangs on Communities*. NYGC Bulletin No. 9. Washington, DC: Office of Juvenile Justice and Delinquency Prevention, National Center for Juvenile Justice, U.S. Dept. of Justice.

Jackson, P. I. (1991). Crime, youth gangs, and urban transition: The social dislocation of postindustrial economic development. *Justice Quarterly*, *8*, 379-397.

Johnson, B.D., Golub, A., and Dunlap, E. (2006). The rise and decline of hard drugs, drug markets, and violence in inner-city New York. In A. Blumsteirn and J. Wallman (Eds.), *The crime drop in America* (revised ed.). New York: Cambridge University Press.

Kann, L., Warren, C.W., Harris, W.A., et al. (1995). "Youth Risk Behavior Surveillance—United States, 1993." *MMWR CDC Surveillance Summaries,* 44(1):1-56.

Kennedy, D. (2006). "The Neighborhood War Zone." *The Washington Post*, Sunday, August 13, p. B-1.

Kim, Tia, Nancy G. Guerra, and Kirk R. Williams (2008) "Preventing youth problem behaviors and enhancing physical health by promoting core competencies." *Journal of Adolescent Health*: 43:401-407.

Kleck, Gary (1991). *Point Blank: Guns and Violence in America.* New Brunswick, NJ: Aldine Transaction.

Klein, M. W. (1995). *The American street gang: Its nature, prevalence, and control*. New York: Oxford University Press.

Klein, M. W., Maxson, C. L., & Cunningham, L. C. (1991). Crack, street gangs, and violence. *Criminology, 29,* 623-650.

Krivo, L.J., and Peterson, R.D. (1996). "Extremely Disadvantaged Neighborhoods and Urban Crime." *Social Forces,* 75:619-650.

Krivo, L.J., and Peterson, R.D. (2000). "The Structural Context of Homicide: Accounting for Racial Differences in Process." *American Sociological Review,* 65:547-559.

LaFree, G. (1999). "Declining Violence Crime Rates in the 1990s: Predicting Crime Booms and Busts." *Annual Review of Sociology* 5, 145-168.

LaFree, G. (1998). "A Summary and Review of Cross-National Comparative Studies of Homicide." In M.D. Smith and M.A. Zahn (Eds.), *Homicide: A Sourcebook of Social Research.* Thousand Oaks: Sage Publications. pp. 125-145.

Land, K.C., and McCall, F.L. (2001). "The Indeterminancy of Forecasts of Crime Rates and Juvenile Offenses." In: National Research Council and Institute of Medicine, *Juvenile Crime, Juvenile Justice,* Panel on Juvenile Crime: Prevention, Treatment, and Control. Committee on Law and Justice and Board on Children, Youth, and Families. Washington, DC: National Academy Press.

Land, K.C., McCall, P.L., and Cohen, L.E. (1990) "Structural Covariates of Homicide Rates: Are There Any Invariances Across Time and Space?" *American Journal of Sociology,* 95:922-963.

Lattimore, P.K., Riley, K.J., Trudeau, J., Leiter, J., and Edwards, S. (1997). *Homicide in Eight U.S. Cities: Trends, Context, and Policy Implications*. Washington, DC: National Institute of Justice, Office of Justice Programs, United States Department of Justice.

Liedka, R.V., Piehl, A.M., and Useem, B. (2006). The Crime Control Effect of Incarceration: Does Scale Matter? Criminology and Public Policy, 5, 245-276.

Levitt, S.D, (2004). "Understanding Why Crime Fell in the 1990s: Four Factors that Explain the Decline and Six that Do Not." *Journal of Economic Perspective*s 18 (1) 163-190.

Loeber, R., Farrington, D.P., Stouthamer-Loeber, M., Moffitt, T.E., and Caspi, A.E. (1998). "Development of Male Offending: Key Findings from the First Decade of the Pittsburgh Youth Study." *Studies on Crime and Crime Prevention*, 7:141-171.

MacDonald, J,M. (2002). "The Effectiveness of Community Policing in Reducing Urban Violence." *Crime and Delinquency*, 48, 592-618.

MacDonald, J.M. and Gover, A.R. (2005). "Concentrate Disadvantage and Youth-On-Youth Homicide: Assessing the Structural Covariates Over Time." *Homicide Studies*, 9(1):30-54.

Massey, D.S., and Denton, N. (1993). *American Apartheid: Segregation and the Making of the Underclass*. Cambridge, MA: Harvard University Press.

Massey, D.S., & Eggers, N.L. (1990). The Ecology of Inequality: Minorities and the Concentration of Poverty, 1970-1080. American Journal of Sociology, 95, 1153-1188.

McCall, P.L, Parker, K.F., & MacDonald, J.M. (2008). "The dynamic relationship between homicide rates and social, economic, and political factors from 1970-2000." *Social Science Research*, 37, 71-735, Elsevier.

McCleary, R., Hay, R.A., Meidinger, E. E., McDowall, D. (1980). *Applied Time Series Analysis for the Social Sciences.* Newbury Park, CA: Sage Publications.

McDowall, D. (2002). "Tests of Nonlinear Dynamics in U.S. Homicide Time-Series, and their Implications." *Criminology*, 40:711-735.

Messner, S.F., Deane, G.D., Anselin, L., and Pearson-Nelson, B. (2005). "Locating the Vanguard in Rising and Falling Homicide Rates across U.S. Cities." *Criminology*, 43(3):661-696.

Messner, S.F., Deane, G., and Beaulieu, M. (2002) "A Log-Multiplicative Association Model for Allocating Homicides with Unknown Victim-Offender Relationships." *Criminology,* 40:457-480.

Messner, S.F., Raffalovich, L.E., and McMillan, R. (2001). "Economic Deprivation and Changes in Homicide Arrest Rates for White and Black Youth, 1967-1998. A National Level Time-Series Analysis." *Criminology*, 16:21-44.

Molnar, B.E., Browne, A., Cerda, M., and Buka, S. (2005). "Violent Behavior by Girls Reporting Violent Victimization: A Prospective Study." *Archives of Pediatrics and Adolescent Medicine,* 159(6):731-739.

Moore, M.H., and Tonry, M. (1998). *Youth Violence*. Chicago: University of Chicago Press. pp. 27-64.

Morenoff, J.D. (In press). "Racial and Ethnic Disparities in Crime and Delinquency in the U.S." In Tienda. M., and Rutter, M (Eds.), *Ethnicity and Causal Mechanisms*. New York, NY: Cambridge University Press.

Mosher, C.J., Meithe, T.D., & Phillips, D.M. (20020. *The Mismeasure of Crime*. Sage, Thousand Oaks.

O'Brien, R.M., and Stockard, J. (2002). "Variations in Age-Specific Homicide Death Rates: A Cohort Explanation for Changes in the Age Distribution of Homicide Deaths." *Social Science Research*, 31:124-150.

O'Brien, R.M., Stockard, J., and Isaacson, L. (1999). "The Enduring Effects of Cohort Characteristics on Age-Specific Homicide Rates, 1960-1995." *American Journal of Sociology*, 104(4):1061-1095.

Office of Juvenile Justice and Delinquency Prevention (1997). *1995 National Youth Gang Survey*. Washington, DC: USDOJ.

Ousey, G.C. (2000). "Deindustrialization, Female-Headed Families, and Black and White Juvenile Homicide Rates, 1970-1990." *Sociological Inquiry*, 70:391-410.

Ousey, G.C., and Augustine, MC. (2001). "Young Guns: Examining Alternative Explanations of Juvenile Firearm Homicide Rates." *Criminology*, 39:933-967.

Ousey, G.C., and Lee, M. (2002). "Examining the Conditional Nature of the Illicit Drug Market-Homicide Relationship: A Partial Test of the Theory of Contingent Causation." *Criminology*, 40:73-102.

Pampel, F.C., and Gartner, R. (1995). "Age Structure, Socio-political Institutions, and National Homicide Rates." *European Sociological Review*, 11(3):243-260.

Pampel, F. and Williams, K.R. (2000) "Intimacy and Homicide: Compensating for Missing Data in the SHR." *Criminology,* 38:661-680.

Parker, R.N. (1995). "Bringing 'Booze' Back In: The Relationship Between Alcohol and Homicide." *Journal of Research in Crime and Delinquency*, 32:3-38.

Parker, R.N. and Cartmill, R.S. (1998). "U.S. Alcohol Consumption and Homicide, 1934-1995, or One Reason Why U.S. Violence Rates are Going Down." *Journal of Criminal Law and Criminology*, 88(4):1369-1398.

Parker, K.F., and McCall, P.L. (1999). "Structural Conditions and Racial Homicide Patterns: A Look at the Multiple Disadvantages in Urban Areas." *Criminology,* 37:447-477.

Parker, R.N., and Rebhun, L.A. (1995). *Alcohol and Homicide: A Deadly Combination of Two American Traditions*. New York, NY: SUNY Press.

Pepper, J.V. (2008). "Forecasting Crime: A City-Level Analysis." *Understanding Crime Trends: Workshop Report*, Washington, DC: Committee on Law and Justice. pp. 177-210.

Peterson, R., Krivo, L., and Harris, M.A. (2000). "Disadvantage and Neighborhood Violent Crime: Do Local Institutions Matter?" *Journal of Research in Crime and Delinquency*, 37:31-63.

Phillips, J. (1997). "Variation in African-American Homicide Rates: An Assessment of Potential Explanations." *Criminology*, 35:527-559.

Phillips, J.A. (2005). "The Relationship between Age Structure and Homicide Rates in the United States, 1970-1999." *Journal of Research in Crime and Delinquency*, 43(3):230-260.

Podesta, F. (2006). "Comparing Time Series Cross-Section Model Specifications: The Case of Welfare State Development." *Quality and Quantity*: 40: 539-559.

Police Executive Research Forum. (2006). Chief concerns: A Gathering Storm – Violent Crime in America. Washington, DC: Police Executive Research Forum.

Pridemore, W.A. (2002). "What We Know about Social Structure and Homicide: A Review of the Theoretical and Empirical Literature." *Violence and Victims*, 17:116-127.

Puzzanchera, C. (2009). *Juvenile Arrests 2008*. Juvenile Justice Bulletin, December 2009. Washington, DC: Office of Juvenile Justice and Delinquency Prevention, Office of Justice Programs, United States Department of Justice.

Raudenbush, S.W. and Bryk, A.S. (2002). *Hierarchical Linear Models: Applications and Data Analysis Methods*, 2nd Edition. Thousand Oaks, CA: Sage Publications.

Report of the 2004 Boston Youth Survey (August 2005). City of Boston, Massachusetts.

Regoeczi, W.C., and Riedel, M. (2003). "The Application of Missing Data Estimation Models to the Problem of Unknown Victim/Offender Relationships in Homicide Cases." *Journal of Quantitative Criminology*, 19:155-183.

Riedel, M. (1999). "Sources of Homicide Data: A Review and Comparison." In M.D. Smith and M.A. Xahn (Eds), *Homicide: A Sourcebook of Social Research*. Thousand Oaks, CA: Sage. pp. 75-95.

Rosenfeld, R. (2002). "Crime Decline in Context." *Contexts: Understanding People in their Social Worlds*, 1:25-34.

Rosenfeld, R., Foranango, R., & Baumer, E. (2005). "*Did Ceasefire, Compstat, and Exile reduce Homicide*?" Criminology & Public Policy 4, 419-450.

Rosenfeld, R., & Goldberger, A. S. (2008). Introduction. In R. Rosenfeld & A. S. Goldberger (Eds.), *Understanding crime trends: Workshop report* (pp. 1–11). Washington, DC: National Academies Press.

Ruggles, S. (1994). "The Origins of African-American Family Structure." *America Sociological Review*, 59:136-151.

Sampson, R.J. (1987). "Urban Black Violence: The Effect of Male Joblessness and Family Disruption." *American Journal of Sociology*, 93:348-382.

Sampson, R.J., and Groves, W.B. (1989). "Community Structure and Crime: Testing Social Disorganization Theory." *American Journal of Sociology*, 94:744-802.

Sampson, R.J., and Laub, J.H. (1993). "Structural Variations in Juvenile Court Processing: Inequality, the Underclass, and Social Control." *Law & Society Review*, 27:285-311.

Sampson, R..J. and Lauritsen, J. (1994). "Individual and Community Factors in Violent Offending and Victimization. In A.J. Reiss and J.A Roth (Eds.), *Understanding and Preventing Violence,* Vol. 3. Washington, DC: National Academy Press. pp. 1-1140.

Sampson, R.J., Morenoff, J.D., and Gannon-Rowley, T. (2002) "Assessing 'Neighborhood Effects': Social Processes and New Directions in Research." *Annual Review of Sociology*, 28:443-478.

Sampson, R.J., & Wilson, W.J. (1995). "Toward a Theory of Race, Crime and Urban Inequality." In J. Hagan and Peterson, R. (Eds.), *Crime and Inequality.* Stanford, CA: Stanford University Press. pp. 27-54.

Savolainen, J. (2000). "Relative Cohort Size and Age-Specific Arrest Rates: A Conditional Interpretation of the Easterlin Effect." *Criminology*, 38:117-136.

Shaw, C.R., & McKaym H., (1942). *Juvenile Delinquency and Urban Areas.* University of Chicago Press, Chicago.

Sheley, J.F. and Wright, J.D. (1995). *In the Line of Fire*. New York: Aldine de Gruyter.

Shihadeh, E.S., and Ousey, G.C. (1998). "Industrial Restructuring and Violence: The Link Between Entry-Level Jobs, Economic Deprivation, and Black and White Homicide." *Social Forces*, 77:185-206.

Shihadeh, E.S., and Steffensmeier, D.J. (1994). "Economic Inequality, Family Disruption, and Urban Black Violence: Cities as Units of Stratification and Social Control." *Social Forces*, 73:729-751.

Snyder, H.N. (2004). *Juvenile Arrests 2002*. Washington, DC: Office of Juvenile Justice and Delinquency Prevention.

Snyder, H., and Sickmund, M. (2006). *Juvenile Offenders and Victims: 2006 National Report*. Washington, DC: Office of Juvenile Justice and Delinquency Prevention, National Center for Juvenile Justice, U.S. Dept. of Justice.

Steffensmeier, D., and Harer, M.D. (1999). "Making Sense of Recent U.S. Crime Trends, 1980 to 1996/1998: Age Composition and Other Explanations." *Journal of Research in Crime and Delinquency*, 36:235-274.

Strom, K.J., and MacDonald, J.M. (In press). "The Influence of Social and Economic Disadvantage on Racial Patterns in Youth Homicide Over Time." *Homicide Studie*s, 11(1):50-69.

Thrasher, F. M. (1963). *The gang: A study of 1,313 gangs in Chicago* (Rev. ed.). Chicago: University of Chicago Press.

Tonry, M. (1995). *Malign Neglect: Race, Crime, and Punishment in America*. New York, NY: Oxford University Press.

Tonry, M., and Moore, M.H. (Eds). *Youth Violence*. Chicago: University of Chicago Press, pp. 27-64.

U.S. Census Bureau (2000). *Statistical Abstract of the United States: 2000* (12th Ed.). Washington, DC: U.S. Census Bureau.

Weisheit, R.A., and Wells, L.E. (2005). "Deadly Violence in the Heartland: Comparing Homicide Patterns in Nonmetropolitan and Metropolitan Counties." *Homicide Studies*, 9(1):55-80.

White, H.R., and Gorman, D.M. (2000). "Dynamics of the Drug-Crime Relationship." In G. LaFree (Ed.), *Criminal Justice 2000, Vol. 1, The Nature of Crime: Continuity and Change*. Washington, DC: National Institute of Justice, U.S. Department of Justice.

Whitten, I.H. and Frank, E. (2000). *Data Mining: Practical Machine Learning Tools and Techniques*. San Francisco: Morgan Kaufman.

Williams, K.R. (1984). "Economic Sources of Homicide: Reestimating the Effects of Poverty and Inequality." *American Sociological Review*, 49:283-289.

Williams, K.R., and Flewelling, R. (1987). "Family, Acquaintance, and Stranger Homicide: An Alternative Procedures for Rate Calculations." *Criminology*, 25:543-560.

Williams, K.R. and Flewelling, R. (1988). "The Social Production of Criminal Homicide: A Comparative Study of Disaggregated Homicide Rates in American Cities." *American Sociological Review,* 53:421-431.

Williams, K.R. and Parker, R.N. (2006). "Urban Structure and Urban Violence: Accounting for Variation of Youth Homicide Rates in 1980, 1990, and 2000." Paper presented at the annual meeting of the American Society of Criminology, Los Angeles, CA.

Wilson, W.J. (1987). *The Truly Disadvantaged*. Chicago: University of Chicago Press.

Wirth, L. (1930). *Urbanism as a Way of Life*. American Journal of Sociology, 44, 1-24.

Zinring, F.E. (2006). *The Great American Crime Decline*. New York: Oxford University Press.

Zimring, F.E., and Hawkins, G. (1997). *Crime is Not the Problem: Lethal Violence in America*. Oxford, U.K.: Oxford University Press.